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# Equity and Inclusion in Climate Action and Adaptation Plans of Michigan Cities

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**Abstract:** Community engagement in climate action and adaptation planning is an essential prerequisite for overcoming existing and projected environmental injustices associated with the negative impacts of climate change. The diversity and inclusion of stakeholders are crucial for addressing equity in both the development and implementation of local climate plans. Our study attempts to evaluate and compare consideration of equity in climate action and climate adaptation plans of Michigan cities and its association with the diversity of stakeholders involved in the planning process. Data analysis is based on the content of eight municipal climate action and/or climate adaptation plans, related documents, and interviews with city planners along with community activists. Data derived from the climate action and adaptation plans were also compared to the strategies outlined in the Tribal Climate Adaptation Menu, which integrates climate science and indigenous knowledge. The study concludes that municipalities that engage more diverse groups of stakeholders appear to be more attentive to social equity and more likely to offer specific climate action and adaptation measures focusing on vulnerable groups. The integration of indigenous knowledge could provide valuable insights for municipalities through collaboration with tribal communities and climate adaptation experts.

**Keywords:** adaptation; equity; diversity; urban; indigenous knowledge



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## 1. Introduction

To address the growing challenges of climate change, many communities in the United States and worldwide have been developing climate action and/or climate adaptation plans [1,2]. Climate action plans (CAPs) are mostly concerned with climate change mitigation, including reducing Greenhouse Gas (GHG) emissions and intentionally increasing carbon sinks through nature-based solutions, such as deforestation and urban gardens. On the other hand, climate adaptation planning seeks to reduce negative impacts of climate change and to take advantage of some of its benefits. Municipal climate planning efforts in the U.S. and internationally have been developing since the 1990s [3], leading to the creation of the Cool Cities Campaign, the Center for Climate Strategies, the C40 Cities Climate Leadership Group, the U.S. Conference of Mayors' Climate Protection Agreement, and the 100 Resilient Cities Network by the mid-2000s. Considerable progress has also been achieved in the U.S. federal climate policy, including the development of national adaptation plans focused on integrating federal, state, local, and tribal efforts on adaptation [4] into key sectors, the publication of five National Climate Assessment reports by the U.S. Global Change Research Program (USGCRP) [5], and, more recently, the Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad", and its Justice40 Initiative [6].

The scholarly literature on climate action and adaptation planning has also greatly evolved over the past decade. Since the late 2000s, there have been numerous national

and international studies on urban CAPs, comparing and evaluating their effectiveness in reducing carbon emissions and climate adaptation strategies [2,3,7–10]. Studies suggest that integrated climate action and adaptation plans (CAAPs) are becoming more popular as a way to balance climate change mitigation and adaptation priorities [8] and prevent maladaptations [9]. In some advanced economies, such as France and Japan, the development of integrative multi-sectoral climate action and adaptation plans by all municipalities is now a national policy requirement [10,11] guided by national guidelines. Despite this trend, few cities in the United States have both a CAP and a climate adaptation plan [7], but many CAPs now incorporate climate adaptation strategies. Historically, climate action and adaptation planning initiatives in the United States have been driven by the bottom-up approach by municipal, tribal, and state initiatives [12], and tend to be non-prescriptive and situational [13]. Due to the absence of uniform national guidelines, municipalities adopt their own methodological frameworks for evaluating human vulnerability and addressing climate justice [14]. As a result, there is an abundance of locally proposed strategies with limited implementation guidance [15] and no comparable frameworks for monitoring the equity and inclusion of stakeholders [16].

Michigan has recently positioned itself as a climate leader with its new Michigan Healthy Climate Plan [17], Clean Energy Future Package (Senate Bills 271, 273, 277, 502, and 519) [18], and the Clean Energy and Jobs Act (House Bills 5120 and 5121) [18]. The state is also home to numerous local plans, including CAPs and adaptation plans developed by cities, counties, and tribes. Therefore, Michigan provides an important case study for the entire nation. After the publication of the first Michigan Climate Action Plan [19], there was a spike in the development of local climate action and adaptation plans in 2011–2015. Currently, the interest in local climate planning is high again, stimulated by abundant funding opportunities for local climate planning projects that became available through the Inflation Reduction Act (IRA). The IRA funding allocated through the EPA Climate Pollution Reduction Grants Program aims to reduce U.S. GHG emissions by 40% by 2030 with a transition to renewable energy, while also supporting disadvantaged and vulnerable communities [20]. Since the end of 2023, this program has provided more than USD 250 million in grants to help states, major metropolitan areas, U.S. territories, and over 200 indigenous tribes develop local climate action plans, assess vulnerabilities, and ensure that vulnerable communities are included in the planning [20]. More specifically, the Justice40 Initiative requires that 40% of the overall benefits of investments in clean energy and energy efficiency, clean transit, affordable and sustainable housing, training and workforce development, the remediation of and reduction in legacy pollution, and the development of clean water infrastructure be directed to disadvantaged communities [6].

Low-income and BIPOC (Black, Indigenous, and People of Color) communities, elderly people, young children, pregnant women, and people with disabilities and/or health challenges are often more vulnerable to the negative impacts of climate change, such as heat waves, air pollution, wildfires, and other hazards. Their experiences, however, often remain underrepresented in climate planning because vulnerable populations face many barriers in contributing their voices due to a lack of time, resources, and systematic exclusion from decision-making. In the absence of national or state standards for equity and justice in climate adaptation planning, it remains unclear whether these existing and emerging plans address equity and climate justice [21]. This research study adopts the definition of equity as "the state, quality or ideal of being just, impartial and fair" [22]. This social concept is closely related to the legal term "justice", which offers a human rights perspective on climate change, acknowledging its social, economic, health, and other adverse impacts on the underprivileged population. There is a significant gap in understanding how the consideration of equity in climate planning is linked to the diversity and inclusion of stakeholders participating in the planning process [16]. Diversity involves various social categories based on class, gender, occupation, income, education, race, ethnicity, age, and ability. They may have very different levels of exposure and sensitivity to climate impacts as well as different levels of adaptive capacity [23]. Observable dimensions of diversity

include characteristics such as gender, race, ethnicity, and age, but can also include many other characteristics, such as education, socioeconomic background, immigration status, income, and various cultural associations (e.g., religion, ancestry, or social causes) [24]. Diversity is closely related to the concept of inclusion, which goes further than demographic representation because it involves an authentic sense of belonging [22].

The lack of authentic inclusion in climate planning is especially acute when it comes to overcoming barriers between indigenous communities and cities. Although Michigan is home to twelve federally acknowledged indigenous tribes that enjoy a special status under federal law and treaties, there are currently no mechanisms for coordinating climate action and adaptation planning between tribal and non-tribal communities. The Anishinaabe communities in Michigan and across the Great Lakes region have a long history of environmental stewardship, rooted in their ongoing relationships with the lands, waters, and other beings of the Great Lakes region. They maintain important traditional knowledge, shared across generations, including knowledge related to the recent changes in climate and ecosystems. In recent years, tribes have led important climate action efforts and, especially, climate adaptation planning across the state. For example, in 2014, the White House Climate Champions Program recognized the Sault Ste. Marie Tribe of Chippewa Indians as a Climate Action Champion. Two years later, the Inter-Tribal Council of Michigan, in collaboration with nine federally recognized tribes in Michigan developed and published the guiding document "Adapt: Collaborative Tribal Climate Adaptation Planning". The document connects tribal-driven climate change vulnerability assessments, identifies climate-sensitive tribal assets, and develops adaptation strategies to support coordinated tribal decision-making [25]. Another important document, Dibaginjigaadeg Anishinaabe Ezhitwaad (Tribal Climate Adaptation Menu), was published by the Great Lakes Indian Fish and Wildlife Commission in 2019, stressing that "many climate adaptation planning tools fail to address the unique needs, values, and cultures of indigenous communities" [26]. The Tribal Climate Adaptation Menu (TCAM), which was developed by a diverse group of collaborators representing tribal, academic, intertribal, and government entities in Minnesota, Wisconsin, and Michigan, provides a powerful framework to integrate indigenous knowledge, culture, language, and history, along with scientific data, into the climate adaptation planning process. Blending traditional knowledge, climate science, and environmental planning, this document is intended to empower not only tribal governments, but also federal and state agencies, as well as other organizations in the Great Lakes region to incorporate the Anishinaabe perspectives into a climate adaptation framework [26]. The strategies presented in this document provide important insights on adaptation planning that are equally relevant for non-indigenous communities. Climate change and many other ecological crises we face today are the result of the pervasiveness of the Western worldview in decision-making around the globe. While Western perspectives value exploration, domination, exploitation, and extraction, the Anishinaabe and other indigenous frameworks call for observation, deliberation, recognition, and adaptation. All localities, tribal and non-tribal, could benefit from practicing the "Etuamptmumk" (Two-Eyed Seeing) approach, which integrates both Western and Indigenous knowledge [27].

Using Michigan as a case study, our inquiry is driven by the following two questions:

- How have Michigan cities addressed equity in their climate plans across various sectors and what groups of stakeholders have been included in the planning process?
- How could the Two-Eyed Seeing approach being reflected in TCAM strategies help cities to improve their planning efforts?

Although this study focuses on Michigan, we hope that the proposed conceptual framework would make a useful contribution to the reanalysis of existing plans and the optimization of guidelines for local climate action and adaptation plans nationwide. Therefore, this research study has three interrelated objectives:

- To evaluate and compare consideration of equity in the climate action and adaptation plans of Michigan cities.

- To evaluate and compare the inclusion of various groups of stakeholders engaged in the development of existing and forthcoming climate action and adaptation plans in Michigan.
- To evaluate how the TCAM framework could inform and improve cities' climate adaptation planning strategies.

This article consists of five sections, including the introduction, methodology, results, discussion, and conclusion.

## 2. Methodology

### *2.1. Selection of Climate Action and Adaptation Plans*

Michigan is a state in the Upper Midwest region of the United States. With a population of over 10 million and an area of 250,490 square kilometers, Michigan is the 10th-largest state by population in the nation [28,29]. The state has recently positioned itself as a climate leader with its new Michigan Healthy Climate Plan [17], Clean Energy Future Package (Senate Bills 271, 273, 277, 502, and 519) [18], and Clean Energy and Jobs Act (House Bills 5120 and 5121) [18]. It is home to numerous local plans, including CAPs and adaptation plans developed by cities, counties, and tribes. Therefore, it provides an important case study for the entire nation. This study examines eight climate plans of seven cities in Michigan, including both CAPs/CAAPs and stand-alone adaptation plans (Table 1, Figure 1). The seven cities reviewed include Ann Arbor, Detroit, East Lansing, Grand Rapids, Marquette, Royal Oak, and Traverse City. For Traverse City, both a CAP [30] and a Climate Adaptation Case Study [31] were examined. The City of Grand Rapids' CAAP is expected to be published by December 2024 [32]. Therefore, only the planning process and engagement of stakeholders but not the content of the forthcoming Grand Rapids CAAP were examined. The choice of case studies aims to offer a good representation of Michigan's geography and chronological range of plans, including the oldest and the most recent plans between 2011 and 2022. It is, however, not intended to provide a comprehensive list of all local climate plans. This study focuses solely on CAPs/CAAPs and climate adaptation plans, intentionally excluding all other planning documents that sometimes mention but are not dedicated to climate preparedness. The research is limited to cities because 82% of the U.S. population live in urban areas. The share of urban population in Michigan is also 82%, with 4 out of 5 Michiganders residing in urban and suburban counties [29]. Cities in the U.S. and globally are both the main contributors to human-induced carbon emissions due their economic activity and leaders in climate change mitigation and adaptation [15,23,33].

**Table 1.** Climate action and/or climate adaptation plans of Michigan cities examined in this study.

| City | Title | Goals | Year |
|---|---|---|---|
| Ann Arbor | A2Zero: Ann Arbor Living Carbon Neutrality Plan | Mitigation with elements of adaptation | 2020 |
| Detroit | Detroit Climate Action Plan: Detroiters Working for Environmental Justice | Mitigation with elements of adaptation | 2017 |
| East Lansing | Climate Sustainability Plan: Meeting our Climate Action and Green Community Goals | Mitigation with elements of adaptation | 2012 |
| Grand Rapids | Climate Action and Adaptation Plan | Mitigation and adaptation | 2024 (expected) |
| Marquette | Adapting to Climate Change and Variability | Adaptation | 2013 |
| Royal Oak | Royal Oak Sustainability and Climate Action Plan | Mitigation and adaptation | 2022 |
| Traverse City | City of Traverse City Climate Action Plan | Mitigation | 2011 |
| | Climate Adaptation in the Great Lakes Region: A Case Study of Traverse City, Michigan | Adaptation | 2015 |


**Figure 1.** Michigan cities with climate action and/or climate adaptation plans examined in this study.

### *2.2. Assessment Framework for Equity and Diversity of Stakeholders*

Cities develop climate action and adaptation plans to mitigate their carbon emissions and to limit their vulnerability to increasingly inevitable negative impacts of climate change [8,34]. Therefore, the consideration of equity in climate adaptation is paramount to equitably reduce the vulnerability of all residents and neighborhoods [23]. In climate preparedness planning, equity implies planning strategies that eliminate disparities and create a physical and social environment that aims to ensure a fairer distribution of community resources along race, class, gender, and other dimensions of diversity [35]. Previous research in the United States [16] and in France [36] has led to the development of a quantitative system for assessing consideration of equity and inclusion of different groups of stakeholders in climate adaptation plans. Adopted from [16], where a more detailed theoretical foundation can be found, this framework is applied in this study with minor modifications. To evaluate the consideration of equity in climate plans, the following fourteen common sectors of climate action and adaptation planning were identified: emergency management, housing security, food security, water security, energy security, multimodality of mobility, energy decarbonization, access to urban green infrastructure, health and wellness, environmental education, access to water resources, air quality, waste management, and business/economic activity. The consideration of equity in each of these domains was evaluated on a scale from 0 to 4 (Table 2, column 2), based on the rubric adopted with minor modifications from [16,37].

**Table 2.** Evaluation rubric for equity in planning domains and inclusion of stakeholders.

| # | Consideration of Climate Equity in Each Adaptation Planning Domain | Diversity and Inclusion of Stakeholders |
|---|---|---|
| 0 | Planning domain is absent | None |
| 1 | Planning domain is present in general, but does not address equity measures | Participant (attended community meetings, participated in surveys or interviews, recognized in the plan) |
| 2 | Planning domain is present, and equity is mentioned as a value or aspirational goal but strategies for achieving equity are not explained | Content co-creator (contributed specific data and information, referenced in the plan) |
| 3 | Planning domain is present and strategies for achieving equity are explained | Collaborator (engaged in decision-making, acknowledged in the plan) |
| 4 | Planning domain is present and strategies for achieving equity are explained. Evaluation plan is provided. | Author/Co-author (listed on a cover page) |

To evaluate and compare the inclusion of stakeholders involved in the co-production of climate action and climate adaptation plans, twelve diverse groups of participants were identified. These were vulnerable groups, social justice advocacy groups, residents and their associations, environmental advocacy groups, colleges and universities, schools, citizen science groups, local elected officials, city planning and services, local businesses, state agencies, and external private firms. Their level of inclusion in the process of the co-creation of climate plans was evaluated on a scale from 0 to 4 (Table 2, column 3). Due to a wide chronological range of climate action and adaptation plans in the sample, the study aimed to examine consideration of equity-related objectives articulated across the plans rather than their implementation progress.

All climate plans were read, searched for specific keywords describing adaptation sectors/planning stakeholders, discussed, and rated by all five co-authors based on both rubrics. Ratings were discussed and documented with citations in Excel Microsoft 365 spreadsheets. When the readers disagreed, the ratings were reconciled through additional readings and discussions till consensus could be reached. The ratings were used to compute percentage scores for each city in order to compare and visualize the ratings for equity-centered climate action and adaptation measures, as well as for the diversity of stakeholders involved in the development of the plans.

Consideration of equity (CE) was calculated as $CE = \Sigma\,(x1,2,3...14)/56 \times 100\%$, where "x" is a number of possible adaptation planning sectors addressed in a plan, ranging from 1 to 14 examined categories, with consideration of equity in each rated on a scale from 0 to 4 based on the rubric (Table 2, column 1).

Inclusion of stakeholders (IS) was calculated as $IS = \Sigma\,(y1,2,3...12)/48 \times 100\%$, where "y" is a number of categories of stakeholders involved, ranging from 1 to 12 possible categories, and their engagement is rated on a scale from 0 to 4 based on the rubric (Table 2, column 2).

### *2.3. Interviews and Survey*

As an extension of the inclusion of stakeholders, the interest in which groups or individuals provided funding for the various plans was also a point of focus for this study. An online Qualtrics survey with questions about climate action and adaptation planning was sent in January 2023 to all agencies listed as the primary authors of the plans included in our study. The response level was low, possibly due to a wide publication date range of the plans. Being inconclusive, the survey results are not included in this analysis. To obtain more information about the planning process and to clarify questions remaining after our own evaluation of the plans, we conducted in-depth semi-structured interviews with sustainability officers (2), climate adaptation planners (1), and leaders of state and local environmental justice and climate action groups (2). The interviews

were conducted between 26 February and 4 April 2024 via Zoom. They were recorded, transcribed, and analyzed in MAXQDA 2022—a software program designed for computer-assisted qualitative data analysis. Each interview lasted approximately one hour and was based on eleven (11) questions about successes, challenges, and examples of equity goals and the inclusion of stakeholders in climate planning. These interactions have provided a rich tapestry of insights into the challenges and proactive measures shaping local policy and community involvement, and are summarized in Table 3.

**Table 3.** Summary of interview insights.

| Participant | Equity Consideration | Collaboration Across Sectors | Inclusion of Stakeholders | Funding Sources | Specific Actions or Goals |
|---|---|---|---|---|---|
| 1 | Equity and adaptation recently integrated more deeply. Formation of a community-steering committee shows a community-driven approach. | Focus on connecting housing to mobility and development of warming/cooling centers. Community-driven efforts highlighted. | Local officials and community groups' involvement emphasizes community-driven implementation. | Public and private funding with a focus on aligning with DEI goals. Highlights funding strategy aimed at equity. | Decarbonization and transportation improvements with community input. Reflects targeted action towards sustainability and equity. |
| 2 | Creation of equity frameworks for advisory teams to ensure decision-making includes equity. Partnership with C4 for diverse community voices. | Advisory teams with mixed expertise and resident experience for transportation planning. Emphasizes structured collaboration. | C4 ensures inclusion of diverse voices in planning. Reflects a partnership model for inclusivity. | Grants from foundations for projects indicate targeted funding approach. Partnership with C4 for specific community projects. | Sustainability and equity are key in the citywide strategic plan, indicating an integrated approach to planning. |
| 3 | Focus on initiatives like the '0' program for energy efficiency in low-income areas. Proactive community engagement for BIPOC inclusion. | BIPOC community engagement for input into planning through surveys and sessions. Specific efforts to engage underrepresented communities. | Efforts to include BIPOC communities through targeted engagement strategies. Focus on accessible participation. | Mentions possible federal funds without specifics. Indicates a need for exploring diverse funding sources. | Energy efficiency pilot projects in focus neighborhoods. Demonstrates actionable steps towards equity in climate action. |
| 4 | Each action in the climate plan has an equity section, emphasizing a systematic integration of equity across the board. | Wide range of stakeholders involved, including housing commissions, CBOs, and universities, illustrating an inclusive collaboration approach. | Rethought engagement for inclusivity with tactical models and targeted outreach. Engagement positions outside traditional settings. | Climate tax and philanthropic funding for community partners. Innovative funding approaches for community-based initiatives. | Actions include energy, circular economy, and comprehensive engagement. Highlights a holistic approach to climate action. |
| 5 | Prioritizations of equitable climate solutions by engaging with financially constrained communities, ensuring climate actions benefit those who need it the most. | Involvement in multi-city pilot programs, particularly in the area of waste management and sustainability. They also work with labor unions and housing commissions. | Advocating for union participation in green installations and fostering community engagement. Various stakeholders, including those from labor, housing, and marginalized communities, have a voice in climate action planning and implementation. | Utilized philanthropic funds for climate advocacy and has adapted to incorporate various public funding sources. Strategic use of county rebates and city mileages, which provided significant financial resources for Ann Arbor's sustainability office and their climate action efforts. | Actions include advocating for the development of affordable green housing projects, contributing to public policy for sustainable city planning, and engaging in community projects such as the establishment of resilience hubs and tree-planting campaigns to mitigate the heat island effect and enhance urban green spaces. |

## 3. Results and Discussion

The results of our assessment of equity consideration in all municipal CAPs/CAAPs are summarized in Figure 2. Based on the consideration of equity calculations, the City of Ann Arbor "A2Zero Plan" [38] received by far the highest score (54%) and clearly stands out among the other plans based on the number of included sectors addressed, and the consideration of equity in each individual sector. Areas of particular strength of "A2Zero" include housing, energy decarbonization, waste management, multimodal

transportation, and health and wellness (Figure 3a). Equity measures related to air quality, food security, and business/economic activity are also present but with fewer details about their implementation. Ann Arbor has a population of 123,349 [39], ranking as the fifth most populous city in Michigan. Best known as home to the University of Michigan, Ann Arbor is a vibrant high-capacity college town with a median income of USD 78,546 per household and USD 52,276 per capita [40], much higher than the state and national average. Nevertheless, Ann Arbor's poverty rate is 23.3%, twice as high as the national average of 11.5% [40].

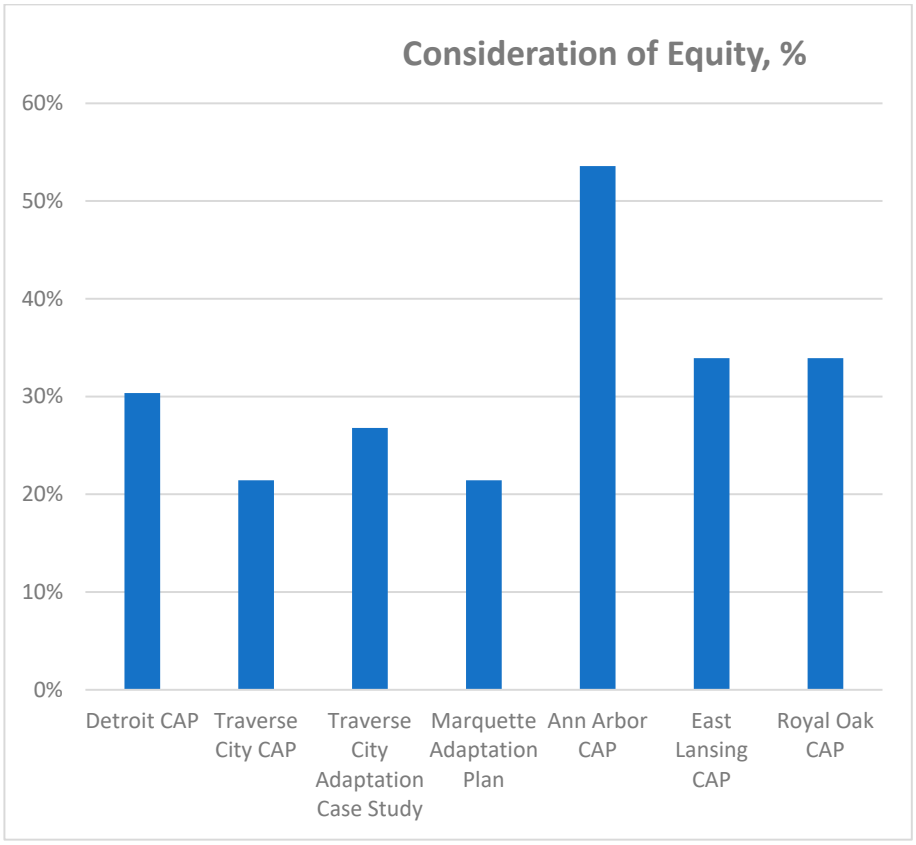


**Figure 2.** Consideration of equity in climate plans of Michigan cities.

Based on our computation of CE, it ranges in all plans between 21% and 33% (Figure 2). A closer examination of CE in specific sectors reveals significant differences in the cities' climate planning priorities. For example, the Detroit Climate Action Plan [41] discusses equity in business/economic opportunities and community environmental education. It also mentions, without elaborating details, equity in air quality and housing security, but omits some other sectors. Detroit is the largest city in Michigan, with a population of 620,376 [42]. In a striking contrast with Ann Arbor, Detroit's median household income and per capita income are only USD 37,761 and USD 22,861, respectively, and the city is associated with one of the highest urban poverty rates (31.5%) in the country [42]. On the other hand, the CAP of Traverse City [30] pays attention to equity in energy security, while the Climate Adaptation Case Study of Traverse City [31] considers equity in access to quality of water resources. Traverse City is a small city with a population of 15,702, enjoying a median household income of USD 70,700 and a per capita income of USD 48,883 [43]. An important tourist destination, the city is reputable for its exceptional quality of life, natural beauty, and the presence of numerous environmental advocacy groups. Its poverty rate (11%) is lower than the state and national averages [43]. The CAP of East Lansing considers equity in access to green infrastructure, while Marquette's adaptation plan prioritizes

equitable environmental education and health/wellness. The CAP of Royal Oak mentions CE in the context of its energy security and multimodality goals.

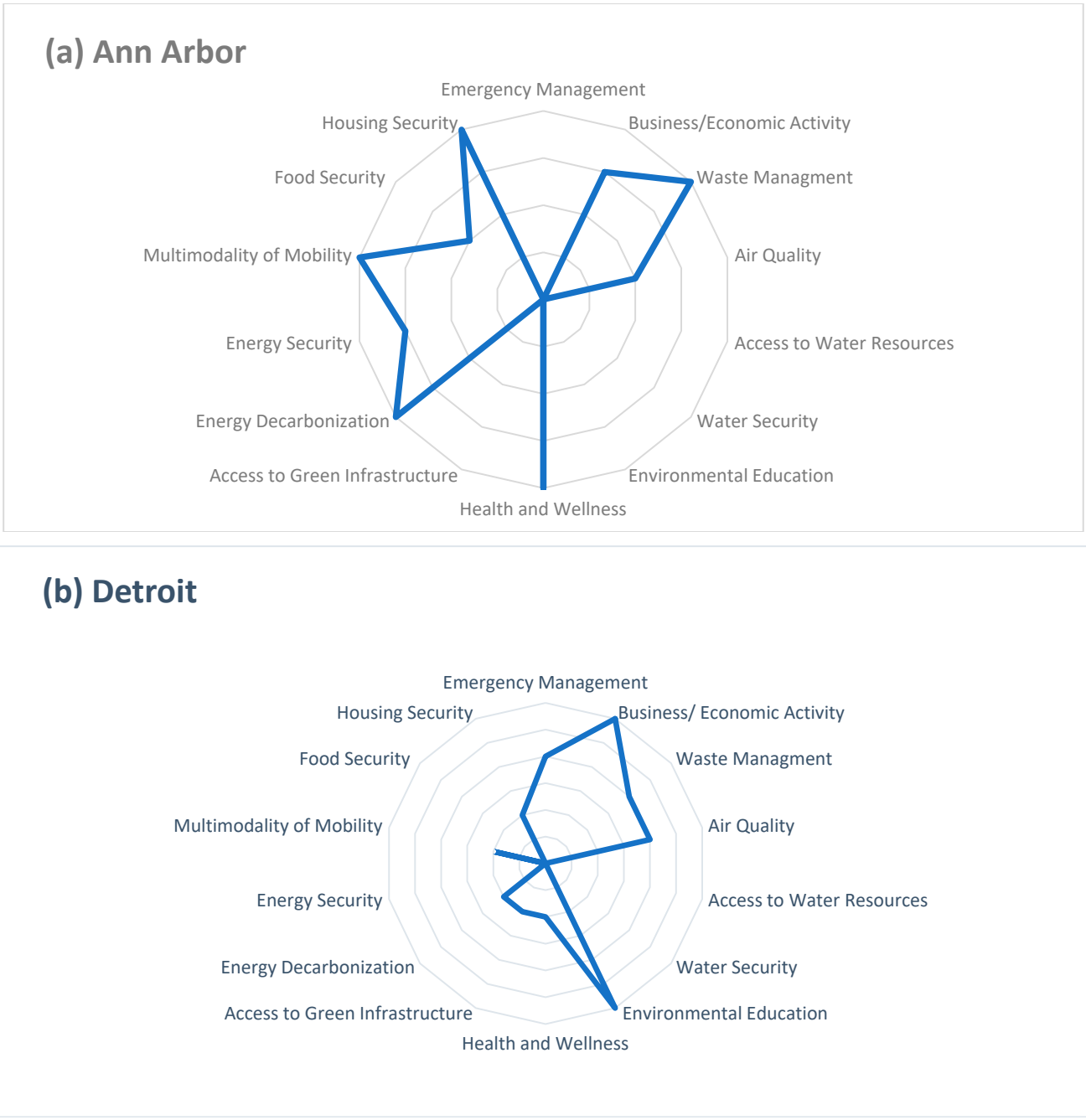


**Figure 3.** Examples of CE in (**a**) Ann Arbor and (**b**) Detroit CAPs.

Although almost all climate plans in our study acknowledge the importance of equity, very few of them offer concrete steps for achieving it. Most plans include statements about the disproportionate impacts of climate change on vulnerable populations and the importance of environmental justice, but do not offer clear strategies for addressing these issues. This finding echoes the concerns raised by stakeholders during the interviews, emphasizing the need for more substantive equity considerations in planning processes. Affordable housing, energy decarbonization and efficiency, multi-modal transportation, and nature-based solutions through the expansion of infrastructure emerge as sectors where equity considerations are beginning to take shape concretely in some CAPs. Initiatives aimed at improving energy efficiency in low-income neighborhoods and enhancing mobility

through affordable electric vehicle programs reflect an attempt to align climate action with equity goals. However, the effectiveness and reach of these initiatives remain subjects for further evaluation.

Scholarly studies worldwide indicate that CE in climate adaptation goals often goes hand in hand with the diversity of stakeholders engaged in the development of climate plans and the representation of their priorities [14,23]. Our computation of IS in the development of climate plans in Michigan appears to confirm this connection (Figure 4). The IS scores of Ann Arbor's and Detroit's CAPs stand out at 60% and 58%, respectively, followed by other plans with scores below 40%.

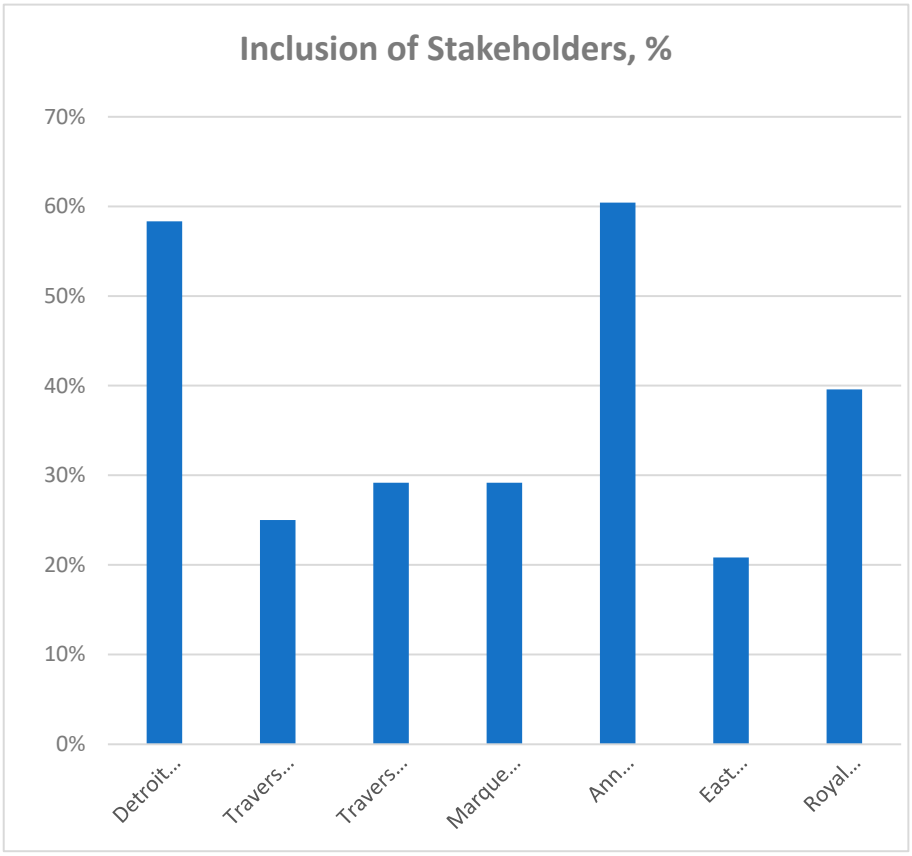


**Figure 4.** Diversity of stakeholders in all CAPs/CAAPs.

Higher scores reflect both broader coalitions of stakeholders involved in the developments of plans and their higher levels of engagement. For example, the CAPs of Ann Arbor and Detroit reflect the collaboration of city planning staff with social justice advocacy groups, universities, local businesses, and environmental advocacy groups (Figure 5b).

City planning services, social justice groups, and environmental advocacy groups led or were actively engaged in the development of most plans. On the other hand, the engagement of residents, vulnerable groups, local businesses, and academia varied significantly from plan to plan. Efforts to engage diverse community stakeholders, particularly those from marginalized and vulnerable groups, were frequently mentioned in the climate plans and in the interviews. However, the extent to which these efforts have influenced planning strategies varies. Overall, plans developed by more diverse coalitions of stakeholders and with more prominent roles of advocacy groups, such as Ann Arbor and Detroit CAPs, tend to prioritize equity in their goals. It is possible that more demographically diverse and/or more politically progressive cities make more intentional efforts to address diversity, equity, and inclusion in city planning. Further research, the quantitative analysis of demographic, social, political, and economic factors is needed to test these relationships quantitatively. More recent plans developed in the past 6–7 years tend to include more diverse stakehold-

ers and provide more information about equity in their adaptation goals. This is a very positive sign, indicating that communities learn from the evolving body of knowledge over time. The interviews highlighted initiatives like the Community Collaborative on Climate Change (C4) in Grand Rapids as a positive example of collaboration between city planners and diverse community ambassadors. These C4 ambassadors are climate activists from all neighborhoods in the City of Grand Rapids who contribute their lived experience, connection to place, and community knowledge. Working in a shared leadership model, they facilitate and communicate with groups of people with diverse interests and from diverse backgrounds, with a goal to dismantle climate injustice. C4 project coordinators and ambassadors facilitate community conversations about the intersectionality of climate justice, environmental justice, racial equity, and accessibility to resources to ensure transparency in CAP decision-making.

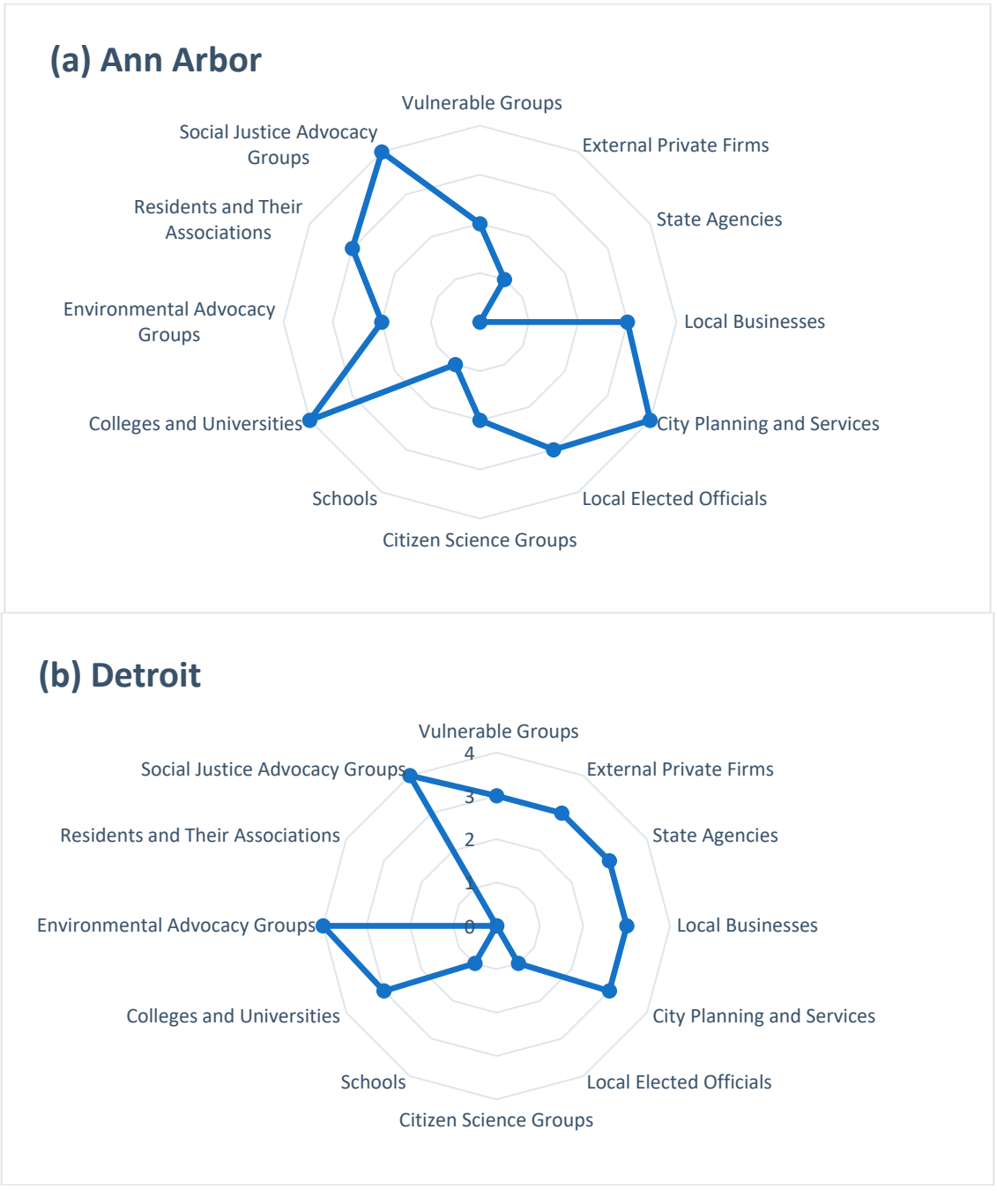


**Figure 5.** Groups of stakeholders engaged in (**a**) Ann Arbor and (**b**) Detroit CAPs.

Yet, there remains a gap between engaging minority voices and ensuring these voices shape decision-making processes effectively in all climate plans. Interviews with stakeholders also identified financial resources as critical to developing and implementing climate action plans, with a mix of federal grants, state funding, and private philanthropy playing roles. One of the most consistent themes was the challenge of securing funding that specifically targets equity goals within climate action initiatives, which is mostly due to the lack of time and personnel dedicated to grant writing. The need for dedicated staff and resources to implement plans was also emphasized by all respondents, pointing to a broader issue of capacity within municipal governments to tackle climate change in an equitable manner. Unfortunately, none of the Michigan cities examined in our study acknowledged indigenous people, their land, their sovereign rights, or their ecological knowledge. The twelve federally acknowledged native American tribes that share their land with the State of Michigan enjoy a special status under federal law and treaties [44]. They are sovereign nations that exercise direct jurisdiction over their members and territory and, under some circumstances, over other citizens residing on their land. Tribal governments provide a wide array of governmental services to their members, including climate change mitigation and adaptation planning. Dibaginjigaadeg Anishinaabe Ezhitwaad [26], in particular, provides a powerful blueprint for tribal and non-tribal communities interested in indigenous approaches to climate adaptation and the needs and values of tribal communities. Organized in a flexible multi-level framework, the Menu outlines fourteen strategies, over fifty approaches, and over one hundred implementation tactics, developed through focus group discussions, workshops, and the assessment of existing climate adaptation tools. Municipal CAPs are missing strategies and goals related to cultural practices, traditions, spiritual guidance, reciprocity with non-human beings, and maintaining a respectful relationship with nature. Such concepts, however, are foundational in tribal adaptation planning [26] and indigenous culture in general. Indigenous ethics expands the definition of "community" to include not only humans, but also soils, waters, plants, animals, and spiritual beings. It is a moral code of conduct based on human kinship with nature, which is a centerpiece of indigenous and many other non-Western cultures [45]. Cities such as Marquette, Traverse City, and Grand Rapids are located in close proximity to native communities who have already developed their own climate adaptation plans, such as the Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians Climate Adaptation Plan [46], and/or have integrated climate change adaptation into their Hazard Mitigation Plans [47,48]. The Anishinaabe philosophy, recognizing the intrinsic value of the environment, is urgently needed today to overcome the climate crisis [49]. Further research is needed to examine opportunities for Etuapmumk (the Two-Eyed Seeing Approach) to integrate modern science and indigenous knowledge and cultural practices into environmental action [27]. Indigenous and traditional knowledge strategies are absent across all municipal plans, with little collaboration with tribal stakeholders. This gap underscores a critical area for future investigation: policies that could encourage the "Two-Eyed Seeing Approach", collaboration with tribal entities, and the holistic integration of Western and indigenous frameworks into local climate action and adaptation plans. Further research is necessary to develop methodologies that effectively integrate indigenous perspectives, engage tribal experts, and honor culturally appropriate practices.

The interpretation of these findings requires a deeper analysis of the cultural, environmental, demographic, social, and economic factors contributing to community preparedness in relation to climate change. More effective articulation of specific goals relevant for each community would be possible only with deeper analysis of their unique vulnerability profiles, truly inclusive of all groups of stakeholders. Future efforts are needed to explore and develop mechanisms for enhancing the engagement of diverse stakeholder groups, including underrepresented BIPOC communities, in the planning process in Michigan and nationwide. This could include developing participatory planning frameworks that ensure all voices are heard and valued. There is a need for longitudinal studies to evaluate the implementation and outcomes of climate action and adaptation plans. Such research would

provide insights into the effectiveness of different strategies over time, including those inspired by Indigenous knowledge. Future research should consider cross-comparative national and international studies of municipalities that have incorporated Indigenous and traditional knowledge in their climate plans and those that have not. This would offer empirical evidence of the impact of such integration on climate resilience and social equity.

## 4. Conclusions

Michigan's approach to climate action is notably fragmented, with only a select few cities having dedicated climate action and/or climate adaptation plans. These existing plans lack cohesion and uniformity, representing the decentralized nature of climate governance in the United States. This results in a patchwork of strategies that may fail to address the environmental challenges facing the state and its regions effectively. To make meaningful progress towards climate goals, Michigan and all other states must bolster support and provide guidelines and peer-learning opportunities to harmonize local initiatives with statewide objectives. This would require the development of comprehensive state-wide and national standards for climate adaptation planning, creating policies to encourage climate adaptation planning nationwide, and providing adequate resources for local governments.

Based on our interviews, there is a pronounced need for additional funding, training, and staffing support at the local level, especially with regard to organizing meaningful community engagement and compensating community members for their time, which is often diverted from paid work and family time. Individual communities within the same city have unique needs that, if met with adequate resources and support, could lead to impactful changes at the local level, significantly benefiting the entire community. Another critical gap in current climate plans is the lack of DEI standards. This omission can reduce the effectiveness of climate action and adaptation strategies by not fully addressing the needs of all community members, especially the most vulnerable groups. The integration of DEI principles is vital, echoing findings from both national and international studies that advocate for an inclusive approach to environmental sustainability, one that acknowledges the diverse impacts of climate change on different demographic groups.

Recent federal and state initiatives have provided significant funding for climate action, presenting a valuable opportunity for cities. However, cities' abilities to fully capitalize on these funds are often hampered by insufficient infrastructure, expertise, or planning capacity. Enhancing the capabilities of local governments through training and resource provision is essential to ensure these funds are utilized effectively to enhance climate resilience. It is important to keep in mind that the share of small and mid-size cities with climate adaptation plans in the U.S. is still substantially lower than other developed countries, e.g., the United Kingdom, European Union members, Australia, and New Zealand. There is a clear urgent need for nationwide climate adaptation policies, guidelines, standards, and incentives for state and local governments to get on board.

Since the initial publications of the first climate plans by Michigan communities, there has been a notable improvement in the incorporation of diverse stakeholders and equity concerns in their goals. This evolution indicates a growing recognition of the importance of these factors in effective climate planning. However, none of the municipal plans have included tribal stakeholders, and cities could learn valuable lessons in coordinated climate adaptation planning from Native American tribes. These communities use a blend of traditional knowledge and modern science in their approaches, particularly through the "Two-Eyed Seeing" approach, which merges Indigenous and Western knowledge systems to create comprehensive and culturally sensitive solutions. There is no evidence of such collaborative practices in municipal plans, which is a missed opportunity for gaining deeper insights and fostering partnerships.

To our knowledge, this is the first regional study providing a systematic evaluation of climate plans in Michigan and the Upper Midwest. It offers a valuable contribution to the literature on equity and inclusion in climate action and adaptation planning by offering insights from seven cities facing diverse climate impacts and non-climatic challenges. Fur-

thermore, it is among the few studies questioning the current status quo of the segregation of municipal and tribal adaptation planning rooted in centuries of discrimination and mistrust. While there is a growing body of knowledge on tribal climate planning [50,51], building bridges between municipal and tribal climate adaptation planning remains a monumental task that would benefit our society as a whole.

These findings resonate with broader trends identified in the national and global scholarly literature [2]. The recognition of equity as a crucial component of climate action is gaining traction globally, with cities around the world increasingly seeking to integrate social justice into their climate strategies [52]. However, the translation of equity from a conceptual consideration to a concrete element of planning and implementation remains a significant challenge. Other studies emphasize the importance of meaningful community engagement, transparent decision-making processes, and targeted financial support to ensure equity considerations lead to actionable outcomes [21]. Moreover, these findings underline the importance of local contexts in shaping climate action plans, recognizing that different communities face different challenges. As a large Midwestern state with advanced local and state climate policies, Michigan is not unique in facing the challenges revealed in our study. Most of our findings and recommendations are applicable nationwide and beyond. These recommendations are as follows:

- Develop and enforce state and national guidelines that include DEI standards to ensure uniformity while allowing for adaptations to local conditions.
- Improve the capability of local governments to manage and implement climate strategies through comprehensive training and resources.
- Promote regional fora for cities, such as the Midwest Climate Resilience Conference and the Great Lakes Adaptation Forum, to share best practices and lessons learned, as well as promote a collaborative atmosphere that expedites the adoption of effective climate solutions.
- Establish formal collaboration frameworks between cities and tribal governments to ensure climate strategies are respectful and integrative of traditional ecological knowledge.
- Develop participatory planning processes, similar to C4 in Grand Rapids, MI, that actively involve all community members, especially underrepresented groups, to ensure that diverse perspectives are considered in climate planning.
- Shift focus from planning to execution, with robust mechanisms to monitor and evaluate the impact of climate strategies, allowing for continuous feedback and improvement.

Our study demonstrates that while cities are advancing in their climate action and adaptation strategies, there is a substantial opportunity to improve these initiatives by more thoroughly integrating equity considerations and Indigenous knowledge. This approach not only broadens stakeholder engagement, including pivotal contributions from Indigenous communities, but also ensures that climate strategies are both comprehensive and culturally attuned. The "Tribal Climate Adaptation Menu", among other documents developed by tribal groups across North America, provides an essential framework for embedding Indigenous perspectives into climate adaptation planning. Municipalities that adopt this framework could achieve a more integrated approach to climate action. As municipal strategies evolve, incorporating traditional knowledge and practices can effectively address today's environmental challenges while respecting and preserving Indigenous cultural heritage.

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