ESI Preprints **Not Peer-reviewed**

What Does Scholarship on Institutionalizing Urban Climate Action Say?

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Doi: 10.19044/esipreprint.1.2023.p163

Approved: 09 January 2023
Posted: 11 January 2023

Cite As:
Boateng A.K. (2023). *What Does Scholarship on Institutionalizing Urban Climate Action Say?*. ESI Preprints. https://doi.org/10.19044/esipreprint.1.2023.p163

Abstract

With in-depth knowledge of the urban climate governance literature, this paper reviews the relevant scholarship on institutionalizing climate action in cities and urban areas to understand which aspects are well-researched, providing guidance to scholars in the field. The results show that articles addressing urban climate adaptation make up a large of the selected literature. The analysis has identified ideas about how innovation may be reinforced. Therefore, one critical step is to explicitly investigate how global North and South cities are testing new institutional arrangements and experimenting with adaptation and mitigation policies, plans, and processes as they seek to develop and advance their climate goals.

Keywords: Institutionalizing, climate governance, cities, systematic review

Introduction

The devastating impacts in cities and urban areas have resulted in local government's efforts to respond to the impacts, with recent studies focusing on evaluating and assessing the contents and quality of urban adaptation policies and plans (Bulkeley, 2010; Castán Broto & Bulkeley, 2013; Anguelovski & Carmin, 2011; Câmpeanu & Fazey, 2014; Carter et al., 2015; Burch, 2010; Hölscher et al., 2019; Reckien et al., 2018a; Olazabal, Ruiz de Gopegui, et al., 2019; Araos et al., 2016; Castán Broto & Bulkeley, 2013; Guyadeen et al., 2019a; Reckien et al., 2018a; van der Heijden, 2019). As a result, research interest in urban climate governance has increased

exponentially in the last three decades. This includes scholars evaluating the quality of local climate adaptation and mitigation plans and policies (*e.g.*, Guyadeen et al., 2019b; (Olazabal & Ruiz De Gopegui, 2021; Reckien et al., 2018b). At the same time, others have also investigated the impact of partnerships and how they respond to climate risks and vulnerabilities (Göpfert et al., 2019a). Although there is a wealth of knowledge on climate change initiatives in cities, in the context of institutionalization, studies of this nature have not been fully explored even though various conceptualizations and studies of institutions and institutionalization can be found in the literature and can take many forms. Previous studies (e.g., Patterson, 2021; Patterson & Huitema, 2019) focused on the characteristics that enable adaptation. Additionally, has emphasized that factors such as leadership, funding, and stakeholder engagement support adaptation while lack of resources, and competencies limit adaptive capacity. Knowing which aspects are well-researched, and where in contrast, research gaps lie, this paper systematically reviews the relevant literature to understand the means through which urban climate governance has been institutionalized in cities and municipalities. Organizing such knowledge can advance the present understanding with reference to institutional analysis and urban climate change

Materials and Methods

Systematic reviews

The researcher systematically reviews articles addressing the institutional dimension of urban climate governance. To do so, peer-reviewed journal articles in English published between 1990 and 2020 were analyzed. The present section spells out the methodological steps leading to such selection: it introduces systematic reviews as a methodology and highlights the details of the research design employed. Commonly applied in health studies, systematic reviews have recently experienced a surge in popularity in the field of environmental studies, particularly in climate research (Berrang-Ford et al., 2015; Hunter et al., 2020; Roggero et al., 2018). The recurring element refers to the ambition of synthesizing a specific body of literature without biases in the way articles are selected and looked at. This is achieved by selecting articles in a transparent and reproducible way. According to Berrang-Ford et al. (2015), in systematic reviews, there is no “one size fits all” (Berrang-Ford et al., 2015: 758). The following subsections illustrate the steps involved in the present review and link them with those in similar studies, highlighting how the underlying design choices stand against the heterogeneity of the literature.

The present review

In line with the purpose of this study, this review was performed using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) (Moher et al., 2009). The PRISMA is a well-known evidence-based method for systematic reviews, and the first step was to select the appropriate database. For this study, the Web of Science database was chosen because it provides a broad range of peer-reviewed social science-related literature. Performed in November 2020, and focusing on articles from 1990 to 2020, the search strings (urban* OR city OR cities OR municipal*) AND clim* AND institution* AND governance yielded six hundred thirty-four (634) articles. In the next step, filtering focuses first on titles, keywords, and abstracts identifying 200 articles. In the final stage, the researcher designed the exact search criteria for the inclusion or exclusion of the full-text articles (refer to table 1 for inclusion and exclusion criteria). Finally, the articles were filtered, resulting in a final data set of 38 articles for analysis (refer to the final list of the selected articles in table 2). The dataset was checked for relevance with the help of an independent reviewer. In line with the definition of institutions used in the present study, the final dataset was checked with an independent reviewer to determine if articles addressed 'institutional underpinning,' i.e., laws, schemes, conventions, shared practices, habits, or traditions as it relates to urban climate governance. Articles were excluded if they did not refer to any institutional underpinning in terms of governance of climate change in cities and urban areas. All selected articles were carefully read and subjected to qualitative analysis. The following questions were raised to gain insights from the present literature: 1) What is the trend of publication and the main topics of the articles? 2) what are the tools used and/or the means through which urban climate governance is institutionalized based on the literature?

Table 1. Article selection process

Item	Description
Database selection	Web of Science database
Search strings Title/abstract/keywords	(urban*OR city OR cities OR municipal*) AND clim* AND institution* AND governance
Screening (specifying search criteria)	Published literature from 1990 - 2020
Inclusion criteria	The study must focus on English language academic literature Must focus on institutional underpinning,' i.e., laws, schemes, conventions, shared practices, habits, or traditions as it relates to urban climate governance
Exclusion criteria	excludes articles published in a language other than English,

	no full text, and did not refer to any institutional underpinning in terms of governance of climate change in cities and urban areas

Results

What is the trend of publication and the main topics of the included articles?

In recent years there has been increasing recognition that global environmental change issues, such as climate change, are critical for cities. Of particular interest is its institutionalization. The selected papers from the early 2000s include three studies in this review. First, Monstadt (2007) published one of the first manuscripts focusing on new policy approaches and institutional reforms to shape the development of energy networks in Berlin. Second, Fünfgeld (2010) highlighted aspects of the institutional challenges to climate risk management in cities, and similarly, Brown & Farrelly (2009) explored the social and institutional challenges ahead in terms of influencing sustainable urban stormwater management in three Australian capital cities. In the late 2010s, those articles primarily discussed the role of urban governance and the development of institutions for climate mitigation and adaptation. Moreover, the motivations and approaches can be identified as the most relevant issues where much of this work included; the development of regulatory frameworks to ensure adaptation and mitigation of climate risks (Romero-Lankao et al., 2013), the institutional governance structures that surround local government work on climate change adaptation (Aylett, 2015). Given that these institutional arrangements may influence adaptive responses, there is much to be gained by understanding their shape, strengths, and weaknesses around adaptive planning. For instance, Pasquini & Shearing (2014) showed how a South African municipality has made considerable progress in institutionalizing environmental issues (particularly mitigating and adapting to the impacts of climate change) in the last decade. At the same time, Hughes & Romero-Lankao (2014) compared the choices Delhi and Mexico City made concerning the structure and formality of science–policy interfaces in support of climate-change policy processes. Over time (i.e., in the early 2020s), several articles have been developed to understand the ways institutions exist and its importance in urban climate adaptation. Among others, Patterson & Huitema (2019) provided insights on how institutional innovation in urban climate change governance can be conceptualised by developing a heuristic through an exploratory case study of urban water governance in Santiago, Chile. Similarly, Bettini et al., (2013, 2015) showed that institutional capacities could increase given the need for urban water transitions, while Lassa, (2019) proposed institutional pathways

for sustaining climate change resilience and risk governance in Surat, Indonesia.

Figures 1 and 2 show the trend of publication (1990 – 2020) and to show a visual representation of the title and keywords based on frequency and relevance.

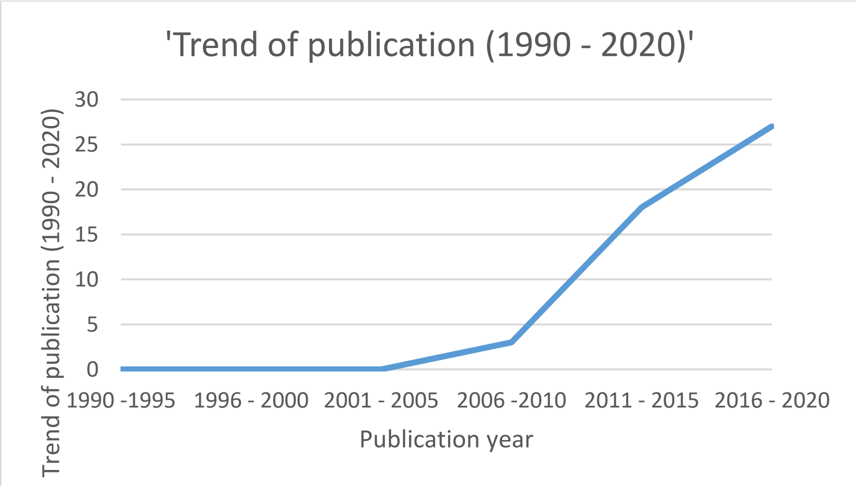

Figure 2 Shows the trend of publication (1990 - 2021)

Figure 3 A visualization of the title and keywords using word cloud

What are the tools used and/or the means through which urban climate governance is institutionalized?

#	Source	Mapping the tools used and or the means through which urban climate governance is institutionalized
1.	Patterson & Huitema (2019)	Production of a regional adaptation plan for Santiago in 2012 (Plan de Adaptacion al Cambio Climatico para la Region Metropolitana de Santiago de Chile – PARMS) after several years of scientific studies and stakeholder collaboration involving international researchers, A local NGO, Adapt-Chile formed in 2013 has been active in facilitating collaboration among municipalities for adaptation planning, an example is the creation of the Chilean Network of Municipalities for Climate Action (RMFCC) in 2014 which provides a platform for coordination between municipalities in Santiago
1.	Anguelovski & Carmin (2011)	Establishment of dedicated climate units either within a relevant department or as a separate and cross-cutting office. In Paris, for instance, a Climate Protection unit was created to help define climate policies, set up initiatives, manage and coordinate all stakeholders, measure the impact of policies, and assess the outcomes of climate initiatives, Stakeholder engagement in urban climate action, making reference to the ICLEI program where local governments participating in the milestone process typically convene meetings to share information with the public and obtain input on plans, Development of regulations, policies, codes, and support programs. Example, London and Toronto developed strategies that provided them with a starting point for developing assessments and plans and engaging the public.
2.	Romero-Lankao et al. (2013)	Mexico City launched a local climate strategy in 2000, There is the involvement of both governmental and non-governmental organisations, and a group of environmental experts to hold critical positions within the Ministry of Environment, Involvement of decision makers from both cities often rely on the Internet for sharing information between agencies and between the government and the public
3.	Fünfgeld (2010)	In multiple cities, multi-level governance frameworks have increased through active involvement of stakeholders including citizens, transfer of climate change knowledge and its integration into planning and decision-making practice, several guidebooks, toolkits, and individual support tools for climate risk management in cities were developed
4.	Göpfert et al. (2019)	There are two types of climate-related advisory committees were identified in the 107 German cities under study: Climate specific committees (CSC) and the Climate integrative committees (CIC)
5.	Frick-Trzebitzky (2017)	Governmental Agencies have designed regulations on disaster, water, and land management, by-laws have been drafted in

		line with flood risks reduction, Engagement of traditional authorities, and non-state organisations, Formation of community associations, Belief systems, and the role of cultural values to foster the decisive role of chieftaincy structures in adaptation to urban flooding in the local context of Accra
6.	Aylett (2015)	Integration of adaptation planning within local government plans, and mainstreaming of adaptation planning within local government structures, Informal channels of communication have been created, Existence of networks within individual local governments
7.	Lassa (2019)	Establishment of the Asian Cities Climate Change Resilience Network (ACCCRN), Formation of the Semarang City Team (STC) for the development of the city resilience strategy, as well as the recruitment of a local champion, Creation of an NGO-like structure to serve as a think tank instead of policy makers to ensure adaptation as a routine development agenda
8.	Göpfert et al. (2019a)	In Mwanza (Tanzania) - existence of environmental units exist at different sublevels with explicit responsibility for mitigation and adaptation, there are decentralized community-based organizations that discuss mitigation and adaptation issues In Wurzburg (Germany)- the Stabsstelle Klimaschutz unit is jointly responsible for mitigation and adaptation and a climate protection officer is responsible for both mitigation and adaptation
9.	Patterson et al. (2019)	Development of adaptation plans by six municipalities in inner Santiago facilitated by a local nonprofit organization (AdaptChile), Activities regarding adaptation in the urban water system have been pursued by the main (private) water supply and sewage company in Santiago (Aguas Andinas), An office of climate change was created within the MMA in 2010 (Law 20.147), later upgraded to a division of climate change (DCC) in 2016/17 also containing a Department of Adaptation to Climate Change and Capacity Development
10.	Cousins (2017)	Stricter laws and regulations, developed in tandem with science and data-driven approaches, as the best way to improve stormwater management, New rules and institutions to foster integrated management approaches, as well as more robust economic instruments capable of assigning a monetary value to stormwater
11.	Francesch-Huidobro (2012)	In 2005 Hong Kong published its First Sustainable Development Strategy, recommending that 1–2% of Hong Kong's total electricity supply be met by renewable sources, mainly wind power, by 2012, signed up to the new Scheme of Control Agreements (SCA)

		through which the government 'encourages' them to implement more environmentally friendly measures
12.	Monstadt (2007)	An Energy Task Force was established within the environmental department to promote more efficient power plants, to increase the share of renewable energy resources and to enhance demand-side management, The Task Force was commissioned to establish comprehensive plans at regular intervals and to coordinate energy-related policies, The Berlin Energy Agency was set up and an energy law was adopted defining an institutional framework for energy planning
13.	Bettini et al. (2013)	A Department of Water has been created in Perth to take overall responsibility for water resources management, others include strategic support, governance arrangements and inter- and intra-organizational relations
14.	Wejs (2014)	The organizational approach (all eight Danish municipalities under study have established a project management unit to coordinate and facilitate the climate change planning), Six out of the eight cases created specialized working groups and steering committees, Institutional entrepreneurs have played a key role in mobilising actors and building legitimacy for their actions in several of the eight municipalities
15.	Bettini, Brown, & de Haan (2015)	Perth's case showed an institutional setting displaying cognitive, normative, and regulative maintaining mechanisms, locking the city into traditional practice by confining the urban water sector to its current structure and function and enabled the city to sustain water service levels throughout the drought (i.e., maintain resilience). Adelaide experienced maintaining influences through information availability, confused debates in public discourse, and professional capacity.
16.	Hughes & Romero-Lankao (2014)	Both Delhi and Mexico City have recently developed climate-change plans, Creation of a Mexico City Virtual Center for Climate Change (MCVCCC) which is a repository for climate-relevant data, research, and current events, Mexico City has chosen to institutionalise and formalise the science–policy interface through the MCVCCC, which now serves as the primary vehicle through which scientific information influences climatechange policy for the city, Drawing on informal science-based partnerships for developing Delhi's State Level Climate Action Plan
17.	Pasquini & Shearing (2014)	The existence of networks between municipalities and other individuals or institutions that can connect them to knowledge and opportunities (examples include ICLEI, and the South African Local Government Association) efforts to spread green norms within municipalities target all levels of the

		administration
18.	Marsden & Groer (2016)	There are carbon management policies for all cities: Frankfurt, Stuttgart, Munich in Germany and Leeds, Manchester, Edinburgh, and Glasgow in the UK, only Leeds has adopted a formal carbon management plan with specific goals for transport,
19.	Hovik et al. (2015)	The professional community, particularly the organization Norwegian Water, is taking an active role in communicating new knowledge, and developing and promoting policy measures and solutions.
20.	López-Martínez et al. (2020)	the efforts made by the regional administrations to reduce exposure to flooding through several non-structural flood management policies since 1998 to address spatial planning,
21.	Roelich et al. (2018)	The municipal energy companies have been set up over the period (2013 to 2017) to contribute to a low-carbon transition through acceleration of low-carbon energy technology roll-out and demand management,
22.	Wamsler & Lawson (2012)	In the Northern context (Manchester), there is a growing dependency on insurance companies to provide the type of assistance that would allow urban resilience to be increased while in the South, to continued reliance on NGOs,
23.	Taylor (2016)	Cape Town has developed a climate adaptation action plan through the hiring of a local consultant in consultation with key officials in other City departments, The municipal government also sought to strengthen partnerships to provide research support to these ongoing planning and strategy processes, the climate adaptation action plan has heightened awareness amongst City staff to prepare for changing climate,
24.	Zaidi & Pelling (2015)	The existence of a National Heat Wave Plan ensures well developed procedures for disaster management and response to extreme hot weather events in London, There are formal procedures for the dissemination of information on heat wave risk in the city of London
25.	Wei (2020)	development of a low carbon policy framework over the period between 2005 and 2018 in Guangzhou, the sectoral practices in four domains, namely, industrial carbon reduction, low carbon industries development, low carbon building, and low carbon transport
26.	Aylett (2013)	In Durban, some municipal departments have established a profoundly different organisational culture that distributes empowered creativity. Something similar can be seen in Portland's attempts to mainstream sustainability and climate considerations across municipal departments. Partnerships
27.	Ferguson et al. (2013)	Cultural cognitive (Melbourne's traditional centralised water system through knowledge and beliefs) Normative (goals, leadership, community)

		Regulative (markets, governance)
28.	Valdivieso et al., (2017)	Transparency Internal coordination (information on internal regulations and organigrams) municipalities with more transparent management practices and stronger internal coordination mechanisms spend more resources on emergencies; municipalities with more social participation and community organizations also spend more; and the more funding that a municipality receives from national and regional governments, the more resources it allocates for adaptation and vulnerability reduction
29.	(Tennekes et al., 2014)	The use of legitimate climate adaptation policies, the role and responsibility of public and private actors in transforming society
30.	(Tingey & Webb, 2020)	Sustainable energy policies and market regulations
31.	(Munaretto et al., 2012)	the Italian government established a legal framework known as the Special Law for Venice. This framework consists of a number of national laws and ministerial decrees, which set objectives, responsibilities, regulations, actions and measures, and allocates funds for safeguarding Venice and its lagoon there is a local technical committee, called Safeguarding Commission for Venice instituted by
32.	(Huck et al., 2020)	Stakeholders from different infrastructure sectors nevertheless started to collaborate in an informal project setting within the Centre for Advanced Engineering at the University of Canterbury. As a result of this collaboration, the Risks and Realities Report (Centre for Advanced Engineering, 1997) provided sector-specific and cross-sector risk assessments and proposed protection and mitigation measure
33.	Duijn & van Buuren (2017)	The presence of institutional entrepreneurship: actors who take responsibility to initiate the necessary actions to redesign existing institutional practices. Alliance
34.	Brown & Farrelly (2009)	Management arrangements and responsibilities, regulations and approvals processes and costs. Capacity building programs, fostering greater socio-political capital and developing key demonstration projects with training events may be useful policy interventions in helping the urban water professional improve the quality of stormwater for both environmental and human benefits
35.	(Roggero, 2015)	Focuses on local administrations and exploring their role as bureaucratic organizations
36.	Hernandez et al., 2018)	Key social actors were engaged, including international organisations, research centres, local Universities, regional and insular
37.	Bettini et al., 2015)	Perth's urban water sector is corporatized with a high level of regulation, water policy development, The establishment of a dedicated water policy portfolio within Government

38.	(Horne & Moloney, 2019)	The use of intermediary organizations, the example of Climate Change Alliances in Victoria

Discussion

As the concept of institutions is becoming more prominent in the field of urban climate change, Patterson & Huitema (2019) explores how institutional innovation can be conceptualized by developing a heuristic which opens up new ways of analysis in the face of constraining institutional frameworks. More recently, to examine adaptation efforts across different cities, countries, or regions, it is observed that a mix of institutions exist depending on the climate risks, degree of affected populations, geographical contexts, organizational priorities, and perceptions about its appropriateness (Agrawal, 2008; Patterson et al., 2019). As such, institutions both enable and constrain cooperation and coordination between different actors in a governance regime thus, they can be either formal or informal. Formal institutions are "rules and procedures that are created, communicated, and enforced through channels widely accepted as official" Examples include written laws, regulations, or standards. In contrast, informal institutions are socially shared rules, usually unwritten, that are created, communicated, and enforced outside of officially sanctioned channels such as work routines, traditions, and knowledge systems. For instance, formal institutions could constitute policy and legal frameworks specifying roles and responsibilities that different actors have while informal institutions are the socially shared rules, usually created, communicated, and enforced outside officially sanctioned channels. Everyday elements could include relationships between other actors that help to coordinate their activities but are not formally written down (e.g., building networks and establishing meaningful partnerships). As local governments devise climate policies, they tend to formalize and institutionalize their work to facilitate implementation and strengthen the support across different sectors and/or departments. One aspect of formalizing it is through the establishment of dedicated climate change departments and offices and is responsible for mainstreaming climate action. In Santiago, Chile for instance, a Climate Protection Unit was set up to help define climate policies, set up initiatives, manage and coordinate all stakeholders, measure the impact of policies, and assess the outcomes of climate initiatives. The complexity of the task at hand provides several institutional challenges to city governments. This review provides an overview of these common areas of institutional constraints: (1) understanding emerging scientific information urban vulnerabilities and climate risks in cities; (2) and a lack of a suitable governance framework for climate risk management in cities.

Conclusion

The paper provides a review of the relevant literature to understand the means through which urban climate governance has been institutionalized in cities and urban areas. The paper provides new insights in terms of the traditional forms of local climate governance, which is shaped by international agreements and national policies, the priorities of donors and usually, initiatives by nongovernmental organizations and transnational networks. The findings indicate that some cities act in response to these stakeholders and the pressures they exert. However, most are motivated by internal goals and are taking independent action to advance their climate agendas. The findings also indicate that while mitigation planning was an institutionalized field of action, adaptation was relatively common. This is because articles addressing institutions make a large portion of the literature. The findings provided ideas about how innovation may be reinforces and therefore, one key step is to explicitly investigate how cities in both the global North and South are testing new institutional arrangements and experimenting with adaptation and mitigation policies, plans, and processes as they seek to develop and advance their climate goals.

Disclosure statement: No potential conflict of interest was reported by the author(s).

Funding

This study is part of a PhD research funded by Prince Albert II of Monaco Foundation. The contents of this article are solely the author's liability and under no circumstances may be considered a reflection of the position of the Prince Albert II of Monaco Foundation and the IPCC Scholarship.

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