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Vulnerability locked in. On the need to engage the outside of the adaptation box

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ABSTRACT

“Vulnerable populations” are experiencing a (re)emphasis in climate change adaptation research and practice even though the concept has long been contested. Adaptation planning is increasingly expected to restore past inequalities and address systemic injustices. Yet, we know little about the role local environmental agencies, bureaucrats, and policy practitioners (can) play in addressing “vulnerable populations”. Drawing from qualitative empirical research in Atlanta, Georgia, the United States, and Jinhua, Zhejiang in China, the local problem recognition about “vulnerable populations” and adaptation decision-making was examined. The findings reveal severe limitations in the way “vulnerable populations” are approached, with certain groups being politically contested and being considered difficult to be prioritized. In both cases, accidental forms of adaptation stand out, which mainly focus on blue-green infrastructure interventions and neighborhood revitalization programs, some of which recreated “vulnerable populations”. The findings hint to vulnerability being more deeply rooted in external conditions to the individual, which requires different policy interventions. The article presents a novel understanding by conceptualizing “vulnerable populations” as an instance of vulnerable political institutions. There’s a need to explore the nature of our political systems, how much inequality we allow and which redistribution mechanisms the state has for addressing interdependent dimensions of inequality. To make “vulnerable populations” finally a front and center concern begs us to radically engage the outside of the conventional adaptation box. Inequality studies offers synergies with adaptation justice discourses and different policy instruments that address the root causes of vulnerability.

1. Introduction

The concept of “vulnerable groups” is currently experiencing a re-emphasis in climate change adaptation research and practice (e.g., Breil et al., 2018; BMI, 2022; EPA, 2021; Eriksen et al., 2021; EEA, 2020; 2022; Gan et al., 2021; IPCC, 2022; Kehler and Birchall, 2021; MEE, 2022; Taylor et al., 2022; UNFCCC, 2018). In research, this re-emphasis is signified by an increasing interest in measuring social vulnerability and the growing usage of Social Vulnerability Indices (SoVis), especially since 2010 (e.g., see Mah, 2023). The concept of social vulnerability has a long tradition in human geography and natural hazards research and is interested in examining how social groups are affected differently by climate change (also see e.g., Cannon and Twigg, 2003, Adger, 2006; Ford et al., 2018; Otto et al., 2019). Many different social vulnerability

approaches exist and are often pitted against the long tradition of and critique against the narrow focus on bio-physical aspects of climate change. SoVis aim to quantify and capture the disadvantage to be at risk from a particular event, such as flooding or extreme heat, through aggregating select social factors such as age, educational levels, socio-economic status, employment, or housing.

In political practice, the re-emphasis is characterized by an increasing uptake of “vulnerable groups” as part of public adaptation planning and strategic policy documents across different geographic regions, political systems, and levels of government, especially from political entities, where the concept was not much part of adaptation discussions before (e.g., China, Germany, the European Union (EU)). The latest Synthesis Report by the Intergovernmental Panel on Climate Change (IPCC) highlights those redistributive policies across sectors and

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regions which “shield the poor and vulnerable” are expected to “enable deeper societal ambitions” in the pursuit of climate resilient development (IPCC, 2023). At the regional level, the evaluation of the EU adaptation strategy too argues for the benefits of adaptation policy design that targets “vulnerable groups” (EEA, 2020). Further, the need to carry out social vulnerability assessments “in the delivery of socially just adaptation solutions” is underlined (Breil et al., 2018: 12).

At national strategic levels, different countries are pointing to the benefits of climate adaptation planning, that targets “vulnerable populations”. The Biden administration for instance, mobilizes efforts to identify “vulnerable populations” and protect workers from extreme heat in the United States (White House, 2021) in addition to the Environmental Protection Agency (EPA) releasing an analysis of heat impacts on “socially vulnerable groups” (EPA, 2021). Social vulnerability and related concepts have informed different federal U.S. agencies for a while (e.g., EPA, 2017; Manangan et al., 2014; Safford et al., 2013; USAID, 2016). Some local governments and policy practitioners across the U.S. too have identified “vulnerable populations” in order to guide climate change adaptation planning, and natural hazards management (e.g., Evans et al., 2016; Fischer et al., 2013; OPR CA, 2018; Mieler, 2022; NCCOS, 2022; Nutters, 2012). In this context, SoVis have been a popular policy instrument to help planning officials address “vulnerable populations” (e.g., see Managan et al., 2014). Despite strong regional variation regarding the degree to which “vulnerable groups” are assessed and made a political priority, coastal regions are considered to be more advanced in their consideration of “vulnerable communities” (e.g., Evans et al., 2016; OPR CA, 2018; Mieler, 2022).³

The Chinese Ministry of Ecology and Environment (MEE) in their latest National Adaptation Strategy (2022) also makes mention of “vulnerable populations” (*ruoshi renqun*) and the aim to improve their “risk protection capabilities” (MEE, 2022). Compared to the 2013 National Adaptation Strategy, the new strategy places a greater emphasis on vulnerable populations (also see Xu, 2022). Despite the mention at Central Government level and in addition to past verbal commitment to “protecting vulnerable populations” and making them the main priority of China’s climate policies (Xu and Liu, 2014), the explicit focus on “vulnerable populations” has not been popular in (local) political practice. Irrespective of the flourishing development of SoVis, which have been also adjusted to various Chinese contexts (e.g., Chen et al., 2013; Chen et al., 2021; Ge et al., 2019), the uptake of social vulnerability analysis in political practice appears to be very sporadic (e.g., Yan et al., 2015).

Although the concept of “vulnerable groups” has entered the political adaptation mainstream at higher political-strategic levels to varying degrees across the globe, we know relatively little about what is happening on the ground and how local governmental agencies go about addressing “vulnerable populations”. Despite often (only) defining “vulnerable populations” with the aim to guide more effective adaptation planning, significant knowledge gaps on adaptation strategies for “vulnerable populations” and effective climate adaptation processes are emphasized (e.g., Gan et al., 2021), in addition to lacking an understanding of the actual implementation and substantive outcomes for vulnerability reduction (Taylor et al., 2022).

The reinvigorated focus on “vulnerable groups” is striking given the tantamount critiques both concept and quantified attempts of measuring differential vulnerability have received (e.g., Arora-Jonsson, 2011; Eriksen et al., 2015; Eriksen et al., 2021; Jozaei et al., 2022; Liverman, 2015; Ribot, 2011, 2014; Taylor, 2014). Commonly discussed shortcomings include the obscurity of factors which are considered to make people more vulnerable, including short-sided assumptions (e.g., women = more vulnerable) that stigmatize people (women = weak) and run the risk of erasing agency (e.g., Arora-Jonsson, 2011; Cannon and

Twigg, 2003; Liverman, 2015; Ribot, 2011, 2014).

The preeminent focus on indicators rather than causal explanations, which shifts attention away from the sources which reproduce marginality was a critique (Ribot, 2011, 2014), that resonated with many adaptation scholars, who subsequently pointed to multi-scalar processes of vulnerability (e.g., Eriksen et al., 2015; Nightingale, 2017; Taylor, 2014; Vázquez, 2018). As a result, intersectional vulnerability analyses have emerged (e.g., Amorim-Maia et al., 2022; Kuran et al., 2020). Intersectionality approaches shed light onto compounding and overlapping vulnerabilities, how different social characteristics such as gender, race, and class intersect and impact privilege, discrimination, and oppression (Amorim-Maia et al., 2022). They seek to provide an integrative approach that addresses multiple and social-environmental inequities and directionality for justice-informed planning on the ground (ibid.). Intersectionality approaches go hand in hand with studies that reflect upon the socio-political origins of vulnerability and the political nature of adaptation (e.g., Glover and Granberg, 2020; Shokry et al., 2020, 2022; Thomas and Warner, 2019).

“Vulnerable groups” are a highly contested phenomenon – with many researchers attempting to avoid the term or referring to “disadvantaged communities” or “marginalized people” to direct attention to socio-political factors, which produce vulnerability (e.g., Arora-Jonsson, 2011; Eriksen et al., 2015). Practitioners too have begun to rethink the term to avoid “harmful, unintended consequences” of perpetuating “people’s invisibility” by reconsidering ambiguous terms and using precise language (e.g., USAID, 2016). Language adjustments put aside, given the multiplicity of crises, an urgency becomes apparent through which debates are reopened that center around “vulnerable populations” and adequate political measures. Besides some progress on the socio-political aspects which impact vulnerability and adaptation, we continue to lack an understanding of the role local environmental agencies, bureaucrats, and policy practitioners (can) play in addressing “vulnerable groups”.

Current research suggests that the “multi-scalar processes driving vulnerability remain largely ignored,” (Eriksen et al., 2021) in addition to differential vulnerability being (re)produced across different spatial scales (Juhola et al., 2022). Against this background, the long lived “all adaptation local” paradigm is increasingly coming into question given the realization that vulnerability reproduction and climate risk governance are multi-level by nature (also see e.g., Nalau et al., 2015). However, given the different nature of political systems, where higher political levels are at times unresponsive, the question also is how local governments are confined and/or enabled by higher government levels in making vulnerable populations a front and center concern.

Limited formal capacity regarding human, financial and knowledge resources is frequently pointed to as major barrier that local adaptation governance faces in addition to containment by other government actors (e.g., Nalau et al., 2015). Ironically, there is growing expectations that adaptation can restore past inequalities (e.g., Juhola et al., 2022) and that systemic inequality structures can be tackled as part of adaptation planning (e.g., Chu and Cannon, 2021; IPCC, 2022). Yet, we know relatively little about the role of local governmental agencies in the pursuit of transformative adaptation. There is no standardized definition of transformative adaptation, which has been approached through different epistemic traditions and disciplinary perspectives (also see Fedele et al., 2019). The baseline understanding defines transformative adaptation as fundamental changes in socio-ecological systems, which address the root causes of vulnerability (ibid.). In the context of human adaptation, root causes are commonly defined as the limited access to resources, structures, and power (e.g., Downing et al., 2005). Transformative adaptation aims for a “radical change” through challenging the systemic structures that produce vulnerability and addressing the root causes of inequality (Lonsdale et al., 2015). Transformative adaptation is differentiated from incremental adaptations, which are understood as minor- and small-scale adjustments and business-as-usual strategies that do not challenge the status quo of current systems (Fedele

³ For an overview of state progress and planning focused on “vulnerable populations,” see the Georgetown Climate Center or Adaptation Clearinghouse.

et al., 2019).

In line with research motivated by an undertheoretization of the political mechanisms, which serve to reproduce vulnerability, this article approaches climate change adaptation as a socio-political process. Given that the term and concept “vulnerable populations” will continue to gain traction, and be applied in diverse political settings, the following article aims to reflect upon the role of the state and (local) political institutions across different political systems for understanding adaptation incrementalism as it relates to “vulnerable populations”.⁴ Congruent with Robertson (2015), unpacking the state is “an essential part of understanding environmental change” (p. 465), and might help us to understand where urgent political change is required also in terms of the broader role the state should play.

2. Understanding public governance of “vulnerable populations”

Research on human vulnerability to climate change and natural hazards has come a long way (Adger, 2006; Ford et al., 2018; Lewis and Kelman, 2012; Lundgren and Jonsson, 2012; O’Brien and Wolf, 2010; Otto et al., 2019; Thomas et al., 2018). The identification of vulnerability and “vulnerable populations” has been one of the primary instruments to inform adaptation policymaking. In the late 1990s and early 2000s, SoVis were considered an innovative bottom-up approach (e.g., Cutter and Finch, 2008) in contrast to long-term climate scenarios, which are seen to be top-down (e.g., Breil et al., 2018). Susan Cutter’s SoVi has been frequently used to assess differential risk to environmental hazards and inform policymaking related to the management of natural hazards and climate change impacts. SoVis describe and seek to understand how the social environment interacts with other stressors, with certain social factors being used as a predictor for vulnerability (for a recent scoping review see: Mah et al., 2023). Cutter’s composite index was succinctly borrowed, applied, and methodologically adjusted by many researchers and disciplines across the globe (e.g., Yoon, 2012; Chen et al., 2013; KC et al., 2015; Oulahen et al., 2015; Ge et al., 2019).

Despite considerable conceptual vagueness, different values, and methods to assess vulnerability, consensus has developed that some people are more disproportionately exposed, that vulnerability is a multidimensional, dynamic process and requires some form of governance (e.g., Adger, 2006; Amorim-Maia et al., 2022; Thomas et al., 2018).⁵ The plurality of different types of knowledge in analyzing vulnerability and pairing it with governance systems marks a particular challenge (Adger, 2006). In the IPCC’s sixth Assessment Report (AR6), a stronger focus has been placed on complex, interconnected risks (IPCC, 2022). Aside from significant advancement in the way we assess vulnerability and risks, big gaps are looming regarding political practice. Here, the identification of social vulnerability is considered one of “the most critical capacity gaps at the city and community levels” (IPCC, 2022: 93).

⁴ Due to the different understandings, and divergent ways of assessing “vulnerable groups”, most of which are highly problematic because they often mask disparities, the term was put in quotation marks. Unless noted otherwise, “vulnerable groups” are approached as a boundary object in this article to enhance our understanding of the idea and how it is addressed in political practice, without the intention of ascribing a universal meaning to the concept.

⁵ In this article, the term “governance” is used to imply the multiple actors and levels at which governance can occur including government, market, non-governmental entities and/or networks. The focus of this research is on examining public governance, i.e., governance through governmental entities. The term “public governance” is used as a signifier to keep in mind, that public governance is one layer out of many.

2.1. Limited reliability of social vulnerability analysis for decision-making

With the growing application of social vulnerability assessments (SVAs) to diverse settings, validation research has also flourished and provides an ambivalent picture of the actual vulnerability (e.g., Fekete, 2009, 2019; Gall, 2007; Jozaei et al., 2022; Liu and Wang, 2013; Rufat et al., 2019; Tate, 2013). For instance, whereas conventional indications of vulnerability could be confirmed for the elderly or “financially weak” in the context of a German river flood (Fekete, 2009), a different study on extreme precipitation in Beijing finds, that “vulnerable groups” were different from traditional research (Liu and Wang, 2013). Here, it was rather adults and males, than females, children, and elderly, who ended up being more severely affected, due to characteristics of rainfall, topography, time the rainfall occurred and distribution as well as locations of victims (Liu and Wang, 2013). Especially the latter points to the relevance of cultural practices, which impact whether people reside outside at a given time of day, and thus are more susceptible. These are only anecdotal examples, which demonstrate, that even the validation of SVAs does not provide a clear picture about people’s actual vulnerability.

Out of the many shortcomings of quantified SVAs, the static understanding of social vulnerability based upon narrow snapshots of time and space has been criticized (Ford et al., 2018; Gall, 2007; Jozaei et al., 2022). SVAs are said to not adequately consider the interlinked nature of dynamic social-ecological systems which have multiple scales and configurations (Chuang et al., 2018; Jozaei et al., 2022). The limited ability to measure certain vulnerability aspects and social dynamics has also been emphasized and social vulnerability analysis more broadly castigated for its inability “to deliver outcomes that reflect the reality of vulnerability and its consequences.” (Jozaei et al., 2022: 1). Subjective modelling decisions, with little or no stated justification are criticized (e.g., Tate, 2013). Rufat et al. (2019) conclude that there is a mismatch between the rising application of social vulnerability models and understanding of their empirical validity. Against this background, their use to inform decision-making has been questioned (Chuang et al., 2018; Jozaei et al., 2022; Rufat et al., 2019; Tate, 2013).

The understanding of vulnerability and how it is assessed matters, due to the policy implications vulnerability analysis generates (e.g., Brooks et al., 2005; Ribot, 2014). This also points to the interlinked nature and the need to study vulnerability and adaptation conjointly. On a governance *meta*-level, vulnerability reduction has become the main objective for political practice, which materializes in the rapidly growing policy field of climate change adaptation (e.g., Eriksen et al., 2015; Preston et al., 2011; Taylor, 2014; Taylor et al., 2022; Thomas et al., 2018).

2.2. The techno-managerial and incremental nature of adaptation practice

With rapidly intensifying climate change, progress is not just observed in the establishment of adaptation plans, strategies, laws, and policies, but countries are also considered to “getting better and becoming more inclusive of disadvantaged groups,” (UNEP, 2022). Adaptation planning has proliferated and is characterized by a plethora of actions and different modes of governance (e.g., Bednar and Henstra, 2018; IPCC, 2023). Yet, a lot of documented adaptation remains anecdotal, with little knowledge about the extent to which adaptation is happening on the ground (Tompkins et al., 2018). The effects and outcomes of adaptation action and whether people turned out to be less vulnerable, as a result of adaptation interventions are also unclear (also see UNEP, 2022: XIII).

Several challenges exist when determining the state of adaptation. Among them are disagreement about what constitutes adaptation and indistinctness of the phenomena, that are being measured (e.g., Dupuis and Biesbroek, 2013; Tompkins et al., 2018). In the context of defining and assessing public adaptation efforts, and as a result of what is referred

to as “dependent variable problem,” Dupuis and Biesbroek (2013) propose an operationalization of adaptation policy to be able measuring policy change and adaptation outcomes. To better characterize adaptation policy, two criteria are being outlined: 1) intentionality, which refers to the purposeful design of policy, and 2) the substantiality of public policy outputs labeled as “climate change adaptation,” which should contribute to reducing climate change vulnerability.

Concerns on (continued) incrementalism of existing adaptation responses are frequently voiced in addition to growing adaptation implementation gaps (e.g., Lonsdale et al., 2015; Huitema et al., 2016; IPCC, 2023), especially when integrating justice concerns into adaptation action (IPCC, 2022). Further, the increased evidence of maladaptation is presented, which adversely affects marginalized and vulnerable groups (IPCC, 2023). Techno-managerial biases in (local) adaptation decision-making continue to dominate, characterized by a focus on regulatory, financial and engineering rather than social struggles (e.g., Chu and Cannon, 2021, Eriksen et al., 2015; Shi et al., 2016). In order to move beyond technocratic policy approaches of adaptation, the incorporation of social vulnerability through a planning lens has been described as novel (Kehler and Birchall, 2021).

2.3. Increasing demands for justice in adaptation planning

In the quest for climate justice and fair adaptation interventions, marginalized and “vulnerable communities” have been (re)positioned as primary and defining actors (e.g., Barrett, 2013; EEA, 2022; Taylor et al., 2022). Yet, and although “vulnerable groups” are increasingly considered an across-sector topic at a national strategic level (e.g., BMUV, 2020), little is known about how governments seek to address “vulnerable communities” across sectors. Rapidly increasing works on maladaptation examine the extent to which adaptation interventions have failed to reduce vulnerability and make evidently clear, that the outcome for vulnerable populations might as well be negative adaptation (Barrett, 2013), reproducing vulnerability for some (e.g., Shokry et al., 2020; 2022) or even weaponizing peoples’ vulnerability (Thomas and Warner, 2019). These angles focus on the distributional impacts of adaptation interventions. As a result of increasing evidence of maladaptation regarding “vulnerable populations,” recent studies have begun examining what justice in adaptation planning could look like and which governance solutions should be criteria for decision-making on climate change adaptation (Chu and Cannon, 2021; Fünfgeld and Schmid, 2020; Juhola et al., 2022; Taylor et al., 2022).

These studies tend to focus on specific justice dimensions, which correspond with distinctive adaptation justice aims (see Table 1). For instance, Schlosberg’s climate justice capability approach for adaptation (2012) focuses on recognition and assessing as well as addressing “what exactly is needed to survive, function, and develop in a climate-changing world,” (p. 457). Schlosberg’s approach is widely cited and intends to offer a framework upon which policy responses can be grounded. Although the approach helps to map different climate justice dimensions and their relationship with policymaking, the article says little about concrete policy instruments. Fitzgibbons and Mitchell (2021) are more concrete by assessing existing resilience frameworks and providing concrete examples to advance procedural justice and the aim of more inclusive adaptation, such as experiments for more inclusive governance, contracting lay-residents as paid consulting, and/or partnering with catalyst organizations. Holland (2017) goes a step further in her account of procedural justice and hints to the importance of political power of people most vulnerable to harm to shape adaptation decisions that goes beyond consultation. Mentioned opportunities include alliances with powerful stakeholders and the relevance of conflicting expertise.

Recent adaptation justice discussions adopt a trivalent view of justice, which pick up and expand upon existing concepts of distributional, procedural and recognition justice (e.g., Fünfgeld and Schmid, 2020; Taylor et al., 2022; Juhola et al., 2022). Distributional justice

Table 1
Adaptation box of justice dimensions, adaptation aims and (policy) instruments

Justice dimension	Adaptation aim	Examples of concrete instruments
Distributional	Consider how climate impacts and adaptation measures and their impacts are distributed across society to inform improved adaptation policymaking	<ul style="list-style-type: none"> • Risk mapping, social vulnerability assessments, vulnerability scenarios • Vulnerability validation studies • Cost-benefit analysis of adaptation • Ex-ante and ex-post impact assessments, monitoring and evaluation • Channeling material resources towards disadvantaged groups
Procedural	Increase equity, participation, and inclusion in adaptation planning	<ul style="list-style-type: none"> • Efforts that enhance direct democracy: e.g., public consultations, citizen juries, participatory forums paired with expense allowances (compensation) • Experiments for more inclusive governance • Contracting lay-residents as paid consultants • Partnering with catalyst organizations
Recognition	Acknowledgement of specific and local vulnerabilities, respective adaptation needs and diverse value systems	<ul style="list-style-type: none"> • Participatory vulnerability assessments • Community vulnerability mapping • Citizen-science projects • Inclusion of different types of knowledge • Broad-based stakeholder consultation in assessing vulnerability
Restorative justice	Restoring dignity and agency to those who have lost it	<ul style="list-style-type: none"> • Compensation measures to deal with maladaptation, unequal distribution of resources, diverging impacts of climate change

approaches consider how goods and bads of climate change and adaptation measures are socially differentiated (e.g., Fünfgeld and Schmid, 2020; Juhola et al., 2022). The procedural justice dimension is interested in fairness of planning processes by increasing equity and inclusion in adaptation planning (Holland, 2017; Fitzgibbons and Mitchell, 2021; Juhola et al., 2022). Recognition justice focuses on the acknowledgement of specific vulnerabilities, as well as adaptation needs, views, perspectives and abilities across different societal groups and identities (Schlosberg, 2013, Fünfgeld and Schmid, 2020; Juhola et al., 2022). Juhola et al. (2022) develop an adaptation justice index which provides guidance how justice could be considered in different phases of the adaptation planning process climate justice with adaptation planning.⁶ They add a fourth element: Restorative justice, with the adaptation aim to restore dignity and agency to those who have lost it through compensation (see Table 1).

Corresponding policy instruments are yet to be more systematically mapped from a perspective of “vulnerable populations” and mark an interesting area for further research. For distributional justice they include but are not limited to risk mapping before and after an event;

⁶ Whereas adaptation planning often refers to the early stages of the adaptation policy cycle and the agenda setting process (e.g., identification of key vulnerabilities and adaptation needs), adaptation interventions can refer to a multitude of aspects such as framing, financing, and often imply the concrete implementation of adaptation measures, e.g., construction of green infrastructure.

cost-benefit analysis of adaptation; monitoring and evaluation. For procedural justice concrete instruments include participatory forums, public consultations, mini-publics in form of citizen juries or as mentioned above contracting lay-residents as paid consultants. Corresponding with the recognitional dimension, exemplary policy instruments are participatory vulnerability assessments, community vulnerability assessments, and stakeholder consultations in assessing vulnerability. It becomes visible, how the different justice dimensions often overlap and are interdependent.

The index by [Juhola et al. \(2022\)](#) itself is a policy tool as it provides concrete guidance how justice can be considered in different phases of adaptation planning. These studies are exemplary of the conceptual advancements of adaptation justice and existing analytical tools to improve policy aspirations and guide a justice-informed adaptation planning process. However, with few exceptions, they often remain at a *meta*-level, provide little insights into concrete policy opportunities, and have an underdeveloped understanding of the policy process (also see [Cairney et al., 2023](#)). Researchers often end up focusing on what they need from policy and policymaking, but do not meaningfully engage with policy theories (*ibid.*).

The glooming absence of evidence on transformative adaptation has put greater pressure on political practitioners to address inequality as part of climate change adaptation ([Berrang-Ford et al., 2021](#); [IPCC, 2022](#); [Simpson et al., 2023](#)). With it, the gap continues to grow, between what local governments are expected to do and what they are implementing ([Berrang-Ford et al., 2021](#)). Yet, we lack an understanding of what addressing the root causes effectively means in political practice. In addition to important insights from studies on maladaptation and justice in existing adaptation planning, further questions arise on the role of political institutions to address the root causes of vulnerability. Looking at local-level governance across different political systems can generate meaningful insights for debates on the larger political changes required to effectively address the root causes of vulnerability.

3. Methods

The article draws from qualitative empirical research on local decision-making related to vulnerable populations and climate change adaptation in China and the United States. Comparing cases in these two countries is especially interesting, as they are supposedly very differently equipped to deal with climate change adaptation and vulnerability given their different political systems. Because little is known about local decision-making on this matter, an explorative research design was applied, which offers preliminary insights upon which future research can be built. The research is instrumental in that it is mainly theory-building, also given little literature on the matter, but may consider theory-engagement. Insights from the cases are understood to facilitate an understanding of broader phenomena.

To cope with selection bias and to make the cases more concrete, case selection relied on international climate vulnerability assessments with a focus on similar regional characteristics. Next, national climate impact assessments were analyzed based on in-country vulnerability hotspots. Atlanta and Jinhua were chosen, because the regions stand out in their climatological, geographic and social exposure ([Chen et al., 2013](#); [KC et al., 2015](#)). Because data on inequality and local patterns of social stratification are limited in China, especially at the local level and how these patterns relate to climate change, available SVAs were used as a baseline to learn about potential local vulnerability characteristics. This data was then complemented by further literature on inequality and empirical insights during fieldwork (see [Teebken, 2022](#)). The initial reliance on SVAs marks a major limitation, but corresponds with the iterative research process, in which vulnerability was reframed as a result of path-dependent political processes.

3.1. Holistic multiple case study design

Given the evidence on highly uneven exposure to climate change, the main research aim is to understand, how local authorities in Atlanta, Georgia, United States and Jinhua, Zhejiang, China address the issue of “vulnerable populations” in political practice. Based upon ([Yin, 2018](#)), a holistic multiple case study design was applied. The research aim is twofold, first, political strategies and planning that was developed in light of intensifying climate change was examined (what local authorities “do”). Secondly, the problem recognition of local authorities about “vulnerable populations” to climate change was analyzed (how local authorities in Atlanta and Jinhua “think”). The holistic unit of analysis is decision-making processes of regional-local governmental authorities in Atlanta and Jinhua related to adaptation and “vulnerable populations”.

3.2. Data collection

The empirical foundation of this research involved primary and secondary sources such as interviews, participant observation, government reports, white papers, urban resilience plans and literature. 53 semi-structured interviews were conducted with a total of 71 people in China and the United States from 2016 to 2018. The interview questionnaire was comprised of four main question blocks, that were slightly adjusted based on the interview partner’s expertise and course of the conversation. In case policy practitioners and decision-makers were interviewed, their background and office function for climate adaptation and vulnerable populations were discussed in greater detail. The question blocks focused on 1) public planning to cope with, prepare for and recover from climate impacts, policy priorities and the extent to which “vulnerable populations” are a concern, 2) vulnerability constructions (understanding and definition of human vulnerability to climate change), 3) responsibility of formal institutions, and 4) barriers and opportunities for adaptation planning that addresses the root causes of vulnerability.

Out of the total amount, 27 interviews were conducted in China and 26 in the United States. The target audience of the interviews either worked as government officials, academics or in professions related to climate adaptation policy- and/or local decision-making (such as emergency management, city planning or public health). Expert interviews aim to reconstruct social situations or processes to find a social scientific explanation for an observed phenomenon ([Gläser and Laudel, 2004](#)). The expert interview may serve as a shortcut for otherwise more complex data collection processes, when experts act as “crystallization point” through inheriting practical insider knowledge ([Bogner et al., 2009](#)).

The interviews were conducted in person in English and Chinese, with the majority of China-focused interviews taking place in Jinhua and Hangzhou in Zhejiang province, Shanghai and Beijing. The U.S.-focused interviews were mainly conducted in Atlanta and Washington, DC. Interview solicitation occurred through means of cold-contacting, participation in conferences, political exchange programs and local political events, as well as snowball method. The interviews lasted 45 to 60 min on average in the United States and 100 min on average in China. The majority of interviews were conducted on a one-on-one basis.

In the Chinese case, field access to political decision-makers was very challenging. Given the already politicized nature of climate change, and especially after Trump was elected, the collection of primary data became more challenging in the United States as well. Here, some people at regional-local levels appeared to be no longer willing to talk about climate change issues, others canceled interviews, and data was scrapped from public websites. Participant and site observation enabled access to difficult to access information on local political dynamics. This includes the attendance at two Georgia Climate Conference (GCC) (2016 and 2019) and the participation in an exchange visitor program run by the Jinhua Municipal Government, which provided access to local political events, such as the opening of the ecological corridor and enabled

meetings with local government officials.

3.3. Data processing

All interviews were conducted in confidentiality and were anonymized. Due to the perceived sensitive nature of the issue in both political contexts, particular attention was paid to safeguarding the anonymity of the interviewees through the development of an interview codebook. The interview process and interview transcriptions were guided by the instructions and simple transcription rules outlined by [Dresing and Pehl \(2015\)](#). The data was processed with a qualitative data analysis software (“f4analyse”), which helped to organize the data schematically. The explorative act of open coding was found to be the most fitting for breaking down the data, to identify common characteristics, conceptual ideas and label the data accordingly.

4. Results: Adaptation and “vulnerable populations” in political practice

4.1. What local authorities do: Accidental adaptation and focus on blue-green infrastructure

Atlanta is based in a climate-skeptic state, signified by unfavorable political conditions and little support from political institutions higher up for designing governmental responses that address climate change in a deliberate manner. Most climate-related efforts in Georgia have relied on municipal, local initiatives, which have gradually become attuned to its external political environment. Local actors, who are engaged in climate policy are used to maneuvering around the issue of climate change, which is often considered a politically sensitive issue. As a result, actors have been using distinctive coping strategies to be able dealing with their adversarial political environment (also see [Teebken, 2022b](#)). Although local municipalities, like Atlanta, appear to have grown largely independent of climate-related support from the state level throughout the years, widespread climate skepticism, the lack of scientific consensus and lack of agreement on (ambitious) climate policy have had their detriments for municipal climate adaptation governance.

Atlanta has been experiencing the effects of climate-sensitive natural hazards, and although this has been increasingly pointed out by local political leaders, most political decision-makers at county and municipal levels have generally not regarded climate adaptation as an own, explicit policy field. Instead, climate change impacts have been addressed through other policy efforts, policy fields and strategies, e.g., watershed management, neighborhood revitalization programs or urban green infrastructure planning (see [Table 2](#)). Whereas some pointed out that climate adaptation policy was “virtually non-existent” (I-29), others mentioned green infrastructure programs as “adaptation process” (I-22). There was no centralized actor to undertake adaptation measures and the lack of a clear policy player has been emphasized (I-29). Instead, adaptation efforts were fragmented and dispersed across various governmental offices and levels (see [Table 2](#)). Some interviewees referred to the Mayor’s Office of Resilience as being, at least theoretically, the main actors in charge (I-29, I-22).

Those who were at that time working at the Mayor’s Office of Resilience, that was established as a result of the grant the city received from the Rockefeller Foundation, expressed that “the plan was to put together a climate adaptation plan” (I-22), but several political context conditions resulted in a much broader resilience strategy. Former language related to extreme heat and climate change was toned down and gradually deleted from the final municipal strategy. Many policy efforts were retroactively labeled “climate change adaptation,” although they had not been planned as such, accordingly, not satisfying the criterion of intentionality. The Beltline, an urban redevelopment project of an abandoned railway corridor which was developed into a multiuse trail is exemplary of that. One heat expert, city planner and policy advisor expresses doubts regarding Atlanta’s accidental climate adaptation

Table 2
Policy Efforts Addressing Vulnerability and Adaptation in Atlanta

Year, Policy	Main objective	Actors
2018: City of Atlanta, Green Infrastructure Strategic Action Plan	Advance green infrastructure, address localized flooding and water quality, increase quality of life and community resiliency	City of Atlanta, Department of Watershed Management, Green Infrastructure Task Force
2017: City of Atlanta Resilience Strategy	Outline Atlanta’s major resilience challenges and how to address them	City of Atlanta, Mayor’s Office of Resilience
2015: City of Atlanta Climate Action Plan	Proposes a strategy for GHG emissions reductions per sector, mentions adaptation as co-benefit	Mayor’s Office of Sustainability
2014: Assessing Health Vulnerability to Climate Change, A Guide for Health Departments	Consists of the Building Resilience Against Climate Effects (BRACE) framework that seeks to help health departments prepare for and respond to climate change	Center for Disease and Control Prevention (CDC), Atlanta
2013: Transit Climate Change, Adaptation Assessment/Asset Management Pilot	Outline principles how MARTA can adapt to extreme weather events and/or a changing climate based upon the “Asses Management Guide”	Federal Transit Administration (FTA)

efforts:

“There are lots of things associated with the Beltline, that are helpful, they are just not intentionally helpful. [...] The parks are just not designed to reduce heat [...] I often argue the Beltline is a climate adaptation project, it is just not an intentional one.” (I-29: 75)

Because of the politically motivated bias towards climate change issues and the project-based nature of climate planning in Atlanta, a lot of efforts outlined in the Resilience Strategy were not implemented. The discontinuation of resilience efforts, coupled with private foundations overtaking or funding important public tasks, demonstrates how state institutions have been failing in addressing climate change adaptation in an efficient and coherent way. Implemented efforts, such as the Beltline or the adjacent floodwater management park located in the Old Fourth Ward, a historically African American district, and landmark of civil rights activism in central Atlanta, are instances of maladaptation due to the displacement of marginalized communities in light of rising property values that were the result of neighborhood revitalization programs (also see [Teebken, 2022a](#)). Green infrastructure designs and landscape planning are embedded in the larger scheme of neighborhood redevelopment, and end up being problematic, due to the dominance of private sector interests, a deregulated housing and investment market with little protection mechanisms for local populations, especially renters. The distributional effects of (accidental) adaptation benefits (e.g., mitigating floodwater runoff and extreme heat) and costs (e.g., displacement of local residents and predominantly People of Color) appears to have played an only minor role in the policy design and implementation (also see discussion section). Two policy instruments were mainly discussed to prevent displacement of local residents: an anti-displacement tax and mandatory inclusionary zoning. Only the latter could be implemented in 2017 with weak affordability requirements for developers. Together with various other policy attempts, which aimed to address the affordable housing crisis along the Beltline, they all failed to deliver on most of

their initial promises.⁷

In contrast to Georgia, the Zhejiang provincial government has been proactive on climate change matters and has undertaken a variety of adaptation measures. The region’s historical exposure to sea-level rise, coastal tourism, population density and economic dependence are among the reasons why the province has had a focus on undertaking coastal adaptation measures. The province is known for its “Thousand Mile Seawall,” which presents one of the earliest examples of ancient civil engineering during imperial China (Wei and Cunhuan, 2002). Because Jinhua is a prefecture-level city, and prefectures are directly administered by the provincial government, local government officials and policy practitioners in Jinhua place a firm emphasis of adaptation measures being a provincial responsibility (I-38).

Although China’s National Adaptation Strategy, published in 2013, stipulates that each province should develop its own climate adaptation plan, Zhejiang has not done so. With the new National Adaptation Framework 2022 this is expected to change. Up to date, however, interviewees indicated, that despite an uptake of some environmental priorities, “economic development is still the most important [...] Zhejiang province takes the economic development first,” (I-12: 125 ff.). There is no deliberate climate adaptation strategy at the provincial level but a Climate Change Plan (2013) with a strong focus on mitigation. At the local level, different policy efforts were launched, most of which serve adaptation purposes, such as the Jinhua sponge city special planning, which aims to build a “healthy and perfect urban water ecosystem”. Another example is the 12th Five-Year-Plan for Meteorological Development in Jinhua, which amongst other things, aims to improve meteorological services, such as warnings from extreme weather (see Table 3). In line with the continued provincial focus on economic development, many interviewees viewed Jinhua’s firm emphasis on economic development as contradictory to Jinhua’s growing environmental pollution problems and rapidly intensifying climate change.

Although Jinhua has been confronted by several historic flood events (also see Teebken, 2018) and is receiving much of its guidance from the provincial level, the city has not come up with dedicated adaptation policy strategies and is not part of current adaptation piloting at the provincial or central government levels. Yet, several measures were announced to constitute quasi-adaptation policies, as this decision-maker at the municipal level indicates:

“So, in Jinhua, although there is an absence of such climate adaptation documents or opinions, the ecological corridor is actually a very useful exploration and attempt to change the climate and to adapt to climate change.” (I-38: 73)

The most prominent ones are policy documents related to the ecological civilization and Jinhua’s sponge city project (SCP). Due to its long history of flooding episodes, Jinhua was among the first to become a sponge city (*haimian chengshi*). The Yanweizhou Flood Park is Jinhua’s most recent completed infrastructure adaptation project, a water resilient landscape. At the heart of the project is a bridge that is elevated above the 200-year flood level, which connects west and northern Jinhua. The Jinhua Municipal Government (JMPG) assigned Turenscape, an architecture bureau with the task of designing the floodwater park.

The planning was rolled out in August 2010 and completed in May 2014, when Jinhua’s flood adaptive landscape was formally opened. This was one year before the Central Government and City Council published their technological guide on building sponge cities and formally introduced the SCP as a national-level framework, for which 30 pilot cities were chosen. A team of researchers on SCPs referred to

⁷ For a more detailed discussion on how mandatory inclusionary zoning was watered down, see pp. 118ff. in Immergluck, D. (2022) *Red Hot City: Housing, Race, and Exclusion in Twenty-First Century Atlanta*, University of California press.

Table 3
Overview of relevant policy efforts in Jinhua

Year, Name	Main Purpose	Issuing Agency
2018: Implementation Plan for the Reform of Ecological Civilization System	Identifies 42 priorities in the reform of the ecological civilization system, establishment of the “Blue Sky Defense Office,” annual target of 10% growth in the ecological protection and environmental management industry was reached ahead of target	Jinhua Municipal Government (JMPG)
2017-2018: Jinhua Ecological Civilization Construction Planning and Jinhua City Ecological Civilization Demonstration Creation Action Implementation Plan	Build environmental and ecological protection knowledge	Provincial and Municipal Environmental Protection Divisions, JMPG, Planning Bureaus
2016-2030: Jinhua sponge city special planning and Implementation Opinions on Promoting the Construction of Sponge City	Maximize natural accumulation; infiltration and purification of rainwater in urban areas, accelerate the construction of a healthy and perfect urban water ecosystem.	Municipal Bureau of Construction, Municipal Planning Bureau
2012, 12 th FYP for Meteorological Development in Jinhua City	Outlines current deficiencies to improve meteorological services, speed up meteorological development, enhance sustainable development capacity	JMPG
2015: Emergency Plan for Environmental Emergency in Jinhua City	Improve the government’s ability to respond to sudden environmental incidents involving public crises	JMPG
2013: Jinhua flood control and drought emergency plan	Deals with disasters in light of natural hazards and water conservancy risks caused by heavy rain, floods, typhoons, droughts	JMPG

Jinhua as a city governing by example (Dai et al., 2017). Andrew Buck of the Chinese landscape architecture firm Turenscape, based in Beijing, has referred to the flood-resistant topography as a civil engineering approach to water management to enable flood control in an ecological way. The Jinhua case is an example of testing and rolling out policy efforts before launching a larger pilot scheme based on the successful outcome of the foregone case. Direct guidance was offered by the Ministry of Housing and Urban-Rural Development, the Ministry of Finance and the Ministry of Water Resources. The implementation of China’s SCP is at the core of China’s response to urban flooding and the sponge city construction is also promoted under the framework of urban adaptation pilots. The governance of accidental adaptation in Jinhua, is signified by a high level of policy integration and more holistic organizing around environmental issues, often including several different departments.

Jinhua’s Sponge City efforts are embedded in the country’s larger efforts and centralized mandates to create ecological corridors (*shengtai langdao*), which aim at the reconstruction of the city center to foster economic and social development. Beautifying the urban city center through implementing large-scale landscape constructions in the name of the ecological civilization (*shengtai wenming*) presents a form of urban entrepreneurialism (for more details see Teebken, 2022a). In Jinhua too, the social differentiation of environmental and climate impacts, and the

effects of related policy measures were not a central concern. Existing adaptation endeavors were more strongly embedded in efforts to make the central part of the city more appealing, compete with other cities and enable economic development.

4.2. Biased problem recognition of “vulnerable groups”

In both cases, interviewees were asked to define marginalized populations and to what extent they were a concern in current policymaking related to climate change adaptation and resilience. Among decision-makers, there was some agreement over certain populations such as the elderly, children and women. Extended definitions included people with disabilities and those who have to work outside. Different patterns became visible in the way certain groups were acknowledged and/or (de)emphasized (see Table 4). Uncontentious groups were defined by age, status of health, economic, and geographic location of people’s occupation. Selected awareness existed about people with disabilities and tribal backgrounds. Especially People of Color appeared to be a contentious issue for some decision-makers, also given Atlanta’s long history of racial segregation and disagreement among different decisionmakers on what needs to be done about it. Other contested populations included homeless people and prisoners, who also faced underestimation and deemphasis by select local decision-makers in

Atlanta. Some considered these groups not worthy of “vulnerability entitlement.”

Particularly prevalent in China, certain groups and people who qualify for being considered “vulnerable” faced stigmatization. Here, all interviewees thought that the term for vulnerable people (*ruoshi qunti*) covers children, elderly, and disabled people. Low-income households, one-parent families, pregnant women and blue-collar workers were the extended definition provided by some interviewees (e.g., I-17, I-18). The biggest issue of contestation was migrant workers. Some considered them to be part of the vulnerable, as “their situation and payment is always at the bottom of the society” (I-17: 3). In Atlanta, too the issue of vulnerable populations unveiled forms of stigmatization. Many interviewees exemplified an understanding of vulnerability as the incapacity of people to take care of themselves (e.g., I-27). In both cases, most interviewees stated that the term “vulnerable populations” is related to the weak parts of society. Besides stigmatizing and disempowering the considered “vulnerable,” the aspect of differential recognition was highly problematic and did not quite translate into the local Chinese context, where the discussion on “vulnerable groups” felt overtly scientific.

The (reasons for) political bias that decisionmakers exhibited toward certain populations needs further research. In both cases, the initial findings from the interviews suggest, that the strong political bias is in

Table 4
Vulnerable groups through the eyes of local officials and policy advisors (grey = viewpoint of local officials, white = academics and policy advisors)

<i>Pattern</i>	<i>Jinhua / Zhejiang</i>	<i>Atlanta / Georgia</i>
<i>Bias: Politically motivated acknowledgement of uncontentious groups</i>	“It is those over 60 years old, 70 years old. Their health is not very good, and then, their children may also not be able to support them.” (I-39G: 204f.)	“Well, the elderly, the poor and the children, I do not know. What else? Those who have to work outside?” (I-30: 99f.)
<i>Bias: Underestimation and deemphasis of contentious groups</i>	“Disadvantaged groups are all the same. Jinhua has the same disadvantaged groups [than other places]. It is where the income is relatively low, low-income people, the amount of people with disabilities. Ah, most of these groups are relatively small.” (I-38: 59)	“Well, I mean, we got, poor people in the district, homeless people, and certainly they are subject to the same stresses than anyone else.” (I-28: 55)
<i>Stigmatization</i>	“Those who cannot take care of themselves.” (s.a.)	“Bottom of society” (s.a.)
<i>Selected Awareness</i>	“Who are the vulnerable? In our province that is pretty clear: there is a strong awareness about the elderly, disabled people and children.” (I-14:11)	“That is a decision-cutter classic: folks have a sense for minority groups and that there needs to be outreach engagement with that group. [...] I do not hear enough talk about the disabled. There is a pretty decent discussion about the elderly.” (I-09: 8)
<i>Emphasis on local characteristics</i>	“The definition of vulnerable population should depend on their wealth. So according to the wealth, the people get divided into three levels, the poor, the rich and the middle-class. And as for the poor group, they also can be divided into three levels, the first one is urban, the second one is rural. [The third one is the subdivision of poor into sub-urban and rural poor].” (I-12: 53)	“Definitely historical Gullah Geechee. Historic slave families, socially and historically vulnerable population in most of the southern states, Georgia, north and South Carolina. [...] uneducated, unemployed that live in the low-income housing areas, somewhere in the middle county.” (I-11: 28)

part an outcome of the way knowledge is produced, by a select group of people and research fields, and how this knowledge is used by political institutions, that are strongly influenced by extra-local environments. The tradition of science and technology research from an engineering point of view and continued absence of social science studies as core characteristic of the Chinese political system was pointed to by most experts interviewed in the academic sector: “for China, the problem is, there are not enough social science studies. It is only about [researching] the impacts”, (I-35). As a result, there appeared to be much lower awareness about how social stratification and climate change are interconnected.

In Atlanta, the long-standing historical segregation of African American communities was a politically sensitive issue for some decision-makers, who would not talk about it on the record, whereas others would be more outspoken about it. This interrelated with other concerns over climate issues, both of which were strongly politicized based on the partisan political divide. Different types of skepticism were prevalent in local decision-making on climate matters. This was also the case when discussing historical legacies of race-based inequality at the municipal level. It became obvious that climate skepticism at higher political levels has strongly impacted patterns of knowledge creation, dissemination, and discourses (e.g., I-27, I-31). The municipal government was “more willing to deal with resiliency as a concept, and not putting the word climate change in front of it”, (I-31). Some interviewees also indicated that climate-related language and following this knowledge path too closely could potentially hamper their career.

The observed patterns of select vulnerability acknowledgement brings to light multiple forms of epistemic injustice in terms of limited access and power to frame dominant vulnerability discourses and inform adaptation planning. The injustice, however, was reported to go much deeper than shaping dominant vulnerability discussions: uneven access to education was emphasized to translate into a lack of economic opportunity, and vice versa, which resulted in a lack of political opportunity, i.e., access to decision-making. One policy advisor and adaptation expert notes:

“There is a structural bias across the board: Who works for city government? People who were probably never poor. Is it people who have no college degrees? No. Those people without high-school degrees do not exist in city government. There [is a] total lack of knowledge about a black uneducated teenager, which makes governments somewhat resistant. They lack experience. The political machine represents one group of the society. Then there is the financial aspect of political campaigning, who are your funders, who you have to please.” (I-06: 34)

Aside from knowledge aspects, and influence of the private sector in funding adaptation projects, interviewees emphasized different elements of social stratification, such as social status and political disenfranchisement to play key roles in why “vulnerable populations” are not considered in political practice (I-08, I-12, I-19, I-24, I-33, I-36). In both cases, the underestimation and de-emphasis of certain groups also appeared to be linked to political legitimacy concerns. The longstanding divide of rural–urban populations, and migrant workers (that were commonly considered “external populations” to the local municipality of Jinhua) were considered politically sensitive issues in China. Some of the vulnerability categories were not considered politically feasible and were contested, as this policy advisor notes in the Chinese context:

“Once you politically enfranchise the migrants to equal urban citizens, that gives them the right to demand services and public goods that the elites in urban areas feel like there is already [...] scarcity of and they do not want to hand that out.” (I-36: 79)

Another adaptation advisor indicated that admitting to having vulnerable populations to climate change was also equated with economic weakness and potentially in contradiction with submitted political targets, as part of the mandatory target system, also because cities

compete over resources, especially Tier-2 cities, like Jinhua (I-40). The city-tier classification system is used to track city development and helps to brand characteristics of a particular city also to trigger future investment. The acknowledgment of large-scale vulnerabilities appeared to stand in contradiction to the city’s political priorities of developing further. Further research is needed on the extent to which city-to-city competition and political target setting hinder effective adaptation policy planning and implementation that targets marginalized populations.

5. Discussion: Vulnerable political institutions

What can we learn from a comparison of (accidental) adaptation decision-making and local problem recognition about “vulnerable populations” in China and the United States? If we first unpack the accidental aspect, the findings relate to previous research on the difficulties of defining the scope and boundaries of adaptation (Dupuis and Biesbroek, 2013). Despite outlining the importance of intentionality and substantiality, both of which appear to be absent in the examined cases, Dupuis and Biesbroek (2013) undertake an important differentiation between policy change and policy outcomes to construct the dependent variable. The authors identify indicators to measure the direction and scope of adaptation. A systematic assessment of policy change or the outcome of existing policies was not possible and marks a limitation of this study. The characteristics that Dupuis and Biesbroek (2013) define are a promising area for a cross-country follow-up study, which could enable a more systematic account of local adaptation policy.

Secondly, the preliminary findings, on how implemented adaptation measures took place, that is predominantly accidentally in form of blue-green engineering, retrofitting urban landscapes and following a logics of revitalizing only certain parts of the city are not surprising. They support earlier discussions, that the multi-scalar processes driving vulnerability remain largely ignored within current adaptation development paradigms (e.g., Shokry et al., 2020; Eriksen, 2021). (Soft)engineering adaptation knowledge and green infrastructure appear to be more readily accessible for (local) decisionmakers and policy practitioners than designing policy responses that deliberately target “vulnerable populations.” What is a bit surprising, is that the logic of accidental adaptation appears to unfold in similar ways in two political systems that are expected to have different capacities. In Jinhua, like in Atlanta, adaptation measures are punctual in that they focus on select pieces of land in sprawling urban areas that can be showcased. In contrast to Atlanta however, planning in Jinhua appears to unfold more holistically when it comes to water governance by involving actors from different policy domains, being more long-term oriented and deliberately aligned with other strategic policy efforts such as ecological corridor construction. Yet, the preliminary empirical insights also suggest, that there was no or only very limited consideration by environmental decision-makers on how adaptation interventions might expose some populations or how the neglect of other more exposed parts of the city might be problematic, where floodwater run-off continues to be a problem and/or people have less access to public resources (especially in southern Atlanta and rural Jinhua).

Thirdly, when looking at local decisionmakers’ problem recognition about “vulnerable populations” it became obvious that not all “vulnerable populations” are considered to be equally “deserving” to be accounted for. Both of these findings speak to existing research on the depoliticized nature of adaptation (Barnett, 2020; Remling, 2018) and that vulnerability is all but an innocent concept, as it challenges the legitimacy of the prevailing political economic order (Barnett, 2020). The select acknowledgement of only certain groups, is also not surprising and connects with remarks on the way vulnerability is used against (some) people, or is being weaponized (Thomas and Warner, 2019). The empirical findings make evident that vulnerability in both countries is deeply political as it includes the deliberate sacrifice of certain populations. This not just regards biased problem recognition by

local decision-makers, or maladaptive policy design, but lacking political opportunities and inaccess to essential public goods, such as affordable housing.

The political bias towards certain people appears to be an outcome of several interdependent factors that are more deeply rooted in the way 1) knowledge is produced 2) by whom and 3) used by who. Path-dependent knowledge processes and the way knowledge operates in local political practice also stands in interrelation with extra-local political environments, which impact what local decision-makers consider to be more legitimate to be addressed politically (also see Teebken, 2022a). This pattern ultimately exhibits how political institutions are vulnerable in their own right, not just when it comes to (political) biases towards certain solutions and population groups, or limited governmental capacity to design coherent policy strategies, but also in the way local adaptation opportunities are rendered by higher political levels and conflicting policy interests. This also relates to previous research, which emphasizes that addressing adaptation is all but a local process and requires multi-level engagement (also see Nalau et al., 2015). This argument can be extended to addressing overlapping marginalization processes – here it is especially state institutions which set the parameters for (re)distribution (Keister and Southgate, 2022).

5.1. Proposing a theory of vulnerable political institutions

Given the larger politics at play, which became obvious in this study, the reemergence of a quantified social vulnerability perspective to inform political practice needs to be problematized. Instead, and because of the multiple difficulties, in defining and making marginalized populations a front and center concern in climate adaptation planning and implementation, this article proposes to move towards a theory of vulnerable political institutions. This connects with vulnerability theorist Martha Fineman (2008) and human geographer Jesse Ribot (e.g., 2011), who both suggest moving away from debates on vulnerability embodiment, and consider more explicitly, where our current institutions fail, are mal-equipped and/or mal-oriented. It is about anchoring equality in the human condition (Fineman, 2008). Current discussions could be enhanced by examining the vulnerability of our political institutions, which provide uneven access to and only have limited steering capacity in the provision of essential resources. Despite the increasing recognition of adaptation and vulnerability as a socio-political process and vulnerability as co-created (e.g., Eriksen et al., 2015; Taylor et al., 2022), recent debates about putting “vulnerable groups” front and center, either often ignore the larger nature of changes required in our political systems (e.g., UNFCCC, 2018; Fünfgeld and Schmid, 2020) and/or remain considerably vague by referring to “complex governance questions” (e.g., see Taylor et al., 2022, also see Cairney et al., 2023). A strong focus rests on socio-ecological dimensions of vulnerability and transformative adaptation rather than the political changes required. A theory and empirical insights on vulnerable political institutions, could help us to reconnect with the main question raised earlier, on the role (local) political institutions play in addressing the root causes of vulnerability. Where to anchor a theory of vulnerable political institutions?

5.2. Addressing vulnerable political institutions I: Expanding our understanding of the policy process

To expand our understanding of vulnerable political institutions and address the earlier critique on an underdeveloped understanding of the policy process (Cairney et al., 2023), there is a need to consider the heterogeneity of different actors in the policy process at multiple levels of governance, their interests, logics, and examine potential conflicts and uneven power structures. Existing studies, which point to the need for integrative adaptation approaches and justice-informed planning often have a simplified understanding of the policy process and assume rationalistic governmental actors. Yet, the findings of this comparative

study reveal that there is an underlying politics at play, which must be considered in the design of adaptation responses, especially those that aim to target marginalized populations, who may end up being weaponized. Few adaptation research, such as Nightingale (2017), touch upon the issue of how micro politics shape macro politics and vice versa. Future policy planning and research related to “vulnerable populations” must consider the broader context conditions in which policy making is embedded.

We can learn much from critical policy studies and the emerging strand of historical-materialist policy analysis (HMPA) therein about the intricate contestation and inertia, which structure policy responses to crises (Brand, 2013; Brand et al., 2022). Critical policy analysis aims to understand the complex interconnection and contexts at play for public sector decision-making. HMPA offers a systematic framework of analysis and tool to study how and why specific state policies are or are not formulated and implemented and to what extent they contribute to the maintenance or reproduction of stately relationships and/or challenge them. As transformative adaptation aims for “radical change” (Lonsdale et al., 2015) and given the longtime debates on vulnerability inertia and persistence of adaptation incrementalism, HMPA is an angle which can offer new insights on why systemic structures that produce vulnerability remain unchallenged. HMPA also comes with a more intuitive understanding than previous analysis, as it argues, that the “state should be seen less in its function of problem-solving but rather as a mechanism for ordering and structuring policy processes against the background of essentially competing and contradictory social interests,” (Brand et al., 2022: 14). Through allowing for complexity, and examining positions with different material and social interests, HMPA is much better equipped to enhance our understanding of the (political) limits of and opportunities for adaptation, which is another gap that needs addressing (Berrang-Ford et al., 2021).

5.3. Addressing vulnerable political institutions II: Expanding the adaptation box

When it comes to the earlier question on what addressing the root causes of vulnerability effectively means, the findings of this study offer insights that go into two different directions: 1) policy responses inside and 2) outside the conventional adaptation box. Both will be unpacked in the following.

5.3.1. Policy instruments from the conventional adaptation box

The detected stigmatization of marginalized populations supports earlier research on the need to critically account for power structures as part of planned adaptation interventions, local epistemic communities, and local forms of shared knowledge to support adaptation planning (e.g., Klepp and Fünfgeld, 2021; Nightingale, 2017). This includes autonomy in having people define and frame their own vulnerabilities and acknowledging the multiple and ambivalent heads that people may carry (Liverman, 2015). Related policy instruments include participatory risk mapping or community-led vulnerability assessments and were presented earlier. In the context of the rapid uptake of SoVis to inform political planning, which often lack an understanding of local community dynamics and assign vulnerability onto people in a top-down, intransparent manner, advocating for community-run, dynamic vulnerability assessments appear to be particularly important. Low-threshold approaches include citizen-science projects enabled through local University actors, as is the case in a recent project community-university partnership in Atlanta. Here, a team of residents and university students collected information on hidden (environmental) hazards and enabled the inclusion of local knowledge and lived experience of community residents (see Jelks et al., 2018). However, aside from enabling agency for local populations, there is a deeper layer.

The empirical insights from Atlanta and Jinhua also speak to vulnerability, which is reproduced historically at different political scales and needs different policy instruments. Many interviewees saw

the uneven access to education, knowledge, and information, to be a crucial factor which impacts the ability to control the production of ideas, frames and meaning making about “vulnerable populations” and more fundamentally impacts who ends up in decision-making structures. The lack of representation in political institutions was already outlined by Holland (2017), who hints at the importance of political power to shape adaptation that goes beyond participatory forums (also see Table 1). Other materialistic inequalities that came to light are the urban–rural divide with the migrant worker population not being considered to belong to the Jinhua population, or the lack of affordable housing in Atlanta. All of these correspond with definitions of the root causes of vulnerability, defined as inequality, and limited access to resources, structures, and power (Downing et al., 2005, Lonsdale et al., 2015). But there is relatively little discussion in the adaptation justice literature which policy instruments address these “root causes”. Quite the contrary: In the way vulnerability is currently addressed in mainstream literature and practice, the lens of “vulnerable groups” serves the function of safeguarding the position of the supposedly “invulnerable,” i. e., the political, cultural, and socio-economic elite.

5.3.2. Policy instruments outside the adaptation box

Insights from inequality studies bring to light several synergies with the adaptation justice agenda and new policy instruments. For instance, in the adaptation discourse, manifold debates focus on procedural adaptation justice, but little is known how to enhance political power more broadly speaking. Inequality scholarship has insights to offer, also regarding the multiple forms of materialistic inequality and access to resources for materialistic well-being (e.g., Downing et al., 2005), which connects with economic and financial power. Stigmatization of certain groups (recognition adaptation justice) interlinks with the cultural dimension of inequality.

Keister and Southgate (2022) refer to exactly these three main dimensions of inequality: 1) economic or financial inequality defined as wealth and net worth, i.e., the value of things people own, or financial wealth, i.e., the value of liquid assets. 2) The status and cultural prestige on which people are stratified associated with certain traits or occupational positions. This includes specialized knowledge, special titles (Doctor, Professor) also exhibited in political positions (Senator, Governor, Provincial Leader or *shengzhang*). The last dimension, 3) power in which people are unequal, refers to power of “influence, authority and persuasion [...] making others do what you want them to do,” (Keister and Southgate, 2022: 17). Naturally, those with higher access to economic resources and prestige tend to be more powerful (Keister and Southgate, 2022).

A theory of vulnerable political institutions can engage in broader discussions on how our society is constituted and how governmental systems set the parameters for a just society. This boils down to one question: how much inequality do we tolerate as part of our different political systems? As much as the ecological system sets the distributive conditions for adaptation justice in terms of distributional vulnerability (Juhola et al., 2022), and as important it is to address justice within adaptation planning, there is severe limitations to what the current dimensions will address. Redefining vulnerability and adaptation discussions along this inequality nexus offers insights into the political reproduction of vulnerability and could add an important fifth layer to the box: redistributive justice.

This corresponds with different policy instruments. Regarding financial and economic inequality, placing debates on wealth limits, and financial means of redistribution in the adaptation context might prove useful. These include but are not limited to capital gains tax, (heightened) inheritance taxes, wealth and property taxes, or more progressive income taxes. Existing works already examine fair income distribution and its meaning for adaptation (e.g., Cappelli et al., 2021). This can be built upon. When looking at the cultural dimension, quota systems enforcing equal rights for all groups, gender equality and a revaluation of care work might be rediscussed as potential climate adaptation

means. When it comes to state politics, the control of markets is an interesting perspective to be discussed through an adaptation lens. Related political instruments are the nationalization and/or socialization of public resources for better governmental steering capacity for affordable housing, affordable energy, and food, rent control, fair access to public health and education.

And yes, given that for instance, the vast majority of U.S. “Congress is economically privileged, white, elderly and male” (Keister and Southgate, 2022: 477), there will be resistance to say the least. However, this is where social science adaptation scholars can make use of the recurring adaptation momentum: when the next heatwave hits, make income redistribution a front-and-center concern for adaptation as part of consultancy projects and public communication. These instruments and their political feasibility are likely to vary across political contexts, but they are important levers that we need to include in our discussions and research to break the cycle of vulnerability reproduction at an institutional level. Without them, adaptation programming that targets “vulnerable groups” will likely have a severely limited impact. For a policy practitioner and/or person working in the public administration, this will mean building unusual alliances with different governmental organizations (e.g., Ministries for Labor and Social Affairs) and thinking of entirely new policy mixes which combine conventional adaptation instruments with redistribution. The cross-departmental organization can ultimately foster policy integration and more holistic government. For academics and the broader public, engaging outside the adaptation box will not just imply opening up transformative adaptation discourses towards classic economic debates e.g., touching upon the equalization of living standards, wealth redistribution and challenging institutionalized power structures, but also questioning anti-statism as guiding principle in the provision of public goods. It is time to radically think outside the adaptation box.

6. Conclusions

Despite the (re)emphasis on “vulnerable populations”, this paper demonstrates the extent to which local political actors in different political systems are signified by a strong political bias in the way certain policy solutions are thought after and “vulnerable populations” (not) addressed. In the accidental adaptation efforts examined, blue-green infrastructural adjustments and neighborhood revitalization programs are the lower hanging policy fruits and follow a logics of revitalizing only certain parts of the city. The findings hint to vulnerability being more deeply rooted in external conditions to the individual, such as limited access to affordable housing, which requires different policy interventions. The social differentiation of environmental and climate impacts, and the effects of related policy measures were not a central concern and appeared to be politically problematic.

When examining the problem recognition of local decision-makers, politically motivated patterns of biased acknowledgment of “vulnerable groups” became apparent. Certain groups were considered more “deserving” than others (e.g., elderly, children, women) and again: politically less problematic. Here too, the findings hint to a deeper level: the way 1) knowledge is produced 2) by whom and 3) used by who in political practice. When looking at both, adaptation practice and vulnerability recognition, the study brought to light a concerning finding: the deliberate sacrifice of certain populations.

The findings help us to adjust our expectations in current adaptation solutions by disclosing the multiple factors which impact local problem recognition, political priorities but also the choices available to local policy practitioners and decision-makers. It became visible, that idealized conceptions and recommendations made in adaptation scholarship, such as considering multi-scale causes of vulnerability for adaptation interventions, are disconnected from the political reality on the ground. Adaptation is a prime candidate for addressing justice questions, due to its cross-cutting nature, but caution is demanded to not adequately considering the larger politics at play.

Some of the opportunities to address injustices within the conventional adaptation parameters were discussed, which continues to be a policy field of relatively little resources. However, to get to the root causes of vulnerability, there is a need to investigate larger questions of political change that regard the constitution of our political systems and broader mechanisms for societal redistribution. The article proposes a theory of vulnerable political institutions in terms of politically motivated bias, and limited governmental means to design effective and problem-oriented government responses. To anchor a theory of vulnerable political institutions and enhance a more complex understanding of policy processes, historical-materialist policy analysis (HMPA) is suggested as one element in addition to expanding the conventional adaptation box by interlinking future climate adaptation research with classical research on social stratification and inequality. These strands have new insights to offer on policy instruments that address some of the root causes that often remain untouched by the conventional adaptation box. This implies a broadening of the adaptation toolbox and rediscussing, for instance, what a capital gains tax, inheritance tax, wealth and property tax, and/or more progressive income tax can do for adaptation. Anti-statism as guiding principle in the provision of public goods must likewise be discussed.

Though the IPCC mentions “redistributive policies” in the pursuit of climate resilient development, there is considerable vagueness associated with what it is that needs redistribution. In the future, we need more research, which systematically and comparatively examines how redistribution mechanisms e.g., in China and the United States unfold, and how they interlink with vulnerability and climate change adaptation. This will also make us question whether political systems, which have privatized most of their public resources, such as the United States, are actually better equipped than fragmented authoritarian contexts such as China.

CRedit authorship contribution statement

Julia Teebken: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

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.

Data availability

The data that has been used is confidential.

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