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How legitimate are urban climate planning processes? A comparative assessment of Accra, Ahmedabad, Bonn and São Paulo

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Keywords: legitimacy, urban climate action plans, knowledge policy interaction, climate change, co-production, city networks

Abstract

Urban climate action plans (UCAPs) guide cities in identifying key climate risks and in addressing climate change. Designed to guide urban transformation over decades through near-term and long-term actions reducing emissions and/or adapting to the consequences of climate change, UCAPs are intended to have significant impacts. Despite their significance for urban climate governance, the procedural quality of how UCAPs are created remains under-analysed. By analysing UCAPs of four cities from different regions of the world - Accra (Ghana), Bonn (Germany), São Paulo (Brazil), and Ahmedabad (India) - we unpack the quality of UCAP creation processes in terms of their legitimacy including whether and how key stakeholders were involved in shaping the plan. Drawing on 72 semi-structured interviews with actors involved in the plan-creation process and complemented by document analysis, this study conceptualises UCAP creation phases and assesses its quality using the framework of input, throughput, and output legitimacy. In terms of key actors, this study highlights the crucial role city networks played in designing and funding UCAP creation processes. Significant differences in UCAP legitimacy with regards to levels of co-production, transparency, accessibility, and substantive participation across the case studies are shown. Based on these findings this study provides actionable insights for the creation of legitimate and impactful UCAPs to promote just and equitable urban transformations.

1. Introduction

Cities play a significant role in achieving global and national climate change goals while also addressing local development priorities. Already today cities are responsible for over 70% of CO₂ emissions while being especially vulnerable to the consequences of climate change (IPCC 2018, Mahendra *et al* 2021, Adelekan *et al* 2022, IPCC 2022). As these trends will aggravate given that an estimated 2.5 billion people will be added to cities by 2050, cities are at the forefront of combatting climate change (Adelekan *et al* 2022, p. 28; Revi *et al* 2022).

For planning the transformation towards climate-resilient and low-emission cities, urban climate action plans (UCAPs) are of pivotal importance. Integrating knowledge and policy on the main sources of climate change and/or local vulnerabilities as well as the related response options to address these, UCAPs are documents summarising the intentions of cities in how they plan to mitigate and/or adapt to climate change (Deetjen *et al* 2018; Reckien *et al* 2018, Pietrapertosa *et al* 2019)³. Studies suggest that thousands of cities have initiated some form of planning with many more likely to follow within this decade (UN-Habitat 2015, Reckien *et al* 2018, Otto *et al* 2021, Salvia *et al* 2021, Aboagye and Sharifi 2023)⁴.

³ UCAPs comprise city's mitigation, adaptation or mitigation and adaptation plans.

⁴ For instance, Salvia *et al.* (2021) analysed 885 cities in the EU-28 with a UCAP, while Reckien *et al.* (2018) examined 200 urban areas across 11 European countries with a UCAP. In Germany alone, Otto *et al.* (2021) found that 103 out of the 104 largest cities have mitigation plans.

As UCAPs have been set to determine municipal policies across all sectors for decades, they will affect a large proportion of the global population (Dodman *et al* 2022, Kato-Huerta and Geneletti 2023). However, given limited resources for local climate governance, UCAPs inevitably prioritise certain climate actions over others, potentially leading to unintended environmental, economic, and distributive consequences (Fitzgerald 2022, Kato-Huerta and Geneletti 2023). For instance, efforts to address climate change through urban greening initiatives or phasing out old vehicles can inadvertently increase housing and transportation costs disproportionately impacting those anyways already more vulnerable (Colenbrander *et al* 2017, Sharifi 2020). Thus, UCAPs should not merely focus on planning urban transformations, but should ensure that such transformations are equitable and just (Hughes and Hoffmann 2020, Henrique and Tschakert 2021, Mabon *et al* 2024)⁵.

Planning just urban transformation requires procedural quality, a recognition that has led to increased attention paid to the design of UCAP creation processes (Andonova *et al* 2009, Feldman 2012, Leal and Paterson 2024). The literature examining UCAP processes has primarily focused on three key aspects: The participatory creation of UCAPs (Trundle and McEvoy 2017, Dekker 2018, Mills and Fletcher 2021), their inclusivity (Chu *et al* 2016, Luna-Galván *et al* 2017) and ‘knowledge co-production’ (Satorras *et al* 2020, Hölscher and Swanson 2023, *her et al* 2024)⁶.

Although these studies have highlighted the benefits of participatory or co-production approaches over linear, non-participatory processes, they often overlook the potential risks associated with UCAP co-production (Turnhout *et al* 2020). However, experience shows that inadequate or poor implementation of participatory processes can contribute to what could be called an ‘unjust urban transformation’ (Munoz-Erickson *et al* 2017, Ruiz-Mallén 2020, Wamsler *et al* 2020, Hölscher *et al* 2024). Some authors have called to understand the role of power, politics and knowledge in governance processes towards just urban transformation (Cashmore 2018, Späth 2018, Turnhout *et al* 2020, Munck and Lachmund 2023).

Responding to this call, this paper explores the quality of UCAP creation processes to enable just urban transformation to move beyond conventional co-production or participatory planning processes by employing the concept of legitimacy. We understand legitimate UCAP creation processes as the procedural basis for just urban transformations and intend to analyse the legitimacy of UCAP creation processes. To do so, we assess the legitimacy of UCAP creation processes in five case studies across four cities—namely Accra (Ghana), Ahmedabad (India), Bonn (Germany) and São Paulo (Brazil) with investigating in Bonn the city-led and the civil society-led UCAP creation process based on 72 semi-structured interviews with policymakers, knowledge holders, city network and civil society representatives and community members.

The remainder of this paper is structured as follows. The next section introduces the conceptual framework, which explores the role of legitimacy in UCAP creation processes and the criteria of input, throughput, and output legitimacy. Following this, we detail the research design and methods used to examine UCAP processes across the four case study cities. The results section presents an analysis of the legitimacy of each city’s UCAP process, identifying key factors that influence procedural quality. In the discussion, we reflect on the role of city networks, the importance of local capacity, and the broader implications of legitimate UCAPs for fostering just urban transformations. Finally, we conclude with policy recommendations and practical insights for enhancing the legitimacy of UCAP creation processes.

By focusing on legitimacy, this paper advances the understanding of UCAP creation processes and offers a framework to support just and equitable urban transformations. Tailored for policymakers concerned with urban transformation and city network representatives, this research provides practical insights that can help enhance procedural quality, fostering accountability and inclusivity in urban climate governance.

2. Conceptual framework

This section introduces the conceptual framework for analysing legitimate UCAP creation processes. It discusses the importance of legitimate UCAPs for enabling just and equitable urban transformation and outlines criteria of input, throughput, and output legitimacy for providing a structured approach to evaluating UCAP legitimacy.

2.1. Legitimate UCAP creation for enabling just urban transformation

In light of climate change and related mitigation and adaptation actions, cities all over the world are set to change fundamentally within the next decades (Adelekan *et al* 2022, Revi *et al* 2022). This transformation will

⁵ In this project we speak of (just) urban transformations to account for a deeper, more radical shift that goes beyond incremental changes or a simple transition from one state to another which could be implied by instead of just urban transition, acknowledging that terms are used often interchangeably in the literature (Torrens *et al.*, 2021).

⁶ UCAPs are increasingly co-produced, e.g. in Delhi (Lall *et al.*, 2023), Barcelona (Satorras *et al.*, 2020), Naples (Visconti, 2023), Berggruen (Ziervogel *et al.*, 2016).

increasingly be guided by the process, ambition, and implementation of urban climate action plans (Reckien *et al* 2018, Deetjen *et al* 2018, Pietrapertosa *et al* 2019).

Initially, UCAPs focused predominantly on mitigating greenhouse gas emissions from ‘end-of-pipe’ sources, reflecting a narrow emphasis on technical solutions to reduce emissions (Bulkeley 2010, Geneletti and Zardo 2016). However, since the 2015 Paris Agreement and the completion of the IPCC’s Fifth Assessment Cycle, there has been a notable shift toward integrating adaptation measures into these plans (Aboagye and Sharifi 2023, 2024). Despite this progress, UCAPs often inadequately address equity and justice, overlooking the disproportionate impacts of climate actions on vulnerable populations (Finn and McCormick 2011, Fitzgerald 2022, Kato-Huerta and Geneletti 2023, Reckien *et al* 2023).

This lack of equity and justice addressed in UCAPs points to the importance of their creation processes. In these processes both political interests and knowledge are integrated, encompassing the interests of included stakeholders such as policymakers from different levels of governance, civil society or business representatives and citizens for instance. These interests are integrated with different forms of knowledge, including global science about the physical base of climate change and scientific and other local knowledge about mitigation and adaptation options.

Given the scale of the transformations required for addressing the climate crisis in cities, it can be argued that this transformation should be carried out in a just and equitable manner (Hughes and Hoffmann 2020, Henrique and Tschakert 2021, Torrens *et al* 2021). To enable just urban transformation, this paper argues that legitimate UCAP creation processes can form a sound procedural basis. Adopted from political philosophy, where legitimacy is often viewed as the enabler for just outcomes (Habermas 1971, Christiano 2004, Rawls 2005, Pettit 2012), this paper views legitimate UCAP creation processes as the enabler for just urban transformations⁷. We hence understand legitimacy to enhance UCAP creation processes by improving both inclusivity and epistemic quality. Inclusivity in this regard is understood as including diverse stakeholders within the UCAP creation ensuring that they substantially participate (Al-Humaiqani and Al-Ghamdi 2022, Cambridge Dictionary 2024); epistemic quality refers to the extent to which knowledge is considered holistically for the UCAP to be built upon a credible base.

Through enhancing the inclusivity and epistemic quality of UCAPs through legitimate creation processes, it is also expected that their effectiveness is increased—legitimate UCAPs are more likely to be implemented (Cashmore and Wejs 2014, Grove *et al* 2020, Eneqvist *et al* 2022). Studying UCAPs, Cashmore and Wejs (2014) and Klein *et al.* (2016) found that legitimacy is key for the prioritisation within local administrations. Hence for UCAPs to become implemented they suggest that legitimacy itself could be instrumental in ensuring the effectiveness of UCAPs (Cashmore and Wejs 2014, p. 211).

2.2. Criteria of legitimacy for UCAP creation processes

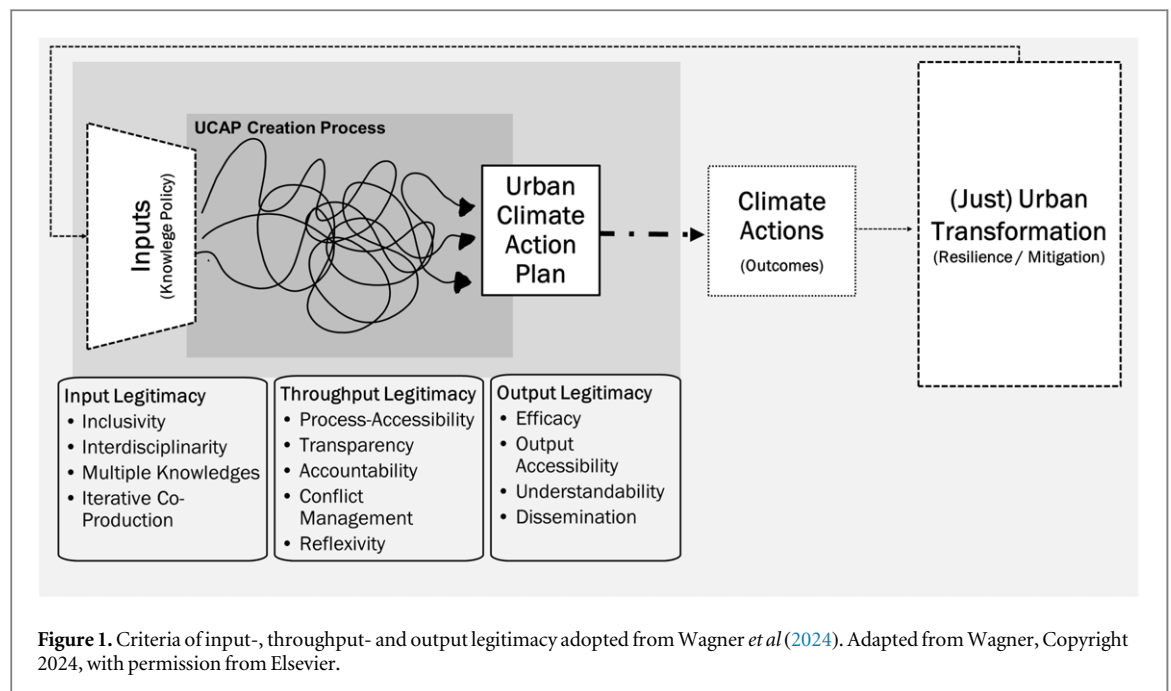
Following the legitimacy literature, UCAP legitimacy is conceptualised as ‘input, throughput, and output legitimacy’. Input-legitimacy criteria assess the quality of participation and holistic knowledge integration in UCAP creation and results from the responsiveness to citizens’ concerns as a consequence of participation *by* the people. Output legitimacy is about the effectiveness of the UCAP *for* the people (Schmidt 2013, p. 2) and hence is its ability to foster the climate action laid out in the UCAP. UCAP throughput-legitimacy relates to all procedural aspects of how the UCAP interest and knowledge inputs are transformed into outputs (Beck and Zürn 1998, Schmidt 2013, Steffek 2019).

For making this conceptualisation of UCAP legitimacy into ‘input’, throughput’ and ‘output’ legitimacy actionable, this paper adopts the criteria of an integrative literature review on processes integrating knowledge and policy in the sustainability context of Wagner *et al* (2024). This framework is chosen because it offers actionable criteria for conceptualising the legitimacy of knowledge policy creation processes in different sustainability contexts across scales and geographies and hence was suitable for assessing legitimacy within local climate action plan processes⁸. From this framework 13 criteria useful for answering the research question of this study are briefly introduced in the following and are illustrated in figure 1.

Assessing the quality of participation and holistic knowledge integration in UCAP creation, input-legitimacy criteria include the inclusive participation of policymakers, politicians, civil society organisations, citizens and other affected stakeholders while holistic knowledge integration includes various knowledge systems and interdisciplinary scientific knowledge. Iterative co-creation, indicating continuous interaction between policymakers and knowledge holders to jointly produce the UCAP, captures the aim of integrating knowledge and policy (Wyborn *et al* 2019, Chambers *et al* 2021).

⁷ Legitimacy in this paper is understood in a procedural way and hence resembles characteristics of concepts such as ‘procedural justice’ and ‘procedural equity’.

⁸ While the framework was exemplary applied to knowledge-policy institutions at the global level, namely the Intergovernmental Panel on Climate Change (IPCC) and the Interstate-Platform on Biodiversity and Ecosystem Services (IPBES), the framework is designed to enhance the legitimacy of process in the sustainability context at all levels.



Criteria of throughput legitimacy comprise the accessibility for enabling substantive participation of stakeholders, transparency of participants' selections and the process of writing the UCAP transparently, conflict-management and accountability mechanisms as well as reflexivity about possible power imbalances between participants and measures for mitigating those (Wagner *et al* 2024). Criteria of output legitimacy include efficacy and hence how tailored the UCAP is to the city, accessibility, understandability and dissemination (*ibid.*).

Grounded in criteria of input, throughput, and output legitimacy, this framework is expected to offer a valuable lens to critically examine and enhance the legitimacy of urban climate action plan creation processes by elucidating dynamics of how knowledge is integrated into urban climate policymaking.

3. Research design and methods

This section outlines our approach to examining the legitimacy of UCAP creation processes across four cities. We employ a qualitative comparative case study method, utilising semi-structured interviews and document analysis. The following subsections detail our case selection, describe our data collection methods, and explain our analytical approach.

3.1. Case studies

This study analyses the UCAP creation process of four cities, namely Accra (Ghana), Ahmedabad (India), Bonn (Germany), and São Paulo (Brazil). In addition to being classified as cities according to UN-Habitat (UN-Habitat 2024), in all of the study locations at least one UCAP in the last five years has been developed. Further, the selected cities are located in a democracy. Being members of a network of climate-ambitious cities or 'mitigation forerunners' (Otto *et al* 2021, Leal and Paterson 2024), all four cities have the potential to lead by example in their respective geographical contexts. The accessibility to potential interviewees was also an important selection criterion with the four research locations being chosen given that the research was embedded in a larger research project with partner institutions in each city. With this selection, we aim to balance comparability and variety of the case study location with the feasibility of conducting study.

Five UCAP creation processes were analysed across four cities. Bonn developed two separate UCAPs in parallel, one by the city administration and one by a civil society organisation called 'Bonn im Wandel'. While these two plans in Bonn were merged to some degree after completion, during the research it became evident they were two separate processes which hence need to be considered as such. The final selection comprises:

1. Accra Climate Action Plan, Accra, Ghana (AMA 2020)
2. Ahmedabad, India (AMC 2023)
3. Klimaplan 2035 Bonn, Bonn, Germany - City-led UCAP (Stadt Bonn 2023)

4. Bürger*innen Klima-Aktionsplan Bonn, Germany - Civil society-led UCAP (Bonn4Future 2022)
5. Plano de Ação climática do município de São Paulo, São Paulo, Brazil (Secretaria de Governo Municipal 2022)

We acknowledge that the creation of UCAPs is not independent of the economic and governance context within which they fall nor of the international political economy. With regards to the resources available for planning climate action, for instance, it is noteworthy that GDP per capita in Germany is about four times higher than in Brazil and 10 times higher than in Ghana (World Bank 2008)⁹.

With regards to the level of autonomy cities have in deciding about having climate action plans or not, there are significant differences to be noted. For instance, constitutionally, the political system in Ghana is much more centralised with the national level determining local decision-making (Mohammed 2022). In Germany and Brazil, by contrast, decision-making power is much more separated (Bäumer and Kroës 2016, Rodrigues 2018). In India, several urban planning decisions are under the purview of the state governments (Idiculla 2020). While these contextual factors do not directly determine the legitimacy of UCAP creation processes, they provide crucial background for understanding the diverse challenges and opportunities each city faces in developing its climate action plans because these factors can influence the resources available for stakeholder engagement, the breadth of expertise that can be drawn upon, and the political landscape within which climate action must be negotiated.

3.2. Data collection and analysis

3.2.1. Data collection methods

Our study primarily relied on two complementary data sources: semi-structured interviews and document analysis. The cornerstone of our data collection effort was a series of in-depth interviews conducted with key stakeholders involved in the UCAP creation processes across our four case study cities. From February to December 2023, the first author conducted a total of 72 semi-structured interviews, engaging with a diverse array of participants who played crucial roles in shaping their respective city's climate action plans (see appendix B for a complete list of interview partners)¹⁰. We began with a review of each city's UCAP and related online resources, identifying individuals mentioned in acknowledgements, members of steering committees or working groups, and representatives from organisations cited as contributors. This initial scan provided us with a foundational list of potential participants. We then employed a snowball sampling technique, asking our initial interviewees to recommend other significant actors in the UCAP process (Naderifar *et al* 2017).

In selecting our interviewees, we prioritised individuals with direct involvement in or significant knowledge of the UCAP creation process. We strived to achieve a balance across different stakeholder types and, to the extent possible, maintain gender diversity among our participants. We aimed to capture a wide spectrum of perspectives to ensure a comprehensive understanding of each city's UCAP development. Relative to representatives from policymaking, depending on the involvement from different levels of policymaking, and city networks, fewer interviews have been conducted with stakeholders from knowledge institutions, citizens, civil society or the private sector given the fact that overall they have had less important or even no role in the processes.

The interviews were conducted in-person and online, depending on the interviewee's location and preference. The first author is fluent in English, Portuguese, and German, allowing to conduct interviews in the participants' preferred language. After participants consented to their participation in the study, interviews typically lasted between 45 to 60 min with some significant variation¹¹. Conditional upon participants' consent, interviews were audio-recorded and later transcribed and non-English interviews were transcribed with the help of AI, being carefully reviewed by the team members.

Our interview structure was guided by the conceptual framework introduced in section two, focusing on three key areas: the role of knowledge and knowledge-policy collaboration in the UCAP creation process, criteria of legitimacy in knowledge-policy interactions, and enablers and barriers for legitimate UCAP creations. The interview questions were specifically developed for this research, with adaptations made before each interview to ensure they were context- and stakeholder-specific. While we maintained a consistent core of questions across all interviews, we tailored our approach to each participant's specific role and expertise. Importantly, our semi-structured format allowed flexibility for interviewees to explore themes they deemed significant, potentially uncovering important aspects we hadn't explicitly addressed in our questions.

To complement our interview data, we conducted a document analysis of the UCAPs themselves, and included documents interview participants referred to during the interviews as key texts that influenced the

⁹ An overview of these contextual factors is found in table 1.

¹⁰ Under the registration code '14c_22 Niklas Wagner', this study received ethical approval on 27.04.2022.

¹¹ The shortest interview lasted less than 10min while the longest was more than three hours.

Table 1. Overview of the four case study cities.

City					Political system and GDP
City Name	Local Government	Country/Region	City Population ^a	Political System	National GDP per capita (PPP 2022) (USD) ^b
Accra	Accra Metropolitan Assembly (AMA)	Ghana/Africa	0.284 Mio (Greater Accra 5.5Mio)	Unitary presidential constitutional democracy	6473
Bonn	Stadt Bonn	Germany/Europe	0.336 Mio	Federal parliamentary republic.	66616
São Paulo	Prefeitura de São Paulo	Brazil/South America	12 Mio.	Federal presidential constitutional republic.	17827
Ahmedabad	Ahmedabad Municipal Cooperation	India/Asia	8 Mio.	Federal parliamentary democratic republic.	8400

^a (Bundesstadt Bonn 2022; GSS 2021; IBGE 2022; Vasudha Foundation 2022).

^b (World Bank 2024).

UCAP development. These included party manifests, public communications, and policy briefs related to the climate action planning process.

It is noted that in-person interviews contributed to establishing a relationship of trust between the researcher and the interview partners. We acknowledge that the first author's whiteness certainly opened some doors. While certainly many doors were opened, some remained closed: Many more stakeholders than the 74 interview partners have been approached but declined the request or did not allow a recording. Additionally, we recognize that some nuances may have been lost in the translation of interviews not conducted in English.

3.2.2. Data analysis

Our data analysis process employed a multi-step approach that combined inductive and deductive coding strategies, thematic analysis, and validation techniques. The analysis began by importing all interview transcripts and relevant documents into MAXQDA 2022 software. We then developed an initial coding framework based on our theoretical understanding of legitimacy in knowledge-policy interactions and UCAP creation processes. This framework was not static; rather, it underwent iterative refinement through team discussions and pilot coding of a subset of interviews employing an inductive-deductive approach (Boyatzis 1998) and a constant comparison technique (Tesch 2013) to identify emerging themes and continuously refine our coding structure.

The final coding structure encompassed several major categories, including the 13 legitimacy criteria, knowledge types and sources, stakeholder roles and interactions, barriers and enablers to legitimate UCAP creation, and context-specific factors. Our primary unit of analysis was the individual UCAP creation process in each city, allowing us to capture the unique characteristics and dynamics of each case. To ensure coding validity, multiple team members independently coded a subset of interviews. We held regular team meetings to discuss and resolve any coding discrepancies, using these sessions as opportunities to refine our coding framework and align our interpretations. This collaborative approach enhanced the consistency of our coding process.

We utilize the analysis tools of MAXQDA 2022 to conduct cross-tabulations of codes across case studies, gender and stakeholder types, enabling us to identify patterns and relationships within our data. Thematic analysis was performed to identify recurring patterns and themes both within and across cases.

4. Results

This section presents the findings of our study on the legitimacy of UCAP creation processes, focussing on the comparison between the five different processes¹². To provide a comprehensive understanding of the legitimacy of UCAP creation processes, we first describe the UCAP creation process itself, followed by an analysis of its legitimacy.

4.1. UCAP creation process

To understand the process of UCAP creation, we conceptually divide it into three phases and eight steps—the initial and design, the knowledge-interest integration and the finalisation phase. This framework systematically examines the process, from initial motivation to adoption and implementation. Figure 2 illustrates the three phases of UCAP creation, with table 2 providing detailed summaries of the five processes examined in this study.

4.1.1. UCAP process-design phase

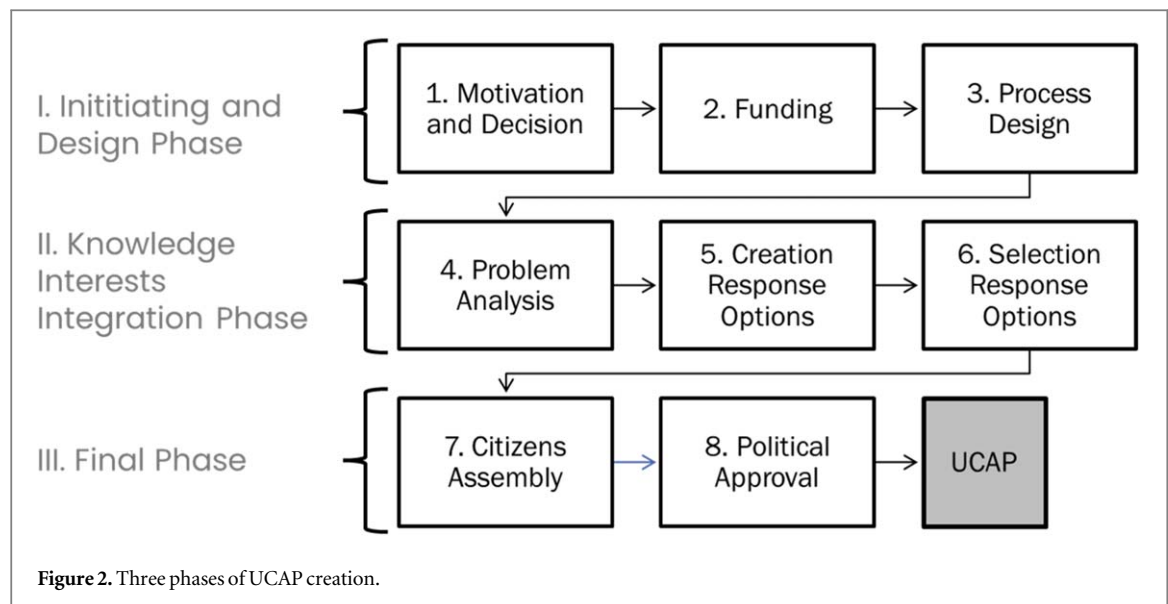
The UCAP creation process begins with the initial motivation and design phase, which is deeply embedded in the political context of each city. This phase sets the foundation for the entire UCAP development process.

In cities like Accra and Ahmedabad, national policy interests have played a significant role in shaping the UCAPs. For instance, Ahmedabad aligned its plan with the Government of India's goal of achieving net-zero emissions by 2070. In Accra, strong political support stemmed from the president's public commitment to make the capital 'the cleanest city in Africa' (Daily Graphic 2017).

The global context, particularly the Paris Agreement, has created a favourable environment for climate action in all study countries. This international commitment has prompted city network organisations to encourage their members to create UCAPs and has facilitated funding for these initiatives. For example, C40's 'Deadline 2020' campaign was the catalyst for São Paulo's UCAP creation (C40 2020). In Bonn, civil society pressure led to the declaration of a climate emergency and subsequent UCAP initiations (Klimawache Bonn 2019),

Funding for all five UCAP creation processes came from the Global North—despite three of the cities being located in the Global South: In Ahmedabad, the Swiss Development Cooperation funded the process, in Accra it

¹² As hypothesised, cross-tabulation analysis across stakeholder types and gender the number of coded segments across the different codes being proportional to the number of interview partners pointing to no significant results to report in this regard.



was the German Ministry for the Environment and in São Paulo the British BEIS ministry supported the creation process. Funding was channelled through the respective city network organisations.

City network organisations played a crucial role not only in funding but also in designing the UCAP creation process. Their past experiences in creating UCAPs worldwide provided valuable templates, especially for city-administration-led UCAPs. In Accra and Ahmedabad, the UCAP process was primarily designed by the respective city network organisations and their staff, who were integrated into the municipal structure. In Bonn and São Paulo, relevant departments designed the process with support from city network organisations¹³.

4.1.2. Knowledge-interest integration phase

Designed in the previous phase, in the knowledge-policy interaction phase of UCAP creation knowledge and policy are integrated. This phase of UCAP creation started with some form of problem analysis or vision setting. In all city-led climate action plans, greenhouse gas inventories to identify sectors with high mitigation potential were created and additionally, in all three Global South cities, a vulnerability analysis was undertaken. These tasks were partially outsourced to different knowledge institutions. In Accra and Bonn's civil society UCAP there was a positive vision of a future city created jointly by the involved stakeholders (AMA 2020, Bonn4Future 2022).

After problem identification and vision setting, the core of UCAP creation processes followed, identifying possible response options and prioritising them. Only in Bonn's civil society plan, the identification of response options was done from scratch, all other UCAPs are to some extent based on possible response options from the repertoire of their respective city network organisations. Exemplary for this is the 'Basket of Solutions', the response option repertoire of the actions considered in Ahmedabad (Capacities Project 2020).

In Bonn and São Paulo, options for climate action were co-created and prioritised mainly by the different departments of the city, complemented by some stakeholder engagement in São Paulo. In Accra, more than 100 actions were co-created between the stakeholders included in the process with 20 actions being prioritised in a multi-criteria analysis (AMA 2020).

4.1.3. UCAP finalisation phase

The final phase of UCAP creation involves presenting the draft plan to citizens and gaining political approval.

In São Paulo and Accra, this phase began by presenting a draft of the UCAP to citizens for information and consultation purposes (Interview 38, AMA 2020). Before implementation, UCAPs in the study areas have been politically adopted by the respective city councils, in Bonn and São Paulo in modified versions¹⁴. Across all study cases, the UCAP was described as the city's strategy for climate action. Most UCAPs focused on municipal climate action, with São Paulo's UCAP being unique in including a chapter on individual action for citizens.

4.2. Legitimacy of UCAP creation process

Having established an understanding of the UCAP creation process, we now turn to analysing the legitimacy of these processes. This analysis is based on the conceptual framework presented in section two.

¹³ Interviews 28,31,34,35,38,45.

¹⁴ Interviews 33,52.

Table 2. Summary of the different stages of the five urban climate action plans.

Name of the UCAP (year of finalisationN)	Process-design phase					Knowledge-policy interaction phase			Finalisation phase	
	1. Concrete Motivation	2. Funding	3. Process-Design			4. Problem Analy- sis—Vision Setting	5. Response Crea- tion and Prioritisation	6. Response Prioritisation	7. Citizens Assembly	8. Political Decision
			Main stakeholders	Template	Principles					
Accra Climate Action Plan (2020)	-Accra being a C40 city Funding possi- bilities National demands	BMUV (Ger- many) through C40	AMA, C40	C40	Inclusivity of Stakeholders	City Vision 2050 and inventory in a Stakeholder workshop	Co-creation with stakeholders	Prioritisation through multi- criteria analysis between stakeholders	Citizens Assembly for consultative purposes	Through council
Klimaplan 2035 Bonn (2020)	-Civil society pres- sure and following	City funding	Stadt Bonn, gertec and Jung Stadt- konzepte, WI	Gertec	No information	GHG Inventory created by city net- work organisations	Co-creation between CNO and city department	Not applicable	No	Through local council
Bürger*innen Klima-Aktions- plan (2020)	cities' climate emergency	Citizens Engage- ment Project Funding through the City of Bonn	Bonn im Wandel (civil society)	Not used	Co-creation	City Vision 2035 in Citizen Stake- holder Format cocreated	Co-creation with Citizens Stakeholder workshop, prioritisation only partially happened		Not applicable	Considered by Municipality.
Plano de Acao cli- matica do muni- cipo de São Paulo (2020)	-Municipality approached C40 given C40 Initiative	BEIS (UK) through C40	C40, Secretaria do Verde	C40	Cross-depart- mental collaboration.	GHG Inventory and Vulnerability Mapping by differ- ent knowledge institutions	Co-creation between various departments of the city and stakeholders	Not applicable	Citizens assemblies happened	Through municipality
Climate Resilience City Action Plan Ahmedabad (2023)	-Development project -Interna- tional Commitments	Swiss Develop- ment Agency	Econcept, ICLEI and AMC (partially)	Capacities Project	No information	ICLEI vulner- ability mapping and GHG inventory	Actions of pre- vious cities tai- lored to Ahmedabad	No information	No information	No information

4.2.1. Input legitimacy of UCAP creation processes

Input legitimacy in UCAP creation processes encompasses several overlapping criteria: inclusivity, multiple knowledge, interdisciplinarity, and iterative co-production.

Accra's UCAP creation process stands out for its focus on inclusivity. The process design principle emphasized integrating vulnerable communities, resulting in participation from a diverse range of stakeholders. These included political actors, university representatives, private sector representatives, informal waste collectors, market women, and traditional chiefs. All these groups participated in numerous meetings to co-create the UCAP, jointly selecting solutions and creating a shared vision (AMA 2020).

The inclusion of diverse stakeholders and their climate-related knowledge and its impacts contributed significantly to the input legitimacy of Accra's UCAP creation process. Notably, several universities and research institutions across the country contributed both formally and informally, despite the UCAP team not placing 'too much premium on academic contributions' as the focus was on creating a 'workable document for the local government, not an academic paper' (Interview 7). While experts from multiple disciplines contributed to Accra's UCAP, some gaps were noted. For instance, expertise in biodiversity and urban greening was not considered, and stakeholders such as the flower grower association were not invited¹⁵.

Bonn's Civil Society UCAP was designed with a co-production intention. In four mini fora of each two days, 100 randomly selected citizens were invited as 'experts of living in Bonn' (Bonn4Future 2022, min 15:30) to create a citizens' UCAP together with 25 representatives of initiatives, companies and institutions (Bonn4Future 2022)¹⁶. These 125 participants came together with technical experts from policymaking and research to co-create a strategy towards carbon neutrality. Unlike the city-administration-led UCAPs, Bonn's civil society process began by co-creating a joint, positive vision of life in Bonn in 2035. This was followed by sessions on finding concrete actions for various sectors such as housing, culture and sports, and food systems. However, despite co-productive intentions, the project design was tailored towards citizens creating 'their' climate plan, with knowledge-holders and policymakers serving as consultants rather than co-creators. This approach is evidenced by the fact that policymakers were briefed about the results of the deliberations after each citizens-stakeholder forum, indicating that the UCAP was not fully co-created between policymakers, knowledge holders, and society, but rather represents a 'citizens' version' of a UCAP (Bonn4Future 2022).

In São Paulo and Bonn's city administration, UCAPs were mainly created within the municipal administration, supported by their respective city network organisations. Additionally, in São Paulo, stakeholders from civil society, business and knowledge institutions have been consulted on specific topics, emphasising the 'transversal nature of climate action' throughout the UCAP and its creation (Interview 38). Further, São Paulo's UCAP stands out as next to motivating climate action through local and global science, artistic knowledge in the form of poems or song lyrics was used to 'emotionally engage the implementers' (Interview 38).

Given that parallel to Bonn's city administration UCAP the civil society organisation 'Bonn im Wandel' produced a citizen's plan, there were no own efforts for creating an inclusive UCAP by Bonns' city administration, relying on 'stitching both plans together at some point'¹⁷. With regards to both UCAPs in Bonn, it is noted that both were designed from the beginning as mitigation-centred plans without giving knowledge holders included in the plan the possibility to provide arguments for planning adaptation and mitigation together.

Similarly, Ahmedabad's UCAP creation was not designed in a participatory manner including various stakeholders and their demands and expertise but followed rather a linear model of knowledge-policy interaction: Ahmedabad's city network organisation conducted the problem analysis through a GHG inventory and a vulnerability mapping combining qualitative and quantitative methods and suggested actions from a given set of actions the city network have collected from other projects in the past¹⁸. While in some cases these 'solutions' have been selected with the respective heads of department of Ahmedabad Municipality¹⁹, in other cases the heads of departments were not aware of their municipalities' climate action plan despite being mentioned as authors in it²⁰. One interview partner said that including names by default is 'common government practice' (Interview 66). While this does not imply that their departments did not engage with the cities' plan-making team and did not provide them with data, for instance, it implies that the process had limited involvement of the local decision-makers.

¹⁵ Interviews 5, 6.

¹⁶ Interviews 33, 37.

¹⁷ Interviews 28,29,31,33,34.

¹⁸ Interviews 61, 62, 70.

¹⁹ Interviews 64,69.

²⁰ Interviews 60,65,66.

Table 3. Input legitimacy criteria for five UCAP creation processes.

Legitimacy criterion.	Accra	Bonn civil society	Bonn admin	São paulo	Ahmedabad
Inclusivity	Explicit focus on inclusion of vulnerable stakeholders, intention on informal through civil society, town hall meetings, explicit gender focus missing. Private sector and political institutions included	Focus on citizens (100 randomly selected) and 25 stakeholders. Policymakers spoke as experts.	No participatory process external to the city administration	Focus on administrative level, core-stakeholder engaged. Citizen participation formats (town hall meetings) were used.	No information about the degree of inclusivity is available.
Multiple Knowledge	Inclusion of specific communities such as traditional chiefs and affected stakeholders such as waste collectors.	Local knowledge of citizens as ‘experts of living in the city’	Not applicable	Inclusion of stakeholders’ knowledge of specific topics	Data collection through qualitative methods (‘Shared learning dialogues’)
Interdisciplinarity /Transdisciplinarity	Multiple disciplines included, informal inclusion ‘discipline-picking’	Experts from various sectors and disciplines included	In-house expertise interdisciplinary	Through broad inclusion of departments’ intention of ‘transversality’.	Different internal expertise within city network organisation, no formal external expertise
Iterative Co-Creation	Iterative meetings, formal and informal, between different stakeholders to co-produce the UCAP	Four fora bringing together citizens and experts, UCAP was created by citizens.	Partial co-creation by city network experts and city administration	Co-creation within city administration supported city network experts	Plan was mostly created by the city network organisation

4.2.2. Throughput legitimacy of UCAP creation processes

Throughput legitimacy in UCAP creation processes relates to the accessibility, transparency, and reflexivity of the process itself. Accessibility varied across the different UCAP creation processes. In Accra, stakeholders from vulnerable communities faced significant challenges in attending meetings due to high transportation costs and the opportunity costs of missing a full day of work²¹. Participants in Bonn's civil society UCAP received a daily allowance to lower opportunity costs²². For this process, it was further highlighted that all locations were physically accessible as well for people with disabilities²³. Additionally, there was the intention to use simple language and there was a simultaneous translation into the mother tongue of two participants whose language was not German²⁴.

Transparency as a criterion of throughput legitimacy was assessed in terms of the selection of stakeholders and the process of drafting the UCAP. With regards to transparency of stakeholder selection, information on how stakeholders have been selected was not written in the UCAP and was not publicly available for all city-administration-led UCAPs. Despite this, among political stakeholders designing the process, transparency was perceived to be high, or transparency did not seem to be a bigger concern captured well by this quote: 'Nothing was hidden from anybody. But not everybody was overloaded with information' (Interview 69). Rather than being driven by criteria selection of stakeholders was rather based on luck as a civil society representative in São Paulo said: 'We were lucky to be in the right place at the right time to be able to take part in the only workshop there was' (Interview 50).

In contrast, Bonn's civil society-led process used a lottery system with criteria such as age, gender, and educational background to ensure a representative selection of citizens. Additionally, 25 stakeholders from civil society were included based on predefined criteria, although the selection criteria for expert speakers remained unclear (Bonn4Future 2022).

Transparency for the drafting process and hence the documentation of how the UCAP came about was overall less of a priority with information on this not publicly available on any site except for Accra. Here the UCAP includes a section on how all the stakeholders have applied a 'multi-criteria analysis' with the criteria being documented (AMA 2020). In the other locations, it might often have been the experts from the city network organisations who are writing and with this partially selecting some of the response options as captured in the following quote from an expert writing the UCAP in Bonn: 'So I don't want to say now that everything is completely immediately comprehensible and somewhere also now and then the gut of the expert decides and says come, we do that now. No, but I did not have the feeling that something was hidden somewhere or back there' (Interview 35).

To ensure the participation of all participants despite differences in their societal backgrounds, the importance of awareness and reflexivity among the moderation facilitating the process was highlighted as important²⁵. While this awareness is important, the moderation of a stakeholder session in São Paulo pointed out the difficulty of usually more powerful stakeholders being better at talking and convincing, endangering the legitimacy of the process: 'I was facilitating that session alone, it was really hard because there was this lady from a big industry, and she was such a good talker' (Interview 45). No accountability nor mechanisms for conflict management for possible conflicts of interest, for instance, have been found.

4.2.3. UCAP output legitimacy

Output legitimacy of UCAP creation processes relates to the quality of the UCAP in terms of its ability to foster the climate action laid out in the UCAP. Output legitimacy focuses on how effectively the UCAP's content can be implemented. This implies considering the purpose and role of the UCAP and its target audience. As UCAPs are intended to guide municipalities towards climate neutrality (and resilience), the main audience of UCAPs is typically the staff responsible for implementation often located within the local administration.

One criterion of output legitimacy is efficacy understood as 'the extent to which the output fits the problem at hand, and is relevant for solving it effectively' (Mena and Palazzo 2012). In Bonn, one stakeholder responsible for implementation raised this issue of reduced efficacy. Speaking about the city network organisations developing the UCAP for Bonn he said 'They have a very broad municipal experience. Nevertheless, the result was a large work with seven main topics, ranging from the economy to mobility and so on, where it became clear that they are not quite in the depths of Bonn's reality as far as the administration is concerned' (Interview 29). This lack of efficacy points to a lack of co-production showing how input legitimacy is linked with output legitimacy.

²¹ Interviews 7, 15.

²² Interview 32.

²³ Interview 35.

²⁴ Interview 35.

²⁵ Interviews 32,45.

Table 4. Throughput legitimacy criteria.

Legitimacy criterion.	Accra	Bonn civil society	Bonn admin	São Paulo	Ahmedabad
Accessibility	High opportunity cost for vulnerable stakeholders not covered.	Daily allowance paid for participating stakeholders, people with disability taken into account, simple language used, translation service, clear moderation rules	Not applicable	No information	Not applicable
Transparency Stakeholder Selection	No transparency, following the city network organisation's stakeholder selection format	Citizens are selected by lottery, snowballing for experts	No information	Intransparent process	No information
Transparency Writing Process	No information	Transparency of all submissions	No information	No information	No information
Reflexivity	No information	Power differences are acknowledged, and the intention of mitigation is through clear rules and moderation.	No information	Power differences acknowledged the intention of mitigation through moderation.	No information
Accountability or Conflict Management Mechanisms	No information	No information	No information	No information	No information

Table 5. Criteria of output legitimacy.

Legitimacy criterion.	Accra	Bonn civil society	bonn admin	São Paulo	Ahmedabad
Efficacy	Funding problems	Critique that action suggestions beyond municipal responsibility	Needed to be adopted by the city administration	No information	No information
Output Accessibility	On website accessible	On website	Accessible on the website, but difficult to navigate	Accessible on website	Not published at time of research
Understandable	Simple English, clear	Yes (but long with 400 pages)	Critique of being rather technical	Focus on understanding city administration and emotionally convincing through art.	No information
Dissemination	Active media engagement	Limited dissemination through media, different formats (Summary and small brochure	Featured in the city administration podcast	Through the city's social media records	Not applicable

In terms of output accessibility, all UCAPs, except Ahmedabad's unpublished plan, are available online (March 2024). With the main target group being the city's implementing staff, the UCAP has to be understandable for them to be able to implement the actions. In Accra, stakeholders particularly praised the implementation plan for its high understandability, attributing this to its simple language and concise length—especially when compared to more extensive documents like Bonn's 400-page plan²⁶. In the Indian context, it was pointed out that regional languages might improve understandability, while in São Paulo poems and art have been used to make the document not only technical but to emotionally involve the implementing stakeholders²⁷.

Efforts to disseminate the UCAP to the wider public varied. São Paulo and Accra held consultative citizens' assemblies, and there were media and social media engagement efforts in Accra, São Paulo, and Bonn. While all UCAPs in this study were produced as documents, a city network official mentioned other UCAPs that had also been produced in poster format for the offices of the implementers²⁸.

5. Discussion

5.1. The multiple roles of city networks in UCAP creations

Our findings on the significant roles of city networks in UCAP creation processes align with and build upon the body of literature on transnational municipal networks in global climate governance. City networks play several key roles in UCAP creation processes, including motivation and funding, process design, and knowledge dissemination.

In São Paulo, Accra and Ahmedabad, city networks had critical roles in the initial motivation for creating the UCAP and organising the respective funding, channelling the demands of the funder towards the city as an interview with a stakeholder from a Swiss development consultancy about the Swiss-funded UCAP of Ahmedabad showed. Partnering with the city network ICLEI, this consultancy provided the capacity training to ICLEI ('we train the trainers') as well as the focus of the UCAP design process was designed around the 'basket of solutions' found in previous projects with an explicit focus on mitigation without the intention to be very participatory (Interview 61, memory log). Without Swiss funding, it is likely that the UCAP would not have been created.

In all four city-administration, UCAPs city networks further assumed an influential role in designing how policymakers and knowledge holders come together to create the UCAP. Further, city networks have important knowledge roles: They create their knowledge and translate global knowledge for their members, they organise capacity training and visits as well as their network function has an important knowledge role of sharing best practices and learnings about specific topics related to sustainability²⁹. 'C40 was in fact who had the knowledge and was pulling the strings of the work, so C40 was the financing agent of the plan, it was C40 that did the coordination and the work with the city, helped in the discussions, brought in experts from outside to talk about certain topics, to broaden the discussion' (Interview 44). It should also be noted that city network-led plans could result in a 'repeat menu' of actions from their experience in contrast to fresh and creative locally relevant ideas that could be generated through a more participatory process.

These multiple roles city networks assume make them very powerful actors for UCAP design processes and hence important for fostering local climate action. However, it should be noted that several stakeholders perceive the significant role of city networks in local climate action planning as a reproduction of post-colonial tendencies³⁰. One stakeholder in India summarised it very drastically that UCAPs are 'Western ideas funded by Western money not wanted by the local authorities' (Interview 58). In contrast to Ahmedabad, in São Paulo various stakeholders underlined the very pivotal but supportive role of the city network the local UCAP was co-produced with³¹. This tension between being a pivotal actor in climate action on the one hand and the risk of reproducing post-colonial tendencies has been previously identified in the literature (Bansard *et al* 2017, Barbi and de Macedo 2019, Haupt *et al* 2019).

Building on this research, future studies could further explore how city networks navigate conflicts of interest between organisational goals and the specific development needs and climate ambitions of host cities. Additionally, investigating the long-term impacts of network-led UCAPs on local capacity building and climate

²⁶ Interviews 4,6,7,12,21, 31.

²⁷ Interviews 38,54.

²⁸ Interview 45.

²⁹ Interviews 7,44,45,55, 62,70.

³⁰ Interviews 5,38,54,58.

³¹ Interviews 38,47,48,53.

action implementation could provide valuable insights for improving the effectiveness and equity of these collaborative efforts.

5.2. Lack of local capacity and the importance of local agency

The important role of city networks in the UCAP creation process might be related to the lack of capacity and resources within local administrations for planning and implementing robust climate action reports across all case studies³². Respondents pointed to shortages of trained personnel, limited financial resources, and competing priorities as major challenges hindering cities' ability to develop and operationalise comprehensive UCAPs. This lack of capacity was particularly pronounced in cities in the Global South, where resource constraints and capacity gaps were more severe and might be worsened if city networks just filled a vacuum for creating the UCAP without building up local capacity (Carter *et al* 2015, Reckien *et al* 2018, Grafakos *et al* 2020).

While with general capacity constraints, the local agency of individuals has made a difference. In Accra, it was the mayor's deeply rooted desire for an inclusive process which led vulnerable communities to have a seat at the table (Interviews 13,15,26). Bonn's civil society UCAP was only possible because active individuals had a vision of a co-produced citizens' climate action plan (Interviews 32,35). In São Paulo, the role of particularly one individual in the city's administration has been pivotal for the complete UCAP process from the initial motivation to the final layout (Interviews 38,44,43,45,47,52,53,56). In all cases, local agency and individual ownership have contributed to the UCAP.

5.3. The importance of legitimacy for enabling just urban transformation

Legitimacy is crucial for integrating diverse forms of knowledge, including academic, local, and artistic perspectives, to enhance UCAPs. While in Accra the inclusion of academics demonstrated the potential for creating synergies between scientific and policymaking realms through the active involvement of researchers, in the other four case studies little academic engagement has been found. Beyond scientific knowledge, our findings underscore the significance of incorporating local knowledge and expertise, as well as the power of art in communicating emotions and experiences related to climate change. By embracing a wide range of knowledge sources, UCAPs can better reflect the diverse realities and needs of urban communities, ultimately enabling more holistic and impactful climate action.

To mitigate the risk that UCAPs are perceived to be 'unwanted by local authorities' (Interview 58), legitimacy in the creation process is pivotal: In Ahmedabad, many actors pivotal for implementation did not know about the plan nor its content³³, several other stakeholders voiced concerns that 'it might be one of many plans which soon might be on the shelf'³⁴. If co-created in a participatory process involving citizens, civil society representatives and policy makers within the city administration as well as criteria of throughput and output legitimacy being fulfilled, UCAPs are expected to be better anchored within the local administration and the broader public. Our findings hence mirror the findings of Cashmore and Wejs (2014) showing that legitimacy is important for UCAPs to be implemented and to outlive possible democratic changes in political authority.

However, not only in terms of increasing the likelihood of UCAPs actually being implemented UCAP legitimacy is important but also for contributing that this implementation is just. With fewer female stakeholders having been involved in the UCAP creation process of Accra, it was acknowledged that this lack of gender inclusivity led to the fact that no gender assessment had been carried out, possibly increasing the disproportionate effects of climate change for women (Interview 6, 22) (Denton 2002, Pearse 2017). On similar veins it was mentioned in the same UCAP creation process that due to political reasons the opinion of an expert on biodiversity and climate change was not heard nor the local flower grower association was invited, leading to Accra's UCAP having less emphasis on urban green spaces (Interviews 5, 14). It is reasonable to expect that engaging all these stakeholders would enhance legitimacy and could result in a more legitimate plan.

6. Conclusion and policy recommendations

This study has provided a critical assessment of the legitimacy of UCAP creation processes across four cities- Accra, Bonn, São Paulo, and Ahmedabad. By developing a framework of UCAP input, throughput, and output legitimacy, our findings suggest that legitimacy is not only crucial for ensuring inclusive and participatory processes but also for fostering the epistemic quality necessary for enabling effective urban climate governance. With this we provide an in-depth understanding of the importance of legitimacy for bringing together knowledge and policy to foster climate action, arguing that legitimacy can help mitigate the risks associated with

³² Interviews 21, 26, 29, 33, 42, 70.

³³ Interviews 60,65,66.

³⁴ Interviews 55, 58,59,70.

co-production, which, without transparency, accessibility, reflexivity, and accountability, may inadvertently reinforce existing power imbalances (Turnhout *et al* 2020).

Thereby the article contributes to the literature on legitimacy, knowledge-policy interaction and urban climate planning processes. Specifically, the research presented conceptually contributed to this literature by providing a framework of UCAP input, throughput and output legitimacy which can be used to bring knowledge and policy together in urban climate governance. This legitimacy framework presented here comprises 13 criteria including criteria of inclusivity and co-production but addresses the associated risks through ‘throughput legitimacy criteria’ such as transparency, accessibility and reflexivity. In contrast to much of the literature focusing on the effectiveness of urban climate mitigation and adaptation measures (Setiadi 2018, Addis *et al* 2022, Hochachka *et al* 2022), this paper’s focus on legitimacy aims to enable just urban transformations that go beyond addressing the ‘low-hanging fruits’ of uncontroversial climate change mitigation and adaptation measures.

Empirically, the contributions lie in providing an understanding of the processes of UCAP creation and the extent to which criteria associated with legitimacy can be fulfilled in creating this climate planning. While the selected case studies represent a range of geographical, economic, and political contexts, the comparative analysis focuses on identifying the underlying mechanisms and cross-cutting themes that shape the legitimacy of UCAP creation processes. By examining the extent to which legitimacy criteria are met across these diverse settings, the study provides insights into the universal as well as context-specific factors that influence the procedural quality of urban climate action planning.

Further the study contributes to the literature showing that city networks have emerged as central actors in the design and funding of UCAP creation processes, often providing technical expertise and templates for cities (Barbi and de Macedo 2019, Frantzeskaki 2019). However, while their involvement may contribute to cities creating UCAPs, there is a risk that external funding and frameworks may not necessarily enhance local agency with this risking to foster just urban transformation. To prevent this it is recommendable for city networks operate in a way that empowers local stakeholders and ensures that climate action plans are tailored to the unique socio-political contexts of the cities they serve (Chu 2016). The action guide in appendix A serves as a practical tool for city officials and city network actors, providing operational insights into enhancing the legitimacy of UCAP processes.

While legitimate processes are foundational for just urban transformations, they are not enough in isolation. The successful implementation of UCAPs depends on a broader alignment of political will, financial resources, and institutional capacity (Aboagye and Sharifi 2023). Cities, particularly in the Global South, face acute resource constraints, which can hinder the operationalisation of ambitious climate goals despite having legitimate and well-designed plans.

In conclusion, this paper contributes to the literature by offering a legitimacy-centred framework for assessing UCAP creation processes, which can guide policymakers in designing more inclusive, transparent, and accountable climate action plans for enabling just urban transformations. Given that there is no one-size-fits-all blueprint for just and equitable urban transformations, legitimate UCAP creation processes can form the procedural foundation for guiding such efforts.

7. Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ‘claude.ai’ to improve language and readability in editing parts of the text. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Data availability statement

The data cannot be made publicly available upon publication because they contain sensitive personal information. The data that support the findings of this study are available upon reasonable request from the authors.

CRedit authorship contribution statement

Niklas Wagner: Conceptualization, Methodology, Investigation and Interviews, Formal Analysis, Visualization, Writing—original draft, Project administration. **Minal Pathak:** Writing—Review and editing, Supervision.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical compliance

The research team abided by the institutional and legal standards in Germany regarding ethical approval. This study was non-interventional, thereby, the methods used in this paper did not necessitate institutional ethical clearance according to national research regulations.

Appendix A. Action guide

Table A1. Action guide for urban policymakers on legitimacy criteria, adopted from Wagner *et al* (2024). Adapted from Wagner, Copyright 2024, with permission from Elsevier.

Phase in UCAP	Legitimacy criterion	Exemplary operationalisation questions	Key stakeholders	Examples illustrating the institutionalisation of criteria in the UCAP context
Planning				
Process-Design Phase	Inclusivity	-Are affected stakeholders represented directly or indirectly in the UCAP creation process? Is it ensured that there is no discrimination concerning gender, social class or race?	Citizens and/or community representatives, civil society organisations, local government officials and other stakeholders directly affected.	The civil society UCAP in Bonn aimed for gender, age, and educational balance in selecting citizens through a random lottery process.
	Multiple knowledge and perspectives	-To what extent is knowledge other than scientific knowledge included in the UCAP creation process?	Citizens and/or community representatives, civil society organisations, local government officials and academics	In Accra, efforts were made to include vulnerable communities like traditional chiefs, waste collectors, and market women next to policymakers and university professors in the UCAP co-creation process.
	Transdisciplinary	-To what extent are experts' scientific disciplines social and natural science involved in the UCAP creation process? -To what extent is the knowledge included in the UCAP creation process co-produced between experts from different disciplines?	Academics from a variety of disciplines with inter- and transdisciplinary expertise	In Accra, experts from multiple disciplines across universities were included informally in the UCAP creation process.
	Iterative Co-Creation	-To what extent is the UCAP continuously and jointly co-produced between the different stakeholders?	Citizens and/or community representatives, civil society organisations, local government officials and academics	Bonn's civil society UCAP involved four two-day fora where citizens, experts, and policymakers co-created the plan.
Knowledge-Policy Integration Phase	Process-Accessibility	-To what extent are physical, language, and practical barriers mitigated for stakeholders to substantively participate in the UCAP creation process?	Local government officials and others designing the process.	In Bonn's civil society UCAP process, daily allowances were provided to participants, venues were accessible, simple language was used, and translation services were offered.
	Transparency	-Is the information on the process of how stakeholders are selected for providing input to the UCAP publicly available and comprehensible? -Is the information on how UCAP outputs are formed publicly available?	Local government officials and others designing the process.	Bonn's civil society UCAP had a transparent process for selecting citizens (random lottery) and stakeholders (defined criteria).
	Reflexivity	-Are reflective activities occurring intending to mitigate possible power asymmetries between stakeholders?	Local government officials and others designing the process, participants and importantly the moderation of the process.	In São Paulo, moderators aimed to ensure balanced participation despite power asymmetries.
Finalisation Phase	Efficacy	-To what extent are the outputs tailored to the problem at hand?	Local government officials and others designing the process.	In Bonn's administration plan, a stakeholder critiqued the city network-developed UCAP for lacking depth in the local context, highlighting the need for tailoring outputs to local realities.
	Output- Accessibility	-To what extent is the UCAP publicly accessible?	City administration	All studied UCAPs were made publicly accessible on websites.

Table A1. (Continued.)

Phase in UCAP	Legitimacy criterion	Exemplary operationalisation questions	Key stakeholders	Examples illustrating the institutionalisation of criteria in the UCAP context
Planning	Under-standability	-To what extent is the UCAP comprehensible for the relevant stakeholders?	Relevant stakeholders the UCAP is designed for, often city administrations but could include broader target groups as well.	Accra's UCAP was praised for its simple language and brevity, making it comprehensible for stakeholders involved in implementation.
	Dissemination	-Are there various formats of the UCAP? -To what extent is the UCAP distributed through media engagement?	Media outlets, communication officers of the respective cities, city networks	All studied UCAPs except Ahmedabad's (unpublished at the time), were to some extent disseminated to a wider public through media and social media channels.

Appendix B. Interview list

Table B1. Interview list.

Interview ID	Date	Interview location	Research country	Gender	Stakeholder type ^a
1	07/02/2023	In-person	Ghana	Female	Policy
2	13/02/2023	In-person	Ghana	Female	University/Research Organisation
3	13/02/2023	In-person	Ghana	Female	University/Research Organisation
4	20/02/2023	Online	Ghana	Male	Policy
5	20/02/2023 and 22/02/2023	Online	Ghana	Male	University/Research Organisation
6.1	24/02/2023	In-person	Ghana	Male	Policy
6.2	24/02/2023	In-person	Ghana	Male	Policy
7	03/03/2023	Online	Ghana	Male	City Network
8	07/03/2023	In-person	Ghana	Male	Civil Society/Community
9	08/03/2023	Online	Ghana	Female	City Network
10	09/03/2023	In-person	Ghana	Male	Policy
11	13/03/2023	In-person	Ghana	Female	Civil Society/Community
12	15/03/2023	In-person	Ghana	Male	Policy
13	16/03/2023	In-person	Ghana	Female	Civil Society/Community
14	16/03/2023	In-person	Ghana	Male	Civil Society/Community
15	17/03/2023	In-person	Ghana	Female	Civil Society/Community
16	22/03/2023	online	Ghana	Male	University/Research Organisation
17	27/03/2023	online	Ghana	Female	Private Sector
18	27/03/2023	online	Ghana	Female	Private Sector
19	16/03/2023	In-person	Ghana	Male	Policy
20	15/03/2023	In-person	Ghana	Male	Civil Society/Community
21	27/03/2023	In-person	Ghana	Male	Policy
22	30/03/2023	In-person	Ghana	Male	Policy
23	30/03/2023	Online	Ghana	Male	University/Research Organisation
24	30/03/2023	In-person	Ghana	Male	University/Research Organisation
25	30/03/2023	In-person	Ghana	Male	University/Research Organisation
26	31/03/2023	In-person	Ghana	Male	Civil Society/Community
27	31/03/2023	In-person	Ghana	Male	City Network
28	06/07/2023	Online	Germany	Female	City Network
29	15/06/2023	Online	Germany	Male	Policy
30	19/06/2023	Online	Germany	Male	City Network
31.1	20/06/2023	Online	Germany	Female	Policy
31.2	20/06/2023	Online	Germany	Female	Policy
32		Online	Germany	Male	Civil Society/Community
33	28/06/2023	Online	Germany	Male	Policy
34	26/07/2023	Online	Germany	Male	City Network
35	26/07/2023	Online	Germany	Male	City Network
36	25/07/2023	Online	Germany	Male	Private Sector
37	15/08/2023	Online	Germany	Female	University/Research Organisation
38	20/07/2023	In-person	Brazil	Female	Policy
39	10/08/2023	In-person	Brazil	Male	Policy
40	31/08/2023	In-person	Brazil	Male	University/Research Organisation
41	15/08/2023	In-person	Brazil	Female	University/Research Organisation
42	17/08/2023	Online	Brazil	Female	University/Research Organisation
43	18/08/2023	Online	Brazil	Female	Policy
44	25/08/2023	Online	Brazil	Male	University/Research Organisation
45	26/08/2023	In-person	Brazil	Female	City Network
46	01/09/2023	In-person	Brazil	Female	University/Research Organisation
47		In-person	Brazil	Female	Policy
48	01/09/2023	In-person	Brazil	Female	City Network
49	04/09/2023	In-person	Brazil	Male	Civil Society/Community
50	05/09/2023	In-person	Brazil	Male	Civil Society/Community
51	08/09/2023	Online	Brazil	Male	Policy
52	13/08/2023	In-person	Brazil	Female	Policy
53	12/08/2023	In-person	Brazil	Male	Policy
54	25/09/2023	Online	Brazil	Male	Policy
55	07/10/2023	Online	Brazil	Male	City Network
56	26/09/2023	Online	Brazil	Male	University/Research Organisation

Table B1. (Continued.)

Interview ID	Date	Interview location	Research country	Gender	Stakeholder type ^a
57	25/10/2023	In-person	India	Male	Policy
58	27/10/2023	In-person	India	Male	University/Research Organisation
59	31/10/2023	In-person	India	Female	Policy
60	06/11/2023	In-person	India	Male	Policy
61	06/11/2023	Online	India	Male	City Network
62	08/11/2023	In-person	India	Male	City Network
63	10/11/2023	Online	India	Male	City Network
64	24/11/2023	In-person	India	Male	Policy
65	26/11/2023	In-person	India	Male	Policy
66	26/11/2023	In-person	India	Male	Policy
67	29/11/2023	In-person	India	Male	Policy
68	01/12/2023	In-person	India	Male	Policy
69	01/12/2023	In-person	India	Male	Policy
70	06/12/2023	In-person	India	Female	City Network
71	28/11/2023	In-person	India	Male	Policy
72	07/12/2023	In-person	India	Female	Policy

^a The 'Policy' category encompassed city government officials, elected representatives, and staff from relevant municipal departments such as environment, urban planning, and transportation. 'University and Research Organisations' included academics, researchers, and representatives from think tanks who contributed expertise to the UCAP process. 'Civil Society, Community' incorporated representatives from NGOs and advocacy groups, local residents and neighbourhood associations, 'Private Sector' includes business representatives and consultants. Lastly, the 'City Networks' category included representatives from national or international networks of cities focused on climate action, such as C40 Cities and ICLEI. The stakeholder types were assigned after the interviews were collected and it is acknowledged that there is possible overlap.

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