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City membership in climate change adaptation networks

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ABSTRACT

By sharing best practices and lessons learned among member cities, professional and learning networks have become prominent actors in supporting and shaping local climate change adaptation. I analyze the membership of 18 highly visible adaptation learning networks to determine what cities participate and if networks attract similar cities. I find that the formation of adaptation networks is driven by large, high-capacity cities. Adaptation networks include members of diverse sizes and planning capacity, however, cities with similar levels of social vulnerability and concern with climate change tend to participate in the same networks. Global and regional networks have different patterns of membership. These patterns of membership have important implications for diffusing climate change adaptation between cities.

1. Introduction

The impacts of climate change – streets flooding, asthma attacks, damage from wildfires, or power outages – are determined not only by changing climate conditions but also the local built environment. In the U.S., many decisions about land use, infrastructure, hazard mitigation, and water resources that dictate how a city will respond to climate change are made at the local level (Nordgren et al., 2016). Local governments, consequently, are uniquely positioned to address the impacts of climate change and adaptation has largely been framed as a local issue (Shi et al., 2016; Nalau et al., 2015; Nordgren et al., 2016). In the U.S., cities have emerged as leaders of adaptation innovation and implementation (Graham and Mitchell, 2016; Shi et al., 2015). More than 40 cities and counties have created stand-alone adaptation plans (Woodruff and Stults, 2016) and many others have integrated or mainstreamed adaptation into existing planning processes such as hazard mitigation, sustainability, and comprehensive planning (Rauken et al., 2014; Lyles et al., 2017).

Framing climate change adaptation as a local issue, however, ignores the complex governance institutions and networks which motivate, enable, and shape local adaptation (Bulkeley and Betsill, 2013; Nalau et al., 2015). In the absence of strong federal leadership on climate change in the U.S., novel governance systems have emerged to support local adaptation (Lubell and Robbins, 2017). Learning and professional networks, that provide an opportunity for cities to exchange information about adaptation and learn from each other, have proliferated across the country. Diffusion of information and ideas through these types of institutions helped shape climate mitigation initiatives (Pitt, 2010; Anguelovski and Carmin, 2011; Ryan, 2015) and may similarly influence adaptation efforts (Castán Broto and Bulkeley, 2013; Shi et al., 2016).

The first local adaptation plan in the U.S., was a collaboration between the City of Keene, NH and ICLEI-Local Governments for sustainability a network that provides member cities guides for adaptation and opportunities for shared learning. Today, high profile networks like 100 Resilient Cities, the Southeast Florida Climate Change Compact, Urban Sustainability Directors, and the San Diego Regional Climate Collaborative are pushing forward the development and implementation of local adaptation. Cities voluntarily join these networks, to access information and resources (Bauer and Steurer, 2014; Busch, 2015; Vella et al., 2016; Westerhoff et al., 2011). Since networks are primarily composed of municipalities, they represent a form of horizontal or polycentric governance outside formal, hierarchical structures (Fidelman et al., 2013; Kern and Bulkeley, 2009). While there is considerable variation in the scope and services of these networks, they all aim to support local climate change adaptation.

Emerging adaptation networks can help local governments develop adaptation plans, policies, and programs through multiple avenues. Most importantly networks provide a forum for shared learning. Local practitioners rank learning from peers as one of the most important sources of climate adaptation information (Nordgren et al., 2016). Exchange of information among peers can proliferate information about climate vulnerabilities and potential adaptation strategies (Vella et al., 2016; Fidelman et al., 2013; Bauer and Steurer, 2014). Learning from other cities illuminates not only what is possible but also how it can be achieved (Busch, 2015). Networks also provide tools and guides to support local action. At times, networks also serve as a means for local governments to coordinate on shared vulnerabilities. As such,

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adaptation networks enable member cities to consider a broader range of adaptation options and overcome barriers to adaptation (Moser and Ekstrom, 2010; Carmin et al., 2012; Nordgren et al., 2016).

Despite having no direct decision-making power, adaptation networks play an important role in enabling and shaping local adaptation (Westerhoff et al., 2011). As federal support for local adaptation diminishes in the U.S., networks are likely to become even more prominent in the field. Consequently, it is critical to ask: what cities voluntarily join adaptation networks? Research on regional planning, formation of new governance institutions, and social networks suggest that a few high resource and innovative cities will drive the formation of adaptation networks (Berke et al., 2013; Lubell and Robbins, 2017). Many small cities may not have the capacity – financial resources, personnel, and time - to participate. Moreover, there may be a tendency for cities with similar characteristics to participate in the same networks; a phenomenon known as homophily (Gerber et al., 2013). Sorting of cities into like groups may limit the ability of adaptation networks to share novel approaches with those that would benefit from them most and to engender new adaptation efforts. The scope of adaptation networks and whether they engage cities in a geographic region or across the globe may also influence what cities participate. Analyzing membership of adaptation networks will provide valuable insights into what cities have access to resources to help initiate and implement adaptation measures.

In this paper I address three questions: (1) What communities are most active in adaptation networks? (2) Are similar communities more likely to participate in the same networks? And, (3) are the patterns of membership different between networks that engage cities within a geographic region and those that have global membership? To address these questions, I analyze the membership of 18 highly-visible adaptation networks. I consider both “global” networks, such as 100 Resilient Cities, that include cities from across the country and “regional” networks, such as the Southeast Florida Regional Climate Change Compact, that connect cities in a defined geographical area. I focus on member city’s social vulnerability and capacity, key determinants of climate impacts (Adger, 2003). Social vulnerability generally refers to the susceptibility of social groups to the impacts of hazards (Cutter, 2006). Chronic stresses like poverty and unemployment compound the risk of extreme events, leaving communities that already experience inequity more susceptible to climate change impacts (Shi et al., 2016). Capacity is defined as a community’s ability to implement change that allows it to cope with climate change (Smit and Wandel, 2006). Key characteristics of capacity include economic resources, staffing, technical resources, communication and information sharing, and institutions (Araya-Muñoz et al. 2016; Brody et al., 2010).

In the following section, I expand on how adaptation networks are defined and the benefits they provide to members. In addition, I explore the difference between global and regional networks. Drawing on the literature on regional planning, formation of new governance institutions, and social networks, I present a hypothesis for each research question. I then present the methods used to construct the dataset and analyze network membership. After which, I present and discuss the results. I conclude with the implications of these findings on the dissemination of adaptation and future research directions.

1.1. Adaptation networks

While the adaptation literature has predominately focused on adaptation at the local level, local action is enabled and shaped by larger governance structures. Informal and voluntary networks have become increasingly important in supporting local action. Networks have been defined as forums where stakeholders come together and partake in political processes outside the restraining procedures of representative democracy (Busch, 2015). In the context of this paper, networks are institutionalized spaces where local governments cooperate on and engage in climate adaptation.

Here, I only consider networks that (a) cities voluntarily join, (b) are horizontal or polycentric and thus constitute a form of self-governance, and (c) seek the implementation of measures through members rather than focus on lobbying or mobilization (Kern and Bulkeley, 2009). In addition, I only consider networks with formalized membership, where cities must become members to access materials or participate in network meetings. Loose cooperation or conferences are not considered (Busch, 2015). Many of the networks analyzed in this paper were initially founded to advance sustainability and climate mitigation; overtime they have taken up adaptation and become important in advancing climate preparedness in the U.S. This shift towards adaptation, mirrors the historic debate on climate change policy and the relatively recent acceptance of adaptation as necessary regardless of the success of mitigation (Busch, 2015).

1.2. Benefits of networks

The formation of these novel governance structures can be understood as contracting process where local actors weigh the potential benefits and transaction costs of different types of interaction (Feiock et al., 2012; Lubell and Robbins, 2017). Through this lens, cities will participate in adaptation networks where the benefits outweigh the transaction costs. Existing adaptation networks provide members multiple benefits, but participation also comes with costs. At a minimum, participation requires staff time, but in some cases cities must make binding commitments (such as creating a plan) or pay membership fees.

Networks provide a forum for shared learning and can help local government overcome common barriers to adaptation including lack the technical expertise, staff time, and funding (Moser and Ekstrom, 2010; Carmin et al., 2012; Nordgren et al., 2016). Global adaptation networks are largely designed as forums for shared learning. They bring together cities from across the country and world to exchange information and best practices. By collaborating communities can experiment with different strategies, share innovation, and learn from each other’s experiences. Compared to networks that advance climate mitigation that usually promote the same mitigation actions across all member cities (e.g. fostering energy-efficiency), adaptation measures must be tailored to community context (Busch, 2015). The *specificity* of adaptation makes the transfer of knowledge more challenging and may result in networks tailored to a specific context. For example, the Mediterranean City Climate Change Consortium network connects cities in Mediterranean-climate regions since they will face many of the same climate impacts. The formation and proliferation of global networks suggest that “global” cities may share more in common with one another than with neighboring jurisdictions. New York City, for example, may benefit more from collaborating with London than neighboring Newark, New Jersey. Global adaptation networks may also provide a platform for participating cities to attract investment and lobby for policy change at higher levels of government.

It is widely recognized that climate mitigation – the reduction of greenhouse gas emissions - is a collective action problem (Ostrom, 2010). Cities bare the cost of reducing greenhouse gas emissions but the benefits are diffuse, providing little incentive for action. By creating a sense of solidarity and providing assurance that others are taking action, networks can change city incentives for climate mitigation. In contrast, adaptation is generally described as a private good (Tompkins and Eakin, 2012). Only the residents of a city will benefit from adaptation efforts. Adaptation, however, is more complicated (Bisaro and Hinkel, 2016). Actions taken by one city often have spillover effects on neighboring jurisdictions, requiring cooperation.

Regional networks are grounded in managing climate impacts that span jurisdictional boundaries. Compared to global networks, regional networks focus more on shared vulnerabilities among member cities and coordination of adaptation actions. Climate change will affect watersheds, transportation networks, and electrical distribution systems that span multiple jurisdictions. This scale mismatch tends to be