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Abstract

In all likelihood, climate change will be the most challenging environmental problem that society will face in the new century. Despite growing scientific evidence that climate change is taking place, skepticism still exists about whether it is actually occurring and, if it is, whether increased greenhouse gas emissions will have a significant adverse impact on the ecosystem. Unless divergent actor groups are able to establish a dialogue on these issues, meaningful discussions about the causes and effects of climate change will not take place, government action will not be forthcoming, and additional harm to the ecosystem will occur. This, in turn, will place an impediment in front of public and private efforts to promote sustainability, making it even that much more difficult to reverse course and adopt needed changes to energy production and consumption in the future. This paper contributes to the emerging scholarly discussion around the dimensions of climate change communication by conducting a stakeholder-focused analysis concerning climate change at the local level. The paper draws upon a theoretical framework developed by Sabatier et al. (2005) to analyze stakeholder involvement in collaborative watershed management, and applies the framework to climate change policymaking in American cities. A major goal of the study is to assess the value of this framework for analyzing the nature and extent of interactions between the major players involved in climate change mitigation and adaptation at the local level. Developing an effective stakeholder framework can help us to understand the multifaceted stakeholder dynamics around climate change communication at the municipal level and can be a critical contribution to theory and, subsequently, to policymaking by helping decision makers become aware and knowledgeable about their constraints and opportunities in addressing climate change within the urban context. Overall, research on climate change policymaking by cities is underdeveloped, and this paper adds to this literature.

Keywords: climate change, collaborative management, cities, GHG mitigation, stakeholder engagement

While research is still ongoing, a broad consensus in the scientific community has emerged concerning how human activity is contributing to climate change (IPCC 2013). Despite convincing scientific evidence that climate change is taking place and that human activity is a primary cause of increasing greenhouse gas (GHG) emissions, the federal government has done very little to control effectively GHG emissions. In response to federal government inaction on this pressing issue, a number of cities (and states) have taken the lead and have adopted climate change policies and programs themselves (Krause 2010, 2011; Mazmanian and Kraft 2009; Portney 2013; Posner 2010; Rabe 2010).

Municipal action to improve air quality through the reduction of carbon emissions contributes to broader sustainable communities initiatives (Portney 2013). According to Portney (2013), creating a sustainable city implies a concerted effort to reduce environmental externalities created by economic development and a commitment to maintaining a level of environmental quality for the benefit of future generations. Localities that seek to reduce GHG emissions by enacting policies that improve energy efficiency, waste management practices, and transportation networks all contribute to local efforts to achieve sustainability. Thus, the reduction of GHG emissions through the implementation of climate change policy can be considered an environmental movement unto itself as well as a valuable component of the broader sustainability movement.

A major reason why some cities have developed climate change programs and others have not is likely due to, among other things, the nature of interactions between diverse stakeholders and the contexts in which they occur (Daley et al. 2013; Portney and Berry 2010). These stakeholders have a direct or indirect vested interest in approaches that can reduce GHG emissions within their locality. This paper contributes to the emerging scholarly discussion around the dimensions of climate change communication by conducting a stakeholder-focused analysis concerning climate change at the local level. Generally speaking, too little research has been done specifically on climate change policymaking in municipalities, and this paper adds to this literature. Much of the current research examines "issue framing" around climate change (Guber and Bosso 2013; Kamieniecki 2006; Kraft and Kamieniecki 2007). This study moves this scholarship forward by specifically linking the emergent role of social science analysis to an examination of critical stakeholder groups engaged (or who should be engaged) in the discourse around climate change. This goal is accomplished by extending the stakeholder framework initially developed by Sabatier et al. (2005) in their research on watershed management to an analysis of climate change policymaking in American cities.

While the climate change problem presents a unique, complex array of challenges for stakeholder engagement, such engagement is essential in order to bring together a variety of important policy interests to craft innovative solutions to environmental issues at the local level. Developing an effective stakeholder framework can help us to understand the multifaceted stakeholder dynamics around climate change communication at the municipal level and can be a critical contribution to theory and, subsequently, to policymaking by helping decision makers become aware and knowledgeable about their constraints and opportunities in addressing climate change within their urban context. A major goal of this inquiry, therefore, is to present and evaluate a possible conceptual framework for stakeholder interactions involving climate change

mitigation and adaptation in various American cities.

A possible framework for stakeholder engagement in climate change policy

A potentially valuable framework for analyzing stakeholder interactions in climate change policymaking at the local level is found in Sabatier et al. (2005). Building on their comprehensive analysis of stakeholder interests in watershed management, Fig. 1 outlines a promising conceptual framework for understanding the variables influencing collaborative climate change policymaking in municipalities in the USA. Antecedent variables are identified at the top and include the socioeconomic, civic, ecological, and government institutional conditions prior to partnership arrangements. These include the economic and social structure of an urban area, preexisting social networks, the severity of different environmental and socioeconomic problems, and the set of governmental institutions (Sabatier et al. 2005).

Fig. 1
A framework for climate change policy at the local level adapted from Sabatier et al. (2005, 286)
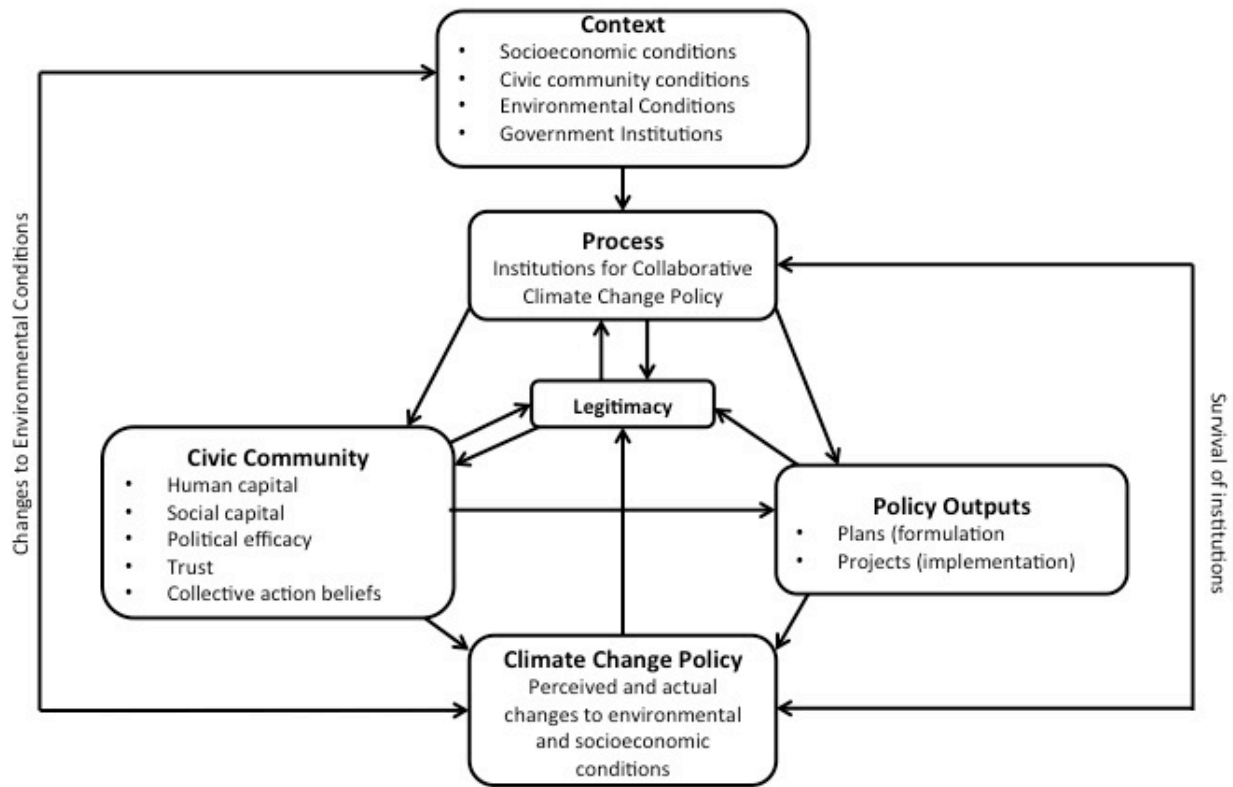
The framework depicted in Fig. 1 has the potential to explain the type of collaborative climate change management approach that will surface, as well as its likelihood of success. For instance, cities composed of widely scattered, fairly transient populations with broad ideological differences are less likely to be successful than smaller, more stable, and more homogeneous localities. Municipalities facing challenging situations are likely to be very distrustful and thus

insist on a variety of procedural rules and norms to protect each group's interest. At the same time, more successful cities will likely have substantial amounts of trust and social capital (networks) to build on and thus will need less elaborate procedural rules (Daley et al. 2013; Sabatier et al. 2005).

Drawing on the work of Ostrom (1990, 1999), Sabatier et al. (2005) treat a collaborative process as essentially a set of guidelines concerning the types of participants, their entry and exit from the deliberations, their authority to undertake certain duties and responsibilities, and how their actions lead to policy outcomes. Context factors then interact with processes to produce both civic community and policy outputs. Civic community and policy outputs interact to influence real and perceived conditions, both environmental (e.g., GHG emissions) and socioeconomic (e.g., unemployment rates and economic growth).

One causal pathway leads from process and context to civic community, which includes human capital (e.g., knowledge about climate change conditions), social capital (e.g., networks of reciprocity), trust of others, legitimacy concerns, and attitudes toward collective action (Sabatier et al. 2005). These urban community variables are conceived as both an end in themselves and a means to improve climate change policy outputs. Sabatier et al. (2005) assume, as we do, that increasing trust and networks of reciprocity in a community is desirable, even if it does not lead to significant environmental protection. They also hypothesize that a collaborative effort that increases trust and social reciprocity is more likely to result in environmental management plans and specific pollution control (GHG emissions in our case) than one that does not. In addition, they hypothesize that agreeing on a plan or a GHG reduction project feeds back into enhanced trust because it indicates that stakeholders resolve many of their differences if they take the time to listen carefully to the concerns of others and recommended solutions compatible to the interests of others, and honor agreements.

After completing their empirical analysis of watershed management, Sabatier et al. (2005) conclude that collaborative institutions and their policy outputs and perceived watershed outcomes contribute to the legitimacy of watershed policymaking, along both procedural and substantive dimensions. At the end of their book, they move legitimacy out of the civic community box (its hypothesized location at the beginning of their analysis) and establish its own independent model element. As shown in Fig. 1, legitimacy has a reciprocal relationship with other civic community factors and collaborative processes, and it is affected by policy outputs and watershed outcomes. They conclude that procedural legitimacy and substantive legitimacy in interrelated ways contribute to the survival of watershed collaborations, at least in the short or medium term. Based on the findings of their study, the researchers also decided to remove an arrow between policy outputs and civic community. Otherwise, the results of their investigation support the hypotheses reflected in the relationships presented in Fig. 1.

Before beginning the analysis, it is worth briefly noting the differences between watershed management and the climate change issue since such differences might influence the applicability of certain facets of the framework used by Sabatier et al. (2005) to climate change policymaking. Perhaps the major difference is that watershed management is inherently a local or regional issue while climate change is primarily a national and global issue. While the benefit from a reduction in GHG emissions are shared by the earth's population, local water policy

initiatives and implementation efforts primarily affect a particular local or regional population. Even though watershed management involves federal laws and regulations, most of the time watershed protection policy formulation and implementation takes place at the local or regional level. This will influence the types of stakeholders that are most concerned about the two policy issues. In contrast, efforts to control GHG emissions into the earth's atmosphere must actively involve national and international governments and bodies, though cities can and do contribute in meaningful ways. Similarly, national interest groups tend to be more engaged in the climate change debate, while local interest groups normally participate in conflicts over water in particular locations. The characteristics of the climate change issue are likely to limit the interest of federal agencies in organizing or participating in municipal-level policy formulation. Furthermore, the necessary involvement of federal institutions in managing the effects of climate change, and the need for federal regulatory mandates to mitigate its causes, may limit the incentive for national actors to invest in policy decisions at the municipal level. In contrast, the water quality issue involves multiple local actors, as well as state and federal-level institutions that have an interest in maintaining, mitigating, and enforcing the causes of impairment. Unlike the climate change issue, often the state and federal government hold some form of property rights to the use of freshwater resources, creating the necessity for their participation in decision-making processes. Overall, however, both watershed management and climate change policy are important core environmental issues. Keeping these differences in mind, the remainder of the paper applies the conceptual framework developed by Sabatier et al. (2005) and reported in Fig. 1 to build a theory of stakeholder engagement in climate change policy in various American cities.

Methodology

This study employs both quantitative and qualitative approaches in determining the applicability of the framework created by Sabatier et al. (2005) to identifying and analyzing patterns and outcomes of stakeholder involvement in climate change decision making in different American cities. Such a mixed methods approach was necessary because of the different types of variables that must be examined in applying the various aspects of the framework produced by Sabatier et al. (2005) within the climate change policy context at the local level. Great care was taken to make sure that the most appropriate indicators of the individual concepts introduced in the work by Sabatier et al. (2005) were used in analyzing stakeholder engagement in climate change policymaking in municipalities.

The quantitative segment of the study involved the selection of 15 cities that have a population >100,000 based on the 2010 US Census and that differed in their geographical location and their overall level of commitment to addressing the climate change problem. In order to ensure geographical distribution and representation in our analysis of stakeholder participation in climate change policymaking in municipalities across the USA, we selected three cities from each of five identified regions, specifically, the west, southwest, midwest, southeast, and the northeast. In addition, cities also were selected based on differences across three climate protection policy categories, specifically, cities that have taken significant action regarding the implementation of climate protection policy, cities that have taken some action to address climate change, and municipalities that have taken no explicit action to reduce GHG emissions at the local level. Cities placed in the "Significant Action" category were those that have signed the

US Conference of Mayors Climate Protection Agreement (CMCPA), [1] joined the International Council for Local Environmental Initiatives (ICLEI)—Local Governments for Sustainability USA, and completed the five milestones[2] of the ICLEI Climate Protection Program (ICLEI 2010). Cities placed in the "Some Action" category were those that have signed the CMCPA, joined the ICLEI and completed up to three of the five milestones of the ICLEI climate change program (ICLEI 2010). Cities that have not signed the CMCPA and have not joined the ICLEI, nor participated in other national networks to mitigate climate change through GHG emissions reductions at the local level were placed in the "No Action" category.

When given a choice, we selected cities with the largest populations from each region. In cases where more than one city from a single state were selected using this approach, a city from another state in the same region was substituted in one or more of the three categories of level of policy commitment. After the final 15 cities were chosen using this approach, we applied the conceptual framework developed by Sabatier et al. (2005) to stakeholder activities in climate change policymaking by investigating aspects of the six components (Context, Process, Legitimacy, Civic Community, Policy Outputs, and Policy) within each city examined in the study.

By selecting a sample of cities that have either not taken action, taken some action, or have taken significant action to reduce GHG emissions, we are able to compare the differences in the antecedent factors that are likely to play a significant role in the development of climate protection policy and subsequent collaborative management institutions. Additionally, the sample of cities that have taken significant action enables a more focused investigation of the collaborative management processes that form policy alternatives and adopt and implement climate change policy solutions at the municipal level. Table 1 reports the cities that are included in this analysis by geographical location and level of climate change policy support. These cities will permit us to evaluate the applicability of particular, quantitative-based aspects of the framework created by Sabatier et al. (2005) to the climate change policy issue. Due to the nature of other concepts in Sabatier et al. (2005) framework, a qualitative inquiry will be required.

Table 1. Cities Included in the Study

Region	Have Taken Significant Action	Have Taken Some Action	Have Taken No Action
West	Denver, CO	Las Vegas, NV	Fresno, CA
Southwest	Austin, TX	Tucson, AZ	Oklahoma City, OK
Southeast	Tallahassee, FL	New Orleans, LA	Memphis, TN
Midwest	Minneapolis, MN	Detroit, MI	Wichita, KS
Northeast	New York City, NY	Philadelphia, PA	Paterson, NJ

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[1] Mayors who sign the agreement commit to taking action, within their civic communities, to work towards meeting the goals established by the Kyoto Protocol of reducing global warming pollution levels to 7 percent below 1990 levels by 2012.

[2] The five milestones include: 1) a GHG emissions inventory, 2) establishing a GHG reduction target, 3) development of a Climate Action Plan, 4) implementation of a Climate Action Plan, and 5) monitors/evaluates progress.

The investigation begins by analyzing the antecedent variables that are hypothesized to provide a causal pathway for decisions to engage in a collaborative management approach to pursue local climate change mitigation. The study then examines the institutions for collaborative climate change across different cities to draw conclusions regarding the influence of antecedent variables that may affect the decision by cities to engage in particular forms of collaborative management institutions. The final four components of the framework are applied to cities that have taken significant action. These cities have used collaborative policy institutions to develop Climate Action Plans (CAP) and implement GHG reduction and monitoring strategies. All analyses in the study were conducted using quantitative and qualitative data compiled from secondary sources including government and non-government databases, government documents, and city reports.

As already mentioned, the objective of this research is to investigate the feasibility of applying a conceptual framework developed for collaborative watershed management to climate change policymaking in municipalities in various parts of the country. Cities that had taken Significant Action were chosen in order to assess the validity and scope conditions of the Sabatier et al. framework (George and Bennett 2005). While selection bias is often a concern in case studies that lack variation in the dependent variable, the adoption of climate change policy in this case, this approach will allow us to assess effectively the form and fit of the framework for stakeholder engagement introduced in Sabatier et al. (2005) in climate change policymaking. We chose to narrow the cases in order to elaborate upon the functionality of the conceptual framework in the context of climate change policymaking at the municipal level and avoid drawing general conclusions regarding interrelationships between the variables included in Fig. 1 (Collier and Mahoney 1996). While analyzing interrelationships between specific variables within conceptual categories in the framework is an important line of future inquiry, we limit ourselves here to a within-case comparison of Significant Action cities to determine the presence of various institutions that are likely to affect legitimacy and the incorporation of stakeholders into the climate change policy planning and implementation process. An in-depth analysis of the collaborative management institutions established in the policy development and implementation process provides insight into how these institutions facilitate opportunities for legitimacy and incorporate aspects of civic community through stakeholder engagement.

Antecedent factors

Antecedent factors that affect stakeholder collaboration and, subsequently, a city's decision to pursue GHG emissions reduction policies are the socioeconomic, civic, ecological, and government institutional conditions of the city. These include the social and economic structure of an urban area, preexisting social networks, the severity of different environmental and socioeconomic problems, and the governmental institutions that are in place (Daley et al. 2013; Sabatier et al. 2005; Sharp et al. 2010).

As Table 2 indicates, a number of indicators of these variables are used in the cross-urban comparisons analysis. Cities that have, on average, a much larger population, larger growth rate projections, a larger median household income, and lower percentages of the population living

below the poverty level have taken significant action to reduce GHG emissions than those that have taken some or no action.

Table 2. Prior Urban Conditions[a] Across Climate Change Policy Categories

	Condition	Significant Action	Some Action	No Action
Socioeconomic	Population (2010)	600,158	551,936	146,199
	Projected Growth (2010-2012)	4.0%	2.0%	1.3%
	Median Household Income (2008-2012)	$48,383	$38,038	$40,920
	Persons Below Poverty Level (2008-2012)	22%	26%	23%
Civic Community	Unemployment Rate	6%	7%	9%
	High School Degree	86%	82%	80%
	Bachelor's Degree	43%	23%	22%
Environmental	Population Density (persons/sq. mi.)	8,497	5,029	5,435
	Number of Unhealthy Air Days[b] (2012)	0	0.8	3.6
	Number of Unhealthy Air Days[1] for Outdoor Activities (2012)	2.25	14.4	26
	Parks within City Limits[c] (Acres)	15,590	5,011	9,275
	Park Land as Percent of City Area[c]	12%	6%	4%
Government Institutions	Form of Government			
	No. of Cities with Mayor-council	3	3	3
	No. of Cities with Council-manager	2	2	2
	No. of Cities with Environmental/Sustainability Office or Dept.	5	5	2

[a] Each value represents the arithmetic mean of the five cities included for each climate change policy category (The Trust for Public Land 2010; U.S. Bureau of Labor Statistics 2014; U.S. Census Bureau 2010; U.S. Environmental Protection Agency 2014)
[b] Data is by county
[c] Data for Paterson, New Jersey was not available for the No Action cities

In this study, environmental conditions include population density, the number of unhealthy air days (general population and outdoor activity), the amount of land designated as public parks, and the percentage of city area covered by public parks. The findings indicate that cities that have larger population densities are more likely to have taken Significant Action than cities with smaller population densities. Likewise, cities with smaller population densities tend to have taken Some Action or No Action on climate change. On average, the number of unhealthy air days, both for the general population and outdoor activities, is larger in the municipalities that had taken No Action on climate change policy and lower in those that had taken Significant Action. The opposite is true for parkland where total park acreage within city limits and parkland as a percent of city area is greatest in cities that had taken Significant Action and lowest in those that had taken No Action. The antecedent indicators for the civic community conditions in

Table 2 show that unemployment rate is highest for cities with No Action and lowest in those that had taken Significant Action, while the opposite is true for education and climate change policy implementation.

Government institutions that are considered to play a potential role in climate change policy include the city's form of government and the presence of a government organization dedicated to environmental quality that can undertake and facilitate climate change and GHG emissions reduction programs (Bae and Feiock 2013; Feiock et al. 2010; Krause 2010). We find that proportions of the cities with mayor-council and council manager forms of government were equivalent across climate change policy categories, and that only cities within the No Action category do not have a specific government organization to oversee environmental quality issues.

As Table 3 reveals, the major industries of the cities analyzed in the study vary across the climate change action categories. However, we do see that the agriculture, manufacturing, and energy industries each represent a significant role in the economies of the No Action cities (also see, for example, Hoffman 2000; Prakash 2000; Robbins 2001; Winter 2002). Cities that generally have high-tech, skilled labor, and education industry-based economies have taken Some Action or Significant Action.

Table 3. Major Industries of Cities and Across Climate Change Categories (U.S. Bureau of Labor Statistics 2014)

Significant Action				
Denver	Austin	Tallahassee	Minneapolis	New York City
Telecommunications Energy Mining	Information technology Govt. Cultural	Government	Manufacturing High-tech	Finance Insurance Health Care Real estate
Some Action				
Las Vegas	Tucson	New Orleans	Detroit	Philadelphia
Tourism Gaming Hospitality	Advanced technology Federal government	Energy Tourism Shipping Aerospace Manufacturing	Automobile Industry R & D	Education Health Tourism Shipping
No Action				
Fresno	Oklahoma City	Memphis	Wichita	Paterson
Agriculture	Agriculture Energy Manufacturing Information technology	Transportation Shipping	Manufacturing Skilled labor	Manufacturing Educational Health Social service

Process: stakeholder collaboration in individual cities

Sabatier et al. (2005) note four general variants of the collaborative management process as they apply to watershed management. As identified in Table 4, the four general variants of collaborative management institutions include (1) collaborative engagement processes, (2) collaborative partnerships, (3) collaborative superagencies, and (4) collaborative panels. We investigate whether these types of collaborative management institutions were adopted and initiated to facilitate and implement local climate protection policies. Variations in collaborative management forms are distinguished by duration, short-term versus long-term, decision power or influence, and informal advisory versus formal authority

Table 4. Variations of Collaborative Management Institutions (Sabatier et al. 2005)

Duration	Decision Power or Influence	Collaborative Management Institution	Characteristics
Short-term	Informal	Engagement	Applies techniques for conflict resolution among diverse stakeholders, developed by outside actors and applied to specific planning exercises
	Formal	Panel	Consist of multi-level government representatives and nongovernment stakeholder partnerships
Long-term	Informal	Partnership	Involve a wide variety of governmental and nongovernmental stakeholders seeking to develop some form of environmental or resource management plan and implementation of projects to achieve the identified goals
	Formal	Superagency	Consist of multi-level government representatives and nongovernment stakeholder partnerships

As Table 5 demonstrates, this study analyzes various forms of collaborative engagement, partnerships, and panel institutions. Superagencies have been found to play an important role in the context of watershed management largely due to the spatial context of these environmental quality issues and the presence of legal jurisdictions and regulatory institutions in place at the state and federal levels to manage this resource (Heikkila and Gerlak 2005; Sabatier et al. 2005). Whereas actions to improve environmental conditions of a watershed are likely to engage a number of federal agencies (e.g., US Environmental Protection Agency, US Fish and Wildlife Service, and US Army Corps of Engineers), the issue of reducing GHG emissions at the municipal level is primarily a local process in which community stakeholders and local government agencies play a central role. Collaborative climate change policy institutions at the municipal level are likely to have insignificant impacts on state or federal agencies.

Table 5. City Participation in Collaborative Management Institutions That Contribute to GHG Emissions Reduction
(Austin Energy 2010; C40 Cities Climate Leadership Group 2011; City Council of Tucson 2011; City of Denver 2007; City Council of Las Vegas 2006; City of Minneapolis 2013; City of New Orleans 2009; City of Philadelphia 2007; City of Tallahassee 2011; Colorado Climate Project 2005; ICLEI 2010; New York City DEP 2008; Sierra Club 2006; Southeast Michigan Regional Energy Office 2014; Southern Nevada Convene for Green 2011; U.S. Conference of Mayors 2009; U.S. Department of Energy 2014)

City[a]	Engagement Processes				Partnerships			Panels
	MCPA	ICLEI	C40	Cool Cities	Clean Cities	Regional	Local	Local Task Force/Committee
Denver	•	•		•	•	•	•	•
Austin	•	•	•	•	•		•	•
Tallahassee	•	•		•	•		•	•
Minneapolis	•	•		•	•		•	•
New York City	•	•	•	•	•			•
Las Vegas	•	•		•	•	•		•
Tucson	•	•		•	•	•		•
New Orleans	•	•	•	•	•			•
Detroit	•			•	•			•
Philadelphia	•	•	•	•	•		•	•
Fresno				•	•			
Oklahoma City					•			

[a] Memphis, Wichita and Paterson do not participate in collaborative climate protection institutions.

We posit that the absence of federal climate change policy institutions, the spatial context of the climate protection policies (municipal-level), and the nature of policy solutions reduce the importance of including state and federal agencies in the collaborative management process. In the context of collaborative management institutions for water resources, federal programs, such as the National Estuary Program (NEP), were created under the umbrella of existing federal regulation to facilitate stakeholder engagement in the protection of water quality. The absence of federal regulation to mitigate the effects of GHG emissions on global climate change limits the capacity of such a program to be implemented by regulatory agencies such as the US Environmental Protection Agency.

Engagement processes that do exist in cities include the MCPA, ICLEI, C40, and the Sierra Club's Cool Cities Program. These climate protection institutions provide participating cities access to software and technical tools, peer networks, assistance from expert staff, training, and events. The Cool Cities Program is a collaboration composed of community members, organizations, businesses, and local leaders to implement clean energy solutions via a network of local volunteer activists who work with local government leaders (C40 Cities Climate Leadership Group 2011; ICLEI 2010; Sierra Club 2006; US Conference of Mayors 2008). Cities also participated in partnerships, such as the Clean Cities program sponsored by the US Department of Energy. The program supports local actions to reduce petroleum use in transportation by facilitating partnerships between private companies, fuel suppliers, local

governments, vehicle manufacturers, scientists, state and federal government agencies, and other organizations to implement local alternative-transportation solutions (US Department of Energy 2014). In addition to the Clean Cities program, some cities participate in local and regional coalitions to coordinate and share knowledge regarding GHG emissions reduction strategies and policy implementation. Regional partnerships include the Southern Nevada Regional Planning Coalition and the Colorado Climate Network (Colorado Climate Project 2005; SNCG 2011). Although not a focus in this study, future researchers should consider exploring such partnerships in greater depth. Various collaborative panels exist within cities that have taken Significant Action as well as those that have taken Some Action to pursue climate protection policies, generally as a response to a specific initiative implemented by the Mayor or City Council, or as part of a policy planning process.

Policy outputs

In general, cities included in the study that maintain some form of government institution or municipal employee responsible for managing or coordinating city policies that affect municipal GHG emissions participate in collaborative panels. The complexity and duration of these panels varies among cities from short-term, ad hoc committees that facilitate collaboration and inform municipal agencies during a community planning or policy implementation process, to long-term, institutionalized collaborations designed to facilitate vertical and horizontal collaboration among government agencies, technical experts, and community stakeholders. Cities that exhibit relatively more complex horizontal and vertical networks of committees have taken Significant Action to implement climate change policy than those that have taken Some Action. Likewise, cities that have not participated in the collaborative panel process have made little or no effort to implement GHG reduction policies.

Table 6 reports climate change action plans adopted by the five cities that have taken Significant Action to reduce GHG emissions. Climate action plans generally include long-term goals, outline community actions and establish incremental targets for GHG emissions reductions. Often, the plans are created through extensive stakeholder processes that involve multiple diverse community interests (Wheeler 2008). While each of the five cities shared a common goal of achieving GHG emissions reductions, each approached the policy planning and implementation process using unique and innovative engagement strategies. The collaborative management process is investigated using a subsample of three cities. We review the presence and dynamics of collaborative climate change policy institutions in formulating climate change policy as defined by the conceptual framework at the municipal level (Fig. 1). This analysis will allow us to gain an understanding of the different types of engagement strategies which cities that adopted climate action plans pursued.

Table 6. Significant Action Cities: Climate Change Action Plans
(Austin Energy 2010; City of Denver 2007; City of Minneapolis 2013; City of Tallahassee 2011; New York City DEP 2008)

City	Plan	Year of Adoption	Political Actors	GHG Reduction Goals
Denver	Denver Climate Action Plan	2007	Mayor	10 % per capita reduction in GHG emission relative to the 1990 baseline by 2012, reducing its community GHG emissions by 1.8 million mtCO2e from expected 2012 business-as-usual levels
				25 % per capita reduction in GHG emission relative to the 1990 baseline by 2020, reducing its community GHG emissions by 4.4 million mtCO2e from projected 2020 business-as-usual levels
Austin	Austin Climate Protection Plan	2007	City Council	City departments to be carbon neutral by 2020
				Increase municipal energy conservation and efficiency, and provide 30 % renewable energy by 2020
				All residential construction to be zero net-energy capable, and increase energy efficiency by 75 % by 2015
				Establish a City employee Climate Action Team to: (1) inventory greenhouse gas emissions from all municipal operations and (2) develop comprehensive emission reduction plans
				Create a City employee climate protection education program, including: (1) information and incentives to help employees reduce their carbon footprint and (2) training on how to educate other community members on ways to reduce their carbon footprint
Tallahassee	Sustainability Plan	2008	City Manager	Reduce GHG emissions 2 % by 2010 from 2009 levels
Minneapolis	Climate Action	2013	City	Reduce GHG emissions 15 % by 2015 and 30 percent by 2025, from the 2006

	Plan		Council	baseline emissions
				Reduce GHG emissions from City operations 1.5 % annually
				Achieve 15 % energy efficiency in residential buildings from the baseline by 2025
				Achieve 20 % energy efficiency in commercial/industrial buildings from the baseline by 2025
				Increase electricity from local and directly purchased renewables to 10 % of the total consumed by 2025
				Achieve a 1.5 % annual reduction in GHG emissions from City facilities
New York City	PlaNYC (Smart Growth)	2007	Mayor	Reduce GHG emissions by 30 % from the 2007 baseline

Denver, Colorado

To aid in meeting its GHG reduction goals and to address the environmental concerns of community members, then Denver Mayor John Hickenlooper, for example, established the Greenprint Denver Advisory Council (Council) in 2005 as part of his Sustainability Initiative (Greenprint Denver 2006). Composed of more than 30 appointed civic, business, university, and government leaders, the council was charged with establishing partnerships with community individuals, businesses, and non-profit organizations to identify opportunities to integrate sustainability practices into city programs and policies. The Council released an Action Agenda in 2006 that included the establishment of regional partnerships, tree planting projects, increased recycling, improvements in renewable energy and energy efficiency, reducing the carbon footprint of city operations, improvements in public transit, and protection of water quality. The Council's Action Agenda was followed by the completion of the Denver Climate Action Plan (DCAP) in 2007 (City of Denver 2007). In response to community interest in the city's sustainability planning, the Council sought public comments on the DCAP and included business and residential outreach campaigns as an action strategy to contribute to GHG reductions.

As part of DCAP's Residential Climate Challenge initiative, for example, the Neighborhood Energy Blitz program was created to provide residents direct services and resources to improve energy efficiency in residential homes. The program is designed and executed by residents who volunteer to canvass their communities and provide information about the city's available energy programs (Peterson et al. 2011). Data from each Blitz program are collected and tracked through the city's Department of Public Health. This agency records the number of volunteers, homes visited, and energy efficiency measures adopted. Greenprint Denver also facilitates the formation of the Neighborhood Energy Action Partnership, a collaboration among city departments, businesses, and non-profit organizations. The group utilizes its non-profit members to provide community outreach by organizing community

volunteers (Peterson et al. 2011).

In 2012, under the direction of Denver's newly elected Mayor Michael Hancock, Greenprint Denver evolved into the Office of Sustainability, a cabinet-level agency charged with continuing the city's sustainability efforts. The city has continued to engage community stakeholders in its sustainability planning and implementation efforts. The Sustainability Council consists of community volunteers and is charged with advising the Office on policies and programs, connecting Office staff with external resources, the initiation of projects, and community and peer outreach.

Minneapolis, Minnesota

In 2012, the Minneapolis City Council initiated the city's effort to reduce GHG emissions by adopting community GHG emissions reduction targets. To develop a strategy for emissions reductions, the city sought to build an extensive network of stakeholder groups to advise the development and implementation of the city's CAP. City employees worked with a Steering Committee composed of staff from the City Council, representatives from the Mayor's office, government and agency partners, business and community representatives, members of the City's Community Environmental Advisory Commission, and representatives from three technical working groups. Each technical working group was formed to develop goals and strategies to achieve emissions reductions within a specific sector. The focus areas of the working groups included transportation and land use, buildings and energy, and waste and recycling (City of Minneapolis 2013). The responsibility of the working groups is to study GHG emissions from their relevant sectors, provide feedback from their affiliated organizations and constituents, and recommend reduction strategies and evaluation criteria for their sector to the Steering Committee. The charge of the Steering Committee was to review strategy recommendations from the working groups and present recommendations from the CAP to the City Council.

Following the first 5 months of the CAP development process, an Environmental Justice (EJ) working group was added to the collection of technical working groups following discussions between city officials and members of the EJ community. As members of the planning and decision-making processes, the EJ working group sought to provide recommendations and feedback to the Steering Committee regarding potential social equity outcomes of proposed goals and strategies. Following the completion of draft emissions reduction goals and strategies from the technical working groups, city staff sought input from the community regarding the CAP by hosting two public meetings and publishing an online survey. Project staff also presented the draft report to members of the city's environmental, public health, transportation, and planning advisory committees.

The city's CAP was adopted in June 2013 by members of the City Council. The plan includes more than 100 specific strategies to reduce GHG emissions by expanding renewable energy production, improving solid waste management, and building energy efficiency and transportation within municipal operations as well as the public and private sectors. In 2014, the city began working to form a formal partnership with local energy providers to develop an energy system that is affordable, clean, and improves social equity. The innovative city–utility

partnership was informed by the CAP, which found that two thirds of the city's GHG emissions arise from electricity and natural gas use in buildings.

New York City, New York

In 2001, under the direction of former Mayor Michael Bloomberg, the city of New York joined the ICLEI Cities for Climate Protection Campaign. Two years later, the city's Department of Environmental Protection (DEP) established partnerships with a range of scientists and engineers and created a formal Climate Change Task Force to oversee the DEP's investigation of and preparation for the potential risks associated with climate change (NYC DEP 2008). In 2004, the Climate Change Task Force, composed of members from multiple internal bureaus and participants from Columbia University, HydroQual, Mayor Bloomberg's Offices of Environmental Coordination and Long-Term Planning and Sustainability, and the New York City Law Department, was formed to provide additional guidance to DEP in climate change assessment and action plan development (NYC DEP 2008).

Led by the task force, the mission of DEP's Climate Change Program was to ensure that all aspects of departmental planning take into account the potential risks of climate change on the city's water supply, drainage, and wastewater management systems, and integrate GHG emissions management to the greatest extent possible. To prepare the city's CAP, the task force conducted internal interviews to identify potential impacts to DEP, met with science advisors, initiated a preliminary inventory of DEP's GHG emissions control policies, and participated in several national and international conferences to share ideas and establish active partnerships with other municipalities and utilities (NYC DEP 2008). The release of the CAP in 2008 was preceded by Mayor Bloomberg's launch of PlaNYC, which included the creation of a city Climate Change Adaptation Task Force and a City Panel on Climate Change, and followed by the City Council's vote to pass Local Law 22, which requires the city to complete annual GHG emissions inventory updates (City of New York 2013a; NYC DEP 2008).

PlaNYC, overseen by the Mayor's Office of Long-term Planning and Sustainability, is a city planning program charged with providing recommendations and strategies for incorporating sustainability practices into city operations and throughout the broader community. The process of outlining the city's sustainability goals and possible strategies was informed by more than 25 city agencies and participants from the academic, business, and civic communities. While PlaNYC sought to address sustainability efforts generally, given that 75 % of the city's emissions are produced by energy use in buildings, the Climate Change Adaptation Task Force and City panel on Climate Change undertook the initial climate action planning efforts of the DEP Climate Change Task Force and established improving building energy efficiency as a major initiative of the program. The Mayor's Carbon Challenge, for example, was launched by Mayor Bloomberg in 2007 to encourage voluntary action from members of the city's institutional (e.g., universities and hospitals) and private sector communities to match the GHG emissions reduction goals of the city (City of New York 2013b).

In August 2012, the New York City Council institutionalized the efforts of the City Panel on Climate Change, voting unanimously to establish the Council Committee on Climate Change. The committee, composed of scientific experts on climate change, is modeled after the

International Panel on Climate Change. Members are appointed by the Mayor and are tasked with producing projections every 3 years regarding the risks that climate change poses for the city.

Legitimacy and climate change policy

To determine the contribution of stakeholder participation in collaborative watershed management, Sabatier et al. (2005) refer to the importance of procedural and structural legitimacy. For the purposes of this study, procedural legitimacy refers to the fundamental values of autonomy and self-rule and the notion that those who are bound by climate change policy must have direct influence on its formulation. Substantive legitimacy refers to the fundamental values of welfare and justice, the notion that climate change policy ought to improve the conditions of life for community stakeholders, and that the benefits and costs of these improved conditions be fairly distributed.

The collaborative policy institutions involved in the development of municipal CAPs displayed a range of structures. We find that three of the five cities we analyzed for this study incorporate community stakeholder engagement in the climate policy development process to varying degrees throughout the planning and implementation phases (City of Minneapolis 2013; Greenprint Denver 2006; Tallahassee DEPER 2011). All sought public input and engagement on proposed plans, while some incorporated methods to monitor and evaluate the level of stakeholder engagement and developed formulas to integrate input into the climate action plan prioritization process (Tallahassee DEPER 2011). Others actively engaged community members to serve as brokers between municipal agencies, project implementation, and the broader community. New York did not appear to involve actively stakeholders from the local community, but instead sought to focus on developing intergovernmental partnerships to receive guidance from technical experts and other municipalities. The extent that the cities integrate reflexivity into local policy decisions through stakeholder engagement would presumably have an effect on both forms of legitimacy. Leach and Sabatier's (2005) study of 76 watershed partnerships in California and Washington shows that involvement in collaborative institutions does satisfy many participant concerns regarding procedural fairness. Similar research should be conducted on climate change policy partnerships.

In the context of substantive legitimacy, it is useful to understand the four general modes of governance through which local governments implement climate change mitigation strategies. The first is based on enabling or supporting actions through information or positive incentives. A second is authority-based and utilizes regulatory instruments and/or negative incentives to compel action. The third is the facilitation of behaviors that reduce GHG emissions through the provision of services that make desired behaviors convenient. The final mode is self-governance, which focuses on the operations of municipalities (Bulkeley and Kern 2006).

All CAPs at the local level contained GHG reduction strategies that include information-based incentives, the provision of services, and self-governance. Each of these, in theory, provides opportunities to improve the welfare and prior conditions for community stakeholders. Improved public transportation, "greening" municipal vehicle fleets, strategic planning, tree planting, public park expansion, reduction in energy costs through improved efficiency and

rebates, and public outreach to support voluntary individual action are common implementation strategies to achieve GHG emissions reduction that have a direct impact on community stakeholders.

However, the equitable distribution of the potential benefits and costs of these actions are less clear. For example, only one city, Minneapolis, explicitly includes an environmental justice working group in the climate change planning process to ensure consideration of social equity issues in the decision-making process. Clearly, the issue of shared benefits and costs warrants further investigation. For example, reducing GHG emissions by switching energy sources may provide benefits to residents and municipal facilities by reducing energy prices; however, the costs of doing so may be unequally distributed to members of the energy sector. This may have negative local socioeconomic impacts, thereby reducing the political feasibility of climate change policy action.

Civic community and climate change policy

The Sabatier et al. (2005) framework includes another causal process that leads from process and context to civic community, which includes human capital (e.g., knowledge about climate change conditions), social capital (e.g., networks of reciprocity), political efficacy, trust of others, and attitudes toward collective action. These urban community variables are conceived as both an end in themselves and a means to improve climate change policy outputs. We assume that increasing trust and networks of reciprocity in a community is desirable, even if it does not lead to significant environmental protection. In addition, we postulate that a collaborative effort that increases trust and social reciprocity is more likely to result in GHG emissions reductions than one that does not. Finally, we hypothesize that agreeing on a plan or GHG reduction project feeds back into enhanced trust because it indicates that people resolve many of their differences if they take the time to listen carefully to the concerns of others, recommend solutions compatible to the interests of others, and honor agreements.

Survivability is one measure of reciprocity and trust. Many of the government institutions established to implement climate change policy are still active, although the extent to which these institutions continue to pursue stakeholder engagement in the decision-making process is less certain. Few of the cities, with the exception of New York City, have continued to publish updated climate action documents and report on the continued climate action plan collaboration efforts. Additional research employing stakeholder and government agency surveys to operationalize the variables from the civic community component of the framework could reveal the actual causal effect of collaborative climate change policy institutions on civic community.

Conclusion

Only about 5 % of cities in the USA have made GHG reduction commitments, and far fewer have developed a formal strategy for how to achieve reduction goals (Krause 2011). The prior conditions of a municipality are critical to driving political action to implement climate protection policy; however, they may not always be beneficial to all community members. Socioeconomic and civic community conditions are likely to be significant contributors to a city's decision to pursue such policies. Policymakers that serve communities in which income is

relatively low and unemployment is relatively high are less likely to implement GHG reduction regulations that may have direct economic impacts on constituents and local industries. In addition to local economic conditions, the education level of local communities is likely to affect the ability of community members to understand and engage in complex scientific discussions related to GHG emissions, creating challenges for establishing climate change plans. Moreover, local efforts may not address anthropogenic causes and achieve significant reductions in GHG emissions. Such conditions can allow certain stakeholders to promote successfully agenda denial (Cobb and Ross 1997a, b).

Krause (2013) finds that a city's decision to engage in climate change mitigation policies can largely be attributed to five factors: achieving complementary goals, financial concerns, concerns about local vulnerability, political influence, and the desire to help mitigate worldwide change. The first two factors are based on the potential to accrue direct financial co-benefits from GHG emissions reduction. The presence of co-benefits contributes to initial decisions to engage in climate protection initiatives. However, they have a smaller effect on the follow-through of these actions, political support from local leaders, the influence of interest groups and peer cities, and altruistic motives (Krause 2013; Sharp et al. 2010). This finding is consistent with the results of this study.

All of the cities analyzed here, with the exception of Wichita and Paterson, participated in the Clean Cities program to reduce petroleum use amongst municipal vehicle fleets and local consumers. The program's primary objective is to reduce dependence on fossil fuels in order to improve energy security. A reduction in GHG emissions is a secondary benefit. The city of Tallahassee achieved measureable GHG emissions reductions during the first 2 years of its climate change mitigation efforts by improving the energy efficiency of the municipal owned and operated utility facilities and switching its primary fuel from oil to natural gas. Yet, within a couple of years, the city reached the limit of possible efficiency improvements using fossil fuel generated energy (ICLEI 2009). Thus, decisions to pursue long-term climate change mitigation measures will likely be largely driven by altruistic behavior or concerns related to long-term community vulnerability.

The process by which climate change policy innovation occurs can be characterized as "incubated innovation," developed as part of a longer process addressing a chronic problem or environmental condition (Deyle et al. 1994; Polsby 1984). Innovations of this type are more likely to be influenced by scientific and technical information and stakeholder negotiations. Policy entrepreneurs often play a considerable strategic role in pushing the issue forward onto the political agenda (Bulkeley and Betsill 2003; Deyle et al. 1994; Kingdon 1995; Lindseth 2004). We found that all cities that have developed and implemented CAPs have integrated stakeholder participation into the planning process to varying degrees. Additionally, city mayors as policy entrepreneurs have played a central role in the process of GHG emissions reduction policy by initiating commitments to networks of technical experts such as the ICLEI and by creating initiatives and using new or existing government institutions to produce local climate change policy. Additional research regarding the degree to which stakeholders feel that they are integrated into the policy process and the distribution of policy outcomes should shed light on the legitimacy of local climate change policy institutions.

Information about the problems and indicators of climate change alone does not guarantee institutional change. Science and information can bring issues to the attention of stakeholders, facilitate a common understanding about the problem, and clarify the causes and the likely beneficiaries of resolving the problem (Heikkila and Gerlak 2005). However, the formation of collaborative institutions can also be supported by a history of communication, trust, and leadership among interested parties. Further research on the impacts of local climate change policy institutions on civic community is warranted.

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