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Climate change is beyond any one of us - The work of public health practitioners in building resilience against climate effects (BRACE) programs

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ABSTRACT

Public health practitioners of the Center for Disease Control and Prevention's (CDC) Climate Ready States and Cities Initiatives operate through critical pragmatism, programmatic facilitation, and collaborative planning to address climate and health impacts at the local and state levels. The study utilized qualitative mixed methods of semi-structured interviews and climate and health adaptation plan analysis to investigate the CDC's 2010–2021 funded cohort of 18 programs across the United States. The research presented here is an exploration of how these care-driven practitioners are constructing networks across scales, agencies, and the public(s) to construct, implement, and evaluate planning strategies in the face of severe barriers and challenges. Practitioners are investing in relational methodologies capable of generating targeted and reflexive programming, which is in line with progressive planning practices. Moreover, practitioners are utilizing these relational methodologies in a manner akin to 'context-responsiveness' to cross institutional and structural boundaries as well as generate and utilize limited resources. Finally, the research concludes by presenting a case for greater inter- and transdisciplinary practices across professional fields and universities to confront and mitigate the severe and growing health impacts of climate change.

ARTICLE HISTORY

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Climate adaptation; climate change; climate and health planning; public health; pragmatism

Introduction

Our playgrounds are ridiculously hot, like it's one hundred eighty hundred ninety degrees. If you try to touch a metal slide, it can cause a second-degree burn. (practitioner, personal communication)

You know, at the state level, it's just fraught with a lot of politics. (practitioner, personal communication)

The temperature is 96 degrees Fahrenheit as I bike nine miles to work at the University of North Carolina at Charlotte. Charlotte, like many other aspirational mid-sized American cities, is developing at an alarming rate, producing clouds of turbid material. God only knows what the dozers and woodchippers are sending into the local air. The clouded air burns worse than the American Spirits I used to smoke as I climbed a half-mile seeking fresh air. By the time I reached the campus, salt remnants had dried to the bike frame. What even is 'health' anymore I ask myself in reflection of shucking car dependency knowing I inhaled aerosolized trash. Not a day goes by that I do not look back to my

childhood, three decades ago, for some sliver of internal solace and memory.

I remember full-tilt sprinting down dirt roads in Florida summer for hours in the sun. It was hot, but I was safe. Summer rain showers were still occurring, although by the time I was 15, an inconsistency in their presence was deepening. There was a time I meandered for hours through salt marshes, lakes, rivers, and forests during the summer vacation. My childhood taught me interdependency with non-human life and deference towards the planet that gave rise to our species. Where is that even possible anymore in our increasingly urbanized, developed, asphalt-laden world? Do we know anything beyond surviving or profiting from capitalism's viciousness? When I was in high school, I could not conceptualize political economic systems, but I could see that society was, and is, devouring sensitive ecosystems (e.g. The Everglades, Indian River Lagoon, Wakulla River Basin, etc.) and species (e.g. Ghost Orchid, Florida Panther, Leatherback Turtle, etc.) that predate nations. Doing so while picking teeth clean with poor, BIPOC, and queer bones.

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After I changed clothes for a day on campus, hoping to be a bit more decent, I praised the air conditioning and the cessation of sweat in my eyes. The humming vent overhead brings me back to being too broke to afford air conditioning. I was 22, fresh out of an undergrad in Deland, FL, landscaping during the recession, and my apartment was 95 degrees Fahrenheit at 7:00pm. As I sit at my desk, I reflect on the literature calling for action for lives cut short by heat. I know from the combination of personal experience and professional training that heat did not kill them, society did. When heat waves occur, like Chicago 1995, society created vine-ripened circumstances for poor Americans to die of dehydration and multiple organ failure.

Extreme heat events will become more common and grow in severity as the Earth becomes terraformed and polluted. Anthropogenic climate change will continue to destabilize long-standing climatic patterns, leading to disproportionate burdens of water- and vector-borne diseases, extreme heat, food instability, air pollution, housing and economic disruption, flooding, drought, and ways of life (Ebi et al., 2021; Krawisz, 2020). The Center for Disease Control and Prevention (CDC) through the Climate-Ready States and Cities Initiative (CRSCI), in response to these climate and health impacts, has provided needed financial and institutional support for a limited number of states and cities to directly plan for and adapt to climate and health impacts. Building Resilience Against Climate Effects (BRACE) is a substantive framework and extension of the CRSCI to guide funding programs. Originally articulated, BRACE is a five-step iterative and adaptive learning approach:

- (1) Anticipate Climate Impacts and Assess Vulnerabilities;
- (2) Project the Disease Burden;
- (3) Assess Public Health Interventions;
- (4) Develop and Implement a Climate and Health Adaptation Plan;
- (5) Evaluate Impact and Improve Quality of Activities (Marinucci et al., 2014).

The function of climate and health plan creation and implementation is simple: to build evidence to understand and build policies/interventions to mitigate climate and health impacts on the public.

The funded *practitioners* of the 2010–2021 CRSCI cohort were the object of this study. It is important to more deeply understand the individuals that work to realize these interdisciplinary planning efforts, as well as the working realities that confront them. The guiding research questions were as follows: 1) What

factors facilitated and/or constrained adaptation plan development within public health agencies? 2) What were the institutional contexts of practitioners and how did they influence the planning processes? 3) What mechanisms support or hinder the implementation and evaluation of climate and health adaptation actions? The research utilized qualitative mixed methods and used a combination of climate and health profile (BRACE step 3) and adaptation plan (BRACE step 4) analyses and semi-structured interviews with practitioners. At the time of this study (summer 2021), there were a total of 18 state/local participating programs, out of which 11 had a formal climate and health adaptation plan. The 18 grantees included the following. Arizona

- (1) Wisconsin
- (2) Minnesota
- (3) Michigan
- (4) Oregon
- (5) Rhode Island*
- (6) New Hampshire
- (7) Maine
- (8) San Francisco
- (9) Maryland*
- (10) California
- (11) Massachusetts
- (12) North Carolina
- (13) Vermont*
- (14) Illinois*
- (15) New York*
- (16) New York City*
- (17) Florida*

* = Does *not* have a health adaptation *plan* at the time of study

This research article first provides an overview of the relevant public health, planning, and climate adaptation literature with an emphasis on barriers, challenges, and practitioner motivations. Following this literature review, the methods and results of the study are discussed. The article then presents a deeper analysis and discussion, as it relates to the core characteristics and interdependencies between practitioners as pragmatic facilitators and climate and health adaptation planning.

Challenges, barriers, and the responsibility to act in the face of them

Those who do not recognize the existence of widespread suffering in communities worldwide are simply not paying attention. (Lyles et al., 2018, p. 247)

Palimpsest: 1) writing material (such as parchment or tablet) used one or more times after earlier writing has been erased. 2) something having usually diverse layers or aspects apparent beneath the surface. (Merriam-Webster Dictionary)

Compassion and kindness are linked to imaginative ingenuity through moral responsibility (Nussbaum, 1990). Nussbaum's (1990) moral imagination is a direct inquiry into the hierarchical assumptions that drive normative forms of action and interventions in long-existent public institutional frameworks. Put more simply, Nussbaum's moral imagination is in direct opposition to human suffering and the barriers and moral apathies that prevent action that would ameliorate human suffering. Rational administrative and governmental frameworks can direct targeted forms of planning interventions, but normative interventions are typically justified via cost-benefit analyses that leave the most vulnerable—and the historically downtrodden—still in harm's way (Adler and Posner, 2000; Gold, 1996; Innes & Booher, 2010; Krumholz, 1982). Typical planning actions to mitigate hazards and health impacts of climate change and disasters are insular and play a highly limited and passive role for people and communities (e.g. most disaster response efforts are limited to preparedness/response, not equity-based mitigation/recovery efforts). This largely 'dislocated' and 'superimposed' view of the universal and atomistic 'person' from public institutions is a hallmark of the current neoliberal paradigm (Asen, 2017).

Speaking eloquently upon Martha Nussbaum's teachings, John Forester (2021) provides an appropriate framework that can be utilized by extension to assess the focused attention of climate and public health planners and practitioners: '(1) Empathic recognition of another's vulnerability or suffering; (2) causal/moral gauging of the sources of that vulnerability or suffering; (3) crafting of acts to mitigate that vulnerability/suffering, and (4) forming the motivation to respond practically to that Other's situation' (63). If we situate these four succinct humanist dimensions in climate and public health work, the construction and implementation of climate and health adaptation plans and partnerships, by practitioners (i.e. ... people), is built upon an 'empathic recognition' to 'craft acts' to 'respond practically to that Other's situation'. The motivations of public health practitioners to actively address such issues as disease, deleterious city air, scalding public use surfaces, preventable deaths driven by suffocating heat, the preservation and protection of potable water, and more, are focused immediately by the fragility and fleeting nature of humankind. Moreover, this motivated compassionate action conflicts immediately with the hierarchical positioning of markets and historical insular governmental silos.

The drive to act in the face of life, altering threats and challenges (i.e. anthropogenic climate change), is an essential aspect of human perseverance and the driving core of compassion (Lyles et al., 2018; Lange, 2022). For example, compassion fatigue due to exhaustion and care driven *labor*, widely witnessed in the heat of the COVID-19 pandemic, is a well-documented phenomenon among health-care practitioners (Lyles et al., 2018; Lluch et al., 2022). Moreover, public health professionals are aware of the unfolding climate change crisis (Kotcher et al., 2021). As E. Maibach et al. (2021) stated '[u]nless adequately addressed, climate change is likely to become a multigenerational public health catastrophe' (137). Public health practitioners already play witness to this stark reality but are impeded by a variety of barriers across personal, professional, and societal dimensions (Kotcher et al., 2021).

Public health and planning practitioners face a myriad of challenges and barriers that can directly hinder and undermine their responsibilities. At a minimum, practitioners face the following challenges: international capital development and fossil fuel/natural resource consumption driving deleterious climate change (Chenet et al., 2021; Holechek et al., 2022),

- multi-scale political hostility (Hahnel et al., 2020),
- localized development patterns that worsen climate effects, such as the urban heat island effect (Roxon et al., 2020),
- localized development patterns that structure inequitable socioeconomic climate-driven effects (Berberian et al., 2022),
- governmental/institutional siloing (Deslatte & Stokan, 2020)
- worsening climate projections/impacts (Louis & Hess, 2008),
- public disinformation (Lewandowsky, 2021),
- limited financial and material support (Bierbaum, 2013),
- knowledge uncertainty/scarcity (Ebi et al., 2016), and
- capacity shortages (Hess et al., 2012).

From the above list, the challenge of capacity-building is never ceasing and is often more akin to programmatic survival (Fox et al., 2019; Hess et al., 2012). Sparse funding provided by the United States for climate change and health adaptation has been well documented (Ebi et al., 2009). The transdisciplinary nature of public health and climate planning demands far more financial investments. For example, the field of climate and health adaptation and mitigation planning simultaneously takes on aspects of and embeds itself in the following: public

health/healthcare, public administration, law, civil engineering, urban and regional planning, geography, sociology, meteorology, environmental science, economics, and even social work (Munasinghe, 2001).

Planning practitioners, amidst hostile political and financial realities, are constantly charged with reinventing and repurposing various methodologies for both data collection and action because of the complex nature of climate and health adaptation and mitigation (Austin et al., 2016; Buist et al., 2023). Saddeningly, practitioners often have to limit the scope of their plans, as climate change is often perceived as something that is misaligned with current public health systems despite the competing and myriad needs of their communities (Campbell-Lendrum et al., 2015). Thus, practitioners are almost always operating within knowledge and resource scarcity as they gather data to understand how climate change is shaping, harming, and destabilizing human and environmental life across institutions and society, as well as within local communities. However, national efforts made by such institutions as the Global Consortium on Climate and Health Education located at Columbia University assists in the construction of knowledge banks and guidance/educational opportunities for climate and public health practitioners.

The ‘edge’ of the climate and public health planning field is the *learning* (institutional, programmatic, and practitioner levels) that takes place at the interface of implemented actions in specific environs and communities (Collins & Ison, 2009). The consequential impacts, outcomes, and happenings of constructed and intentional efforts must be reintegrated into initiatives and efforts as new forms of institutional knowledge (Elkjaer, 2009). Institutional public health practitioners are utilizing what tools they can (e.g. local data monitoring techniques), generating new tools with what they have (e.g. data translation techniques with practitioners and community leaders), and leading plans/actions with partners and communities to push institutional/administrative boundaries (e.g. plan and strategy formulation and implementation) (Fox et al., 2019). This ongoing, temporal, and ‘living’ edge of labor, intentional planning, and new knowledge is an unfolding and changing palimpsest (Redvers et al., 2023); as practitioners scribe their pages with what ink is available to them, the past writings (previous initiatives, societal and environmental conditions, and structurations) are never detached or fully invisible. As climate change is refocused through this personal and localized lens, the unfolding crisis becomes more immediate and even observable at the embodied level (Tschakert, 2012).

The following research contributes to this body of literature by deepening the behavioral and facilitative

understanding of *climate and public health* planning practitioners. The research questions were as follows: 1) What factors facilitated and/or constrained adaptation plan development within public health agencies? 2) What were the institutional contexts of practitioners and how did they influence the planning processes? 3) What mechanisms support or hinder the implementation and evaluation of climate and health adaptation actions? As will be elucidated through the results and discussion sections, this research argues that aspects of practitioner perception, values, and capacity for relational praxes are paramount to progressing climate and health adaptation and mitigation planning. In proposing a deeper understanding of the practitioners, the research is supporting literature that showcases how public institutions are being navigated and adjusted from the ‘inside’ through pragmatic actions to address crises such as anthropogenic climate change.

Methods

The research proposal for this study (STUDY00002383) was granted exempt status by the Florida State University’s Office of Human Subjects Protection. Per research protocols, and in accordance with the Declaration of Helsinki, the authors utilized verbal consent with research participants after providing a full pre-interview study information disclosure. Informed verbal consent was obtained from all the participants.

Climate and health adaptation plan analysis

The study used a mixed methods approach, including plan/policy analysis and in-depth semi-structured interviews with Climate-Ready States and Cities Initiative (CRSCI) practitioners. The formalized but also generalistic research questions that drove data collection and analyses were as follows: 1) What factors facilitated and/or constrained adaptation plan development within public health agencies? 2) What were the institutional contexts of practitioners and how did they influence the planning processes? 3) What mechanisms support or hinder the implementation and evaluation of climate and health adaptation actions? The research began with document analyses of climate and health profiles (BRACE step 3) and adaptation plans (BRACE step 4) to understand how and to what degree practitioners addressed climate and health impacts through formalized policy mechanisms. The plans and documents were acquired directly from CRSCI practitioners and their respective public web-pages (listed and noted in Table 1) and analyzed/dissected using the following framework:

Table 1. Listing of analyzed climate and health adaptation plans (excluding health profiles)

Cameron, L., and A. Ferguson. 2016. Michigan Climate and Health Adaptation Plan (MI-CHAP): 2016–2021 Strategic Plan. https://www.adaptationclearinghouse.org/resources/michigan-climate-and-health-adaptation-program-strategic-plan-update-2016-2021.html .
Maine Department of Health and Human Services. n.d. Building Resilience Against Climate Effects: Enhancing Community Resilience by Implementing Health Adaptations. Climate and Health Adaptation Plan.
California Department of Health. 2017. Safeguarding California: Implementation Action Plans, Public Health Sector Plan. https://resources.ca.gov/CNRALegacyFiles/docs/climate/safeguarding/Public%20Health%20Sector%20Plan.pdf .
Comerford, C. 2017. San Francisco's Climate and Health Adaptation Framework. https://www.sfdph.org/dph/hc/HCAgen/HCAgen2017/June%2020/Climate_framework.pdf .
Massachusetts Department of Public Health. 2014. Capacity to Address the Health Impacts of Climate Change in Massachusetts: Findings from a Statewide Survey of Local Health Departments. https://www.mass.gov/doc/climate-change-in-massachusetts-0/download .
Minnesota Department of Health. 2019. The Minnesota Climate and Health Strategic Plan: August 2016 - August 2021. https://www.health.state.mn.us/communities/environment/climate/docs/strategicplan.pdf .
New Hampshire Department of Health and Human Services. 2010. Preparing for Climate Change: A Strategic Plan to Address the Health Impacts of Climate Change in New Hampshire. https://toolkit.climate.gov/reports/preparing-climate-change-strategic-plan-address-health-impacts-climate-change-new-hampshire .
North Carolina Division of Public Health. 2018. North Carolina Climate and Health Implementation and Monitoring Strategy (IMS) for Heat-Related Illness. https://epi.dph.ncdhhs.gov/oe/climate/HeatIMSNorthCarolinaExecutiveSummary.pdf .
Oregon Department of Health. 2017. Oregon Climate and Health Resilience Plan. https://www.oregon.gov/oha/ph/healthyenvironments/climatechange/pages/resilience-plan.aspx .
Roach, M., E. Barrett, H. E. Brown, B. Dufour, D. M. Hondula, H. Putnam, and B. Sosa. 2017. Arizona's Climate and Health Adaptation Plan: A Report Prepared for the United States Centers for Disease Control and Prevention Climate-Ready States and Cities Initiative. https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/extreme-weather/pubs/arizona-climate-health-adaptation-plan.pdf .
Wisconsin Department of Health Services Division of Public Health. 2016. Wisconsin Climate and Health Adaptation Plan. https://www.dhs.wisconsin.gov/publications/p01447.pdf .

- (1) Plan Type
- (2) Priority Hazards
- (3) Plan Process
- (4) Goal(s)
- (5) Strategies
- (6) Supporting Documents
- (7) Implementation Instruments;
- (8) Partners
- (9) Equity Considerations
- (10) Vulnerable Populations
- (11) Challenges
- (12) Data/Indicators

Interview participants

The combined literature review and plan analysis helped prepare the authors for the interview portion of this research. A total of 17 interviews were conducted with 25 practitioners from July to August 2021 (approximately an hour each in length). New York City did not wish to participate because of the circumstances surrounding the COVID-19 Pandemic. Interviews were conducted using Zoom for recording and transcription. Each interview followed a series of predefined questions similar in construction to the plan analysis framework (e.g. plan construction/implementation, barriers/challenges, equity considerations, partnerships and collaborations, evaluation, supporting data/monitoring). The purpose of this framework was to obtain complementary datasets between the plan analysis and interviews.

Coding and analysis

All interviews were coded for gerunds, similar to the initial phases of grounded theory (Charmaz, 2006). By associating these gerunds with the associated interview material, the team constructed general overarching themes that were adjacent to the components of the initial interview framework. These themes include equity considerations, collaborative partnerships, plan development/implementation, barriers, knowledge uncertainties, capacity, monitoring and evaluation, general observations, and public engagement. Paradoxically, the most powerful insights were generated from how the interviews gave rise to intensive practice-based conversations, not from the preparatory plan and document analyses.

Results

The contents below are two tables (Tables 2–3) that deepen the forthcoming analytical discussions. Table 2 shows the anecdotal and experiential dialogue sourced directly from the interviews. This table provides an immediate, albeit external, perspective on practitioners' working realities. Table 3 contains planning strategies from each of the 11 formal climate and health adaptation plans to showcase formal practitioner actions that are interdependent on the interview material. Table 3 is intended to provide insight into policies that elucidate practitioner tact.

Within the supplemental materials to this research article are four *representative* tables sourced from formal interview coding and analysis. Each table contains further support for interview analysis.

Table 2. Experiential CRSCI practitioner interview dialogue

- 'We had five hundred and twenty people die last year from heat related deaths. And maybe in some of these other states it's just a few people. So convincing people politically is easy. . . Just tackling these issues are preventing fires, floods, heat, et cetera, and the only challenge that I would say is communicating it so it doesn't get into that climate change political spectrum and get taken out of context so you can get the work done. You have to be strategic'.
- 'We're working on a digital storytelling project with some women in [South] County. And doing some Spanish storytelling. They're all agriculture workers and about heat and wildfire smoke, and how some of them are mistaken for indigenous women . . . And then we also are working on wildfire stories for people from Northern [State] who I would say typically wouldn't be considered like, you know, environmental justice or communities of color, but are definitely being impacted by the wildfires and the severe . . . and have lost homes in some cases. Like, even though this one lady has one hundred acres, she's been living in her car or in a trailer for the last two years, or three years'.
- 'I don't really know what the politics are. I don't understand a lot of what's going on. If you understand the challenges related to sea level rise and storms and, you know, resilience and all of that, why not have the same sort of attention or at least advocacy around climate and public health? So I guess that relationship needs to be developed a little bit more. But I think at the local level, depending on where you are, you have a little more sort of room to do a lot of interesting work. And that's at the government level. And then we have all of these outside actors, these nonprofit community based organizations who are also organizing around multiple issues that are affected by climate like economy, housing displacement and public health as well. So there's a lot of dynamics that are happening. But I think it's hard for BRACE as a program to sort of plug in and build those relationships, especially since we're so far removed'.
- 'I think it definitely helped us think about how we talk about [the climate adaptation] plan. And, you know, we have like a couple stories in there, and that was intentional, trying to personalize it. I don't think that that was necessarily like a lesson learned from putting it together as much as speaking to people, but that informed that with folks speaking to people and local health departments informed the process . . . Like we were very intentional on making it practical. And the reason for that was based on our conversations with local health departments in particular. We don't need to know the background information, just give us some examples of what we can do'.
- 'We found really disproportionate rates of disease traveling in really different ways and really, you know, struggled initially. I think, to to be helpful to those groups and figure out the right partners to work with in order to be of most use and to be able to provide the most resources that we could, sort of hopeful that we can build on that agency experience going forward to figure out how do we how do we reach those folks, understand what their needs are, and then connect them to whatever resources we can'.
- 'It's also sort of that narrative about how we're meeting the challenges. And so it's an opportunity for us to hear, but for community members to come together and hear each other's stories. Their concerns and so forth. That also sort of really creates that narrative that builds more resilience, and they need community, you know, as a way to also engage more broadly in their community around the health impacts of climate change'.
- 'In terms of actions, I can't say there's a lot of climate and health adaptation actions that made its way into the state health improvement plan. But some of the mitigation actions and potential benefits for health have made their way into the state health improvement plan and a section on promoting community health. So there are some strategies in there about low-income weatherization, encouraging public transit access, and encouraging walking and biking. The document kind of lays out these are strategies that we're going to work on with our partners across the state, within the health department and outside of the health department'.
- 'We have a lot of partners that represent high risk populations like older adults. Some partners run various programs that provide support for older adults who live at home and require outside assistance. It's kind of our highest risk group of people that we are concerned about during hot weather events. We call it the [State] Hot Weather Group, it's not a very creative name, but it's kind of our collaborative network. We also have folks that represent schools, school sports, that are involved in that group. National Weather Service has been a phenomenal partner for us'.
- 'And kind of I think those discussions [with partners] also sometimes help educate us a little bit, too . . . What we really wanted was to get more money put into the [Office of Temporary and Disability Assistance] program so that, you know, it could benefit more people. And in our first meeting, learn that while they weren't really going through the funding that they were already allocating. So those discussions evolved into more like how can we go through that money? And so that's where we settled on, at least initially. Rather than advocating for that policy change, we shifted to more of an approach where we were promoting the program. So we've provided some funding to help develop joint flyers that could be put up more broadly than they were at the time. In the last couple of years, we've done an extreme heat social media campaign to try to target zip codes where we think there may be more vulnerable people who are also eligible for the heat cooling benefit'.
- 'I see a really big opportunity with this program to do this sort of [adaptation] project. I think this would be extremely impactful and feasible. But without the willingness of partners, it's like we are in a space where we can't force anyone to do anything. And that can be hard because it's like it seems like such a big win, but it's really like bringing people along to support it and champion it'.

- Table S5 - Equity: This table contains interview data that speaks directly and indirectly to equity. Further, this table speaks on inequity. The data itself is simplistic but nevertheless important and makes inferences to power structures (indigeneity, institutional barriers/limitations, race/ethnicities, economics, and disproportionate heat impacts).
- Table S6 - Barriers, Challenges, and Competing Priorities: This table contains interview data that speaks on such things as financial costs, disinformation, public distrust, personnel shortages, and siloing.
- Table S7 - Public Engagement: This table contains interview data that speaks on trust building, storytelling, focus group facilitation, public education/training, and public outreach. Public engagement is a core component to CRSCI praxes.

- Table S8 - Collaborations and Partnerships: This table contains interview data that speaks on facilitating partner expertise, technical assistance provision, workshops, contracts, direct service provisions, scenario planning, and more. Collaboration and partnerships, like public engagement, is a core component of CRSCI praxes.

Discussion - climate change is larger than anyone—CRSCI practitioner as programmatic facilitator and the need for national investment

We need to not just gather data, but get in and engage. (practitioner, personal communication)

There's so many dimensions of the population, it's so diverse, and we have populations that are in great need but are fairly hidden because they're not documented or

Table 3. Strategies showcasing practitioner tact

Arizona	'Expand and mobilize relationships with existing local, neighborhood, community, and faith-based groups that provide social and health services to residents, and connect preparedness activities with these groups, such as providing cooling refuge at localities that also offer case management, food and shelter, or job training' (11).
California	'Engage members of communities facing impacts of climate change to define what resources and training they desire, and collaborate with the communities to develop these self-defined community assets' (165).
Maine	'Community Strategies for Local Response—Check on people living alone and/or who are more vulnerable to heat's effects' (31).
Massachusetts	'Promote and provide/increase technical and financial support for small-scale farming' (84).
Michigan	"Response priorities to climate change events: 1. Develop responses for emergencies related to extreme weather and/or climate change that are protective of vulnerable populations. 2. Ensure accessibility to health care services for people with chronic conditions during service disruptions caused by extreme weather events. 3. Address anxiety, depression or other mental health conditions as consequences of a climate change event" (3).
Minnesota	'Objective 6a. Provide education and outreach to key stakeholders such as public health professionals, healthcare providers, state agency personnel, business owners, farmers, planners, architects, landscape architects, designers, water industry professionals, policymakers and elected officials on the climate change effects to human health' (12).
New Hampshire	Based upon a modified 10 Essential Health Services Model—"5. Develop policies and plans that support individual and community level climate change risk reduction efforts' (4).
North Carolina	'Cultural Humility—NC [Department of Public Health] staff are aware of the limitations they face regarding the different cultures of the four counties in North Carolina. NC [Department of Public Health] uses cultural humility to not master the culture but to learn more about the culture they are working with to better serve them' (20).
San Francisco	"The guiding principles of the Climate and Health Program are: Equity: Explicitly address vulnerable populations in programs and policies focused on climate health impacts with the goal of reducing health disparities. Community: Inform and engage communities about the health impacts and health co-benefits associated with taking action to both adapt and mitigate to climate change" (5).
Oregon	'Provide financial and technical support to local and tribal health jurisdictions to carry out community-led climate adaptations and interventions' (np).
Wisconsin	'Ensure that utility rates during heat waves do not spike, that there are emergency response plans (ERP) for power outages, and consider populations dependent on air conditioning and oxygen' (22).

for other reasons prefer not to be politically visible.
(practitioner, personal communication)

The first core tenet of this paper is practitioners *care* (Forester, 2021; Healey, 2024; Lyles et al., 2018). The state and local health care practitioners participating in the Climate-Ready Cities and State Initiative (CRSCI) program first had to *apply* for the available funding after recognizing the needs of their communities. There are implications for this care and sense of responsibility. For example, practitioners often display high degrees of ingenuity in implementing climate and health planning practices after diagnosing climate and health impacts on their communities, usually in the form of partnerships and collaborations across sectors and scales (e.g. agencies and community partners). As such, these public health practitioners behave more in line with critical pragmatism and context-responsiveness than solely as healthcare service providers or technical bureaucrats (Forester, 2022). Thus, this pragmatist form of relational planning leads to a second core tenet—incrementalism, and small programmatic steps can keep climate and health adaptation work *alive* (T. Holmes & Eisenman, 2020). Despite calls, and rightfully so, for more than incrementalism (Surugu & Chutab, 2021)—it is important to reflect that, in certain contexts/scales, incrementalism may be the *only* action taking place in some states/regions.

CRSCI practitioners sit in the middle of communal, societal, and planetary crosswinds. The small but ever-growing subset of public health that deliberately plans

for the embodied health impacts of anthropogenic climate change should be considered its own field. Traditionally, technical expertise combined with normative forms of public institutions is excellent in compartmentalizing hazard-driven programs (e.g. epidemiology, disaster response, wildfire prevention, flood mitigation) and in the creation of *targeted* programs/interventions (e.g. strategically placed cooling centers, hurricane shelters, retaining walls) (Al-Habil, 2011; Kuecker & Hartley, 2021). However, technical training in epidemiology, climatology, and other fields does not necessarily teach the skills necessary to develop and maintain partnerships, collaborations, and working relations. These 'relational' skills are abruptly brought to attention when *tactfully* developing work contracts, budget allocations, public engagement sessions, and even communication techniques co-constructed *with* vulnerable populations and communities (Albrechts et al., 2019; Andres et al., 2021).

What is emerging between CRSCI practitioners, their programs, and partner agencies is the deliberate construction of new 'networks between similarly positioned bureaucrats [to] enable them to communicate, share experiences, and build trust' (Nicholls & Baran, 2024, p. 3). As such, the following concepts of CRSCI practitioners are based on documented observations of public health practitioners' navigation of barriers, challenges, public institutions, and charge/responsibility to mitigate climate and health impacts. Public

health practitioners within the CRSCI have had to learn the skills (itemized and contextualized in Table 4) necessary to improve climate and health adaptation planning. In summary, practitioners seek to be of service to the public(s) while operating from within public institutions that have been historically designed to hold them separate from said public(s) (Forester, 1989; Friedmann, 1987; Healey, 2020; Innes & Booher, 2010; Scott, 2020).

In our conversations with practitioners, we found that practitioners extensively engage in collaborative approaches to public health planning, both at the institutional/inter-agency level and with communities. Practitioners have a variety of reasons for seeking face-to-face interactions with members of the public, other practitioners, community leaders, and vulnerable populations (see Tables 2-3 and S5-S8):

- Have access to localized and contextualized data,
- Build public trust,
- Augment public behavior and awareness,
- Build reciprocal communication channels for plans, partnerships, and interventions,
- Deliver services and material/financial support when available, and
- Support evaluation practices for plans and interventions (Fage-Butler et al., 2022; Hügel & Davies, 2020; Lange, 2020, 2022; Wieland et al., 2020).

It is increasingly clear that to transgress institutional limitations and neoliberal socio-economic structures, direct human connections between practitioners, organization leads (at all scales and sectors), and people(s) are paramount (Rayner & Lang, 2012). As stated by a CRSCI practitioner, 'Communities need to see us continue to show up to meetings and build trust'. This statement is further corroborated by another CRSCI practitioner, 'It's really about listening and trying to get people to sit down at a table, which is not easy'. There is evidence to support that the facilitation of direct human connections between fellow practitioners in partner agencies/organizations and the public can accomplish the following:

- Traverse barriers/boundaries to provide a tactful program and intervention construction and implementation (e.g. connecting services to functional needs; Table S8)
- Increase the likelihood of programmatic survival in the reporting of strategic impacts for further funding (e.g. direct contract provision to community-level partners, Table S6/S8),
- Draw attention to severe societal challenges related to climate and health impacts (e.g. inequitable tree canopy cover and budgetary shortfalls; Table S5; ex: confronting dis/misinformation; Table S6), and
- Challenge long-standing traditional public health training based on technical expertise through a shift in model to a programmatic facilitator (e.g. customized breakout session based upon sector and profession; Table S7).

Facilitation, across both programmatic considerations and the public(s), demands relational and communicative methodologies that can interdependently thread together acts of budgeting, data collection, public inclusion/participation, reporting, and plan/strategy development (Bolden et al., 2018; Ebi et al., 2018). Further, facilitatory praxes and overall programmatic design *should* reflect cultural considerations (race, class, indigeneity, gender, etc.) for both data specificity and preservation of working internal and external relationships across time (Erfan, 2017; Kinsella, 2010; Lange, 2022). It will be briefly stated that pilot projects and programmatic design (e.g. mini-grants, communication/training campaigns in conjunction with local public health departments, contract construction, delegation, etc.) are classic programmatic and facilitative dimensions of deliberative pragmatism (Forester, 2013). These long-standing intradepartmental dimensions are always a part of praxes at the institutional level. However, climate and public health adaptation practices are evolving to do more with less, often because of increasing budgetary constraints. Thus, public participation and facilitatory processes with partners and local organizations are needed for present and future knowledge access and service provision (Lehoux et al., 2009).

Table 4. The public health and climate change practitioner

Typically positioned in public health institutions at the state and municipal level
Working collaboratively across agencies, sectors, and scales (from federal to the communal)
Often limited in direct resources (financial, technological, personnel)
Working contexts for strategy development is transdisciplinary with partnerships ranging from climatology and epidemiology to emergency management and community development
Asset-based community development and community network constellation construction are commonplace seeking to generate resources and capacity at the communal level
Immense work is put forth to connect and translate climate and health impacts into policy and strategy construction, implementation and evaluation
Always working 'at scale' to bridge the climatic to the local but is nevertheless working in complex and sometimes limiting settings such as bureaucracies

Lastly, such deliberative programmatic facilitation by public health practitioners across working relationships is to uphold *efficacy*, but also to shape praxes more equitably to reduce institutional contradictions often caused by political realities (Innes & Booher, 2010; Nicholls & Baran, 2024).

Thus, public health practitioners within the CRSCI program act more in accordance with critical pragmatism than technical policy analysts/bureaucrats (Friedmann, 1987; Nguyen-Trung et al., 2024). Moreover, *how* public health practitioners act within their planning capacities; however, large or small, is well conceptualized through ‘context-responsiveness’ (Forester, 2022). CRSCI practitioners, acting within public health contexts, utilize their subject matter expertise to craft straightforward policies and *planning* methods to protect their communities. They are going about this through deep public engagement strategies and inter-agency partnerships that simultaneously act as data/communication channels, but also as resources for planning and strategy implementation (Forester, 2022). CRSCI practitioners act as programmatic facilitators from within their respective departments/programs and bridge themselves across boundaries through networks after diagnosing climate and public health impacts (e.g. climate and health profile construction, community training sessions, information sharing, and public education).

Not spoken directly in the interviews or in the adaptation plans, but still a looming cloud hanging over the project of climate and health adaptation planning, is how the current paradigm of aggressive national economic development is structuring climate impacts and health exposures (Kaffrell-Lindahl & Sewpaul, 2024). Climate and health impacts follow, almost verbatim, the inequities of society (e.g. wealth distribution) (Louis & Hess, 2008; Smith et al., 2022). Wealth, material resources, and disposable income *is* resilience in capitalist America (Tselios & Tompkins, 2019). Further, the most difficult task posed to climate and health practitioners is to understand more directly the linkages between climate change and human bodies over time and across socioeconomic structures (Nyantakyi-Frimpong, 2021; Tschakert, 2012). For example, there are pronounced knowledge gaps, as they relate to planning for extreme heat and heat-related illness/mortality. It is not well known *how* heat waves follow societal inequities down to the individual level across geographies; we know that they do, and we generally know who will most likely be impacted (Porto et al., 2017; Tschakert, 2012). For instance, certain scenarios lead to heightened risk of heat-related illness/mortality across certain groups (people of color, disabled, those living at home alone, older apartments on higher floors, urban, poor, elderly, outdoor labor-based

employment, etc.). However, it is very difficult to track how an individual, at the *experiential* level, becomes trapped and dies of dehydration and multiple organ failure in their own home (i.e 1995 Chicago Heat Wave) (Ajibade & McBean, 2014).

In recognition of these realities, the CDC has partially redirected planning efforts towards environmental justice in 2022 and continued this effort into a formal partnership with the American Public Health Association on the basis of justice, equity, diversity, and inclusion in 2024. This substantive reformation of climate adaptation planning into political dimensions is why the subject of public health addressing climate and health impacts through equity and pragmatic planning praxes should be its own field and taken more seriously by the planning community (Forester et al., 2021). Pragmatism, particularly context-responsiveness and collaborative planning based on care and responsibility, permits the politicization of life on Earth without stepping on political tripwires (Klein, 2015). The CRSCI practitioners discussed here creatively interpret and navigate data, relationships, partnerships, financial resources, and the overwhelming challenges and barriers to implement and evaluate planning strategies and interventions. Thus, it is posited that urban and regional planning and public health, as disciplines, need to build deeper interdependent relationships across cities, states, and universities to deliberately plan to protect life on Earth, not markets, as the ultimate reason for the state’s existence.

Public health brings with it a dimension of awareness and training that is embedded in the human body across environmental and social domains. Urban planning departments can, in turn, train individuals on the methods and praxes discussed in this research, paradoxically being utilized by public health professionals. This shift in urban planning practices entails the creation of intense interdependencies between climate and public health planning with equity planning (Krumholz & Hexter, 2022), advocacy planning (Davidoff, 1965), communicative and collaborative planning (Innes & Booher, 2010), radical planning (Sandercock, 2024), neighborhood planning (Keating & Krumholz, 2000), and even therapeutic planning (Erfan, 2017; Lange, 2022) for the creation of theoretical and practice-based synergies. Urban planning, emergency management, transportation planning, housing, community development, and even public works departments are in key positions at local and state levels to provide key investments to mitigate climate and public health impacts through the production of equity-based co-benefits (Sharifi et al., 2021).

Universities should, in turn, invest in programs that bridge public health and urban and regional planning,

with the intent of progressing climate and public health adaptation and mitigation planning and training such as Columbia's Global Consortium on Climate and Health. This key investment will help generate personnel and research that edges the field closer to understanding the linkage between human bodies, society, and health, and to support equity and justice-based praxes. These observations and documented linkages made by climate and public health practitioners can be used as data to push climate litigation further. For as it currently stands, professionals, such as those of the CRSCI, dedicated to the task of climate and health planning are woefully overshadowed by the magnitude of what's coming down the pipeline in future years and decades.

Since the inauguration of President Trump in January of 2025 there has been extensive dismantlement of the existing climate and public health infrastructure. A venerable onslaught of executive orders has sought the defunding and grounding of major federal agencies such as the National Institute of Health, the Centers for Disease Control and Prevention, the National Science Foundation, and more. The United States has once again been removed from the Paris Climate Accord, as well as removed itself from active participation in the World Health Organization. Scientific methods observing climate change and health impacts that are grounded in empirical reality and contextualized by race, gender, sexuality, ability, and more are being deemed a threat to society. This current moment in time the human species and its existence are being undermined through a paradigmatic turn to authoritarianism and fascism.

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Author contribution statement

Zechariah Lange performed the original theorization, original conception, original writing, methodological construction, and assisted in data collection and data analysis. Fushcia-Ann Hoover assisted in theorization, conception, data analysis, original writing, and critical review. Tisha Holmes assisted in data collection, data analysis, critical review, and original project conception. Christopher Uejio assisted in critical review, original project conception, and is the lead principal investigator of the project.

Data availability statement

Data of the research is presented within the body of the article and within its supplemental material. However, data availability requests may be made to Zechariah Lange at zlange@charlotte.edu.

References

- Adler, M. D., & Posner, E. A. (2000). Implementing cost-benefit analysis when preferences are distorted. *The Journal of Legal Studies*, 29(S2), 1105–1147.
- Ajibade, I., & McBean, G. (2014). Climate extremes and housing rights: A political ecology of impacts, early warning and adaptation constraints in Lagos slum communities. *Geoforum*, 55, 76–86. <https://doi.org/10.1016/j.geoforum.2014.05.005>
- Albrechts, L., Barbanente, A., & Monno, V. (2019). From stage-managed planning towards a more imaginative and inclusive strategic spatial planning. *Environment & Planning C Politics & Space*, 37(8), 1489–1506. <https://doi.org/10.1177/2399654419825655>
- Al-Habil, W. I. (2011). Positivist and phenomenological research in American Public Administration. *International Journal of Public Administration*, 34(14), 946–953. <https://doi.org/10.1080/01900692.2011.615554>
- Andres, L., Bryson, J. R., Denoon-Stevens, S. P., Bakare, H., Toit, K. D., & Melgaço, L. (2021). Calling for responsible inclusive planning and healthy cities in Africa. *The Town Planning Review*, 92(2), 195–201. <https://doi.org/10.3828/tpr.2020.49>
- Asen, R. (2017). Neoliberalism, the public sphere, and a public good. *The Quarterly Journal of Speech*, 103(4), 329–349. <https://doi.org/10.1080/00335630.2017.1360507>
- Austin, S. E., Biesbroek, R., Berrang-Ford, L., Ford, J. D., Parker, S., & Fleury, M. D. (2016). Public health adaptation to climate change in OECD countries. *International Journal of Environmental Research and Public Health*, 13(9), 889. <https://doi.org/10.3390/ijerph13090889>
- Berberian, A. G., Gonzalez, D. J., & Cushing, L. J. (2022). Racial disparities in climate change-related health effects in the United States. *Current Environmental Health Reports*, 9(3), 451–464. <https://doi.org/10.1007/s40572-022-00360-w>

- Bierbaum, R., Smith, J. B., Lee, A., Blair, M., Carter, L., Chapin, F. S., Fleming, P., Ruffo, S., Stults, M., McNeeley, S., Wasley, E., & Verduzco, L. (2013). A comprehensive review of climate adaptation in the United States: More than before, but less than needed. *Mitigation and Adaptation Strategies for Global Change*, 18(3), 361–406. <https://doi.org/10.1007/s11027-012-9423-1>
- Bolden, I. W., Seroy, S. K., Roberts, E. A., Schmeisser, L., Koehn, J. Z., Rilometo, C. H., Odango, E. L., Barros, C., Sachs, J. P., & Klinger, T. (2018). Climate-related community knowledge networks as a tool to increase learning in the context of environmental change. *Climate Risk Management*, 21, 1–6. <https://doi.org/10.1016/j.crm.2018.04.004>
- Buist, Y., Bekker, M., Vaandrager, L., Koelen, M., & van Mierlo, B. (2023). Strategies for public health adaptation to climate change in practice: Social learning in the processionary moth knowledge platform. *Frontiers in Public Health*, 11, 1179129. <https://doi.org/10.3389/fpubh.2023.1179129>
- Campbell-Lendrum, D., Manga, L., Bagayoko, M., & Sommerfeld, J. (2015). Climate change and vector-borne diseases: What are the implications for public health research and policy? *Philosophical Transactions of the Royal Society B: Biological Sciences*, 370(1665), 20130552. <https://doi.org/10.1098/rstb.2013.0552>
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. Sage.
- Chenet, H., Ryan-Collins, J., & Lervén, F. V. (2021). Finance, climate change and radical uncertainty: Towards a precautionary approach to financial policy. *Ecological Economics*, 183, 106957. <https://doi.org/10.1016/j.ecolecon.2021.106957>
- Collins, K., & Ison, R. (2009). Jumping off Arnstein's ladder: Social learning as a new policy paradigm for climate change adaptation. *Environmental Policy & Governance*, 19(6), 358–373. <https://doi.org/10.1002/eet.523>
- Davidoff, P. (1965). Advocacy and pluralism in planning. *Journal of the American Institute of Planners*, 31(4), 331–338. <https://doi.org/10.1080/01944366508978187>
- Deslatte, A., & Stokan, E. (2020). Sustainability synergies or silos? The opportunity costs of local government organizational capabilities. *Public Administration Review*, 80(6), 1024–1034. <https://doi.org/10.1111/puar.13237>
- Ebi, K. L., Balbus, J., Kinney, P. L., Lipp, E., Mills, D., O'Neill, M. S., & Wilson, M. L. (2009). US funding is insufficient to address the human health impacts of and public health responses to climate variability and change. *Environmental Health Perspectives*, 117(6), 857–862.
- Ebi, K. L., Berry, P., Hayes, K., Boyer, C., Sellers, S., Enright, P. M., & Hess, J. J. (2018). Stress testing the capacity of health systems to manage climate change-related shocks and stresses. *International Journal of Environmental Research and Public Health*, 15(11), 2370. <https://doi.org/10.3390/ijerph15112370>
- Ebi, K. L., Hess, J. J., & Isaksen, T. B. (2016). Using uncertain climate and development information in health adaptation planning. *Current Environmental Health Reports*, 3(1), 99–105. <https://doi.org/10.1007/s40572-016-0077-0>
- Ebi, K. L., Vanos, J., Baldwin, J. W., Bell, J. E., Hondula, D. M., Errett, N. A., Hayes, K., Reid, C. E., Saha, S., Spector, J., & Berry, P. (2021). Extreme weather and climate change: Population health and health system implications. *Annual Review of Public Health*, 42(1), 293–315. <https://doi.org/10.1146/annurev-publhealth-012420-105026>
- Elkjaer, B. (2009). Pragmatism: A learning theory for the future. In K. Illeris (Ed.), *Contemporary theories of learning* (pp. 82–97). Routledge.
- Erfan, A. (2017). Confronting collective traumas: An exploration of therapeutic planning. *Planning Theory & Practice*, 18(1), 34–50. <https://doi.org/10.1080/14649357.2016.1249909>
- Fage-Butler, A., Ledderer, L., & Nielsen, K. H. (2022). Public trust and mistrust of climate science: A meta-narrative review. *Public Understanding of Science*, 31(7), 832–846. <https://doi.org/10.1177/09636625221110028>
- Forester, J. (1989). *Planning in the face of power*. University of California Press.
- Forester, J. (2013). On the theory and practice of critical pragmatism: Deliberative practice and creative negotiations. *Planning Theory*, 12(1), 5–22. <https://doi.org/10.1177/1473095212448750>
- Forester, J. (2021). Our curious silence about kindness in planning: Challenges of addressing vulnerability and suffering. *Planning Theory*, 20(1), 63–83. <https://doi.org/10.1177/1473095220930766>
- Forester, J. (2022). Options analysis as context-responsiveness in practice: Integrating diagnosis, expertise, and negotiation (refining communicative planning and critical pragmatism). *Planning Theory & Practice*, 23(5), 663–680. <https://doi.org/10.1080/14649357.2022.2133158>
- Forester, J., Verloo, N., & Laws, D. (2021). Creative discretion and the structure of context-responsive improvising. *Journal of Urban Affairs*, 45(6), 1145–1162. <https://doi.org/10.1080/07352166.2021.1901589>
- Fox, M., Zuidema, C., Bauman, B., Burke, T., & Sheehan, M. (2019). Integrating public health into climate change policy and planning: State of practice update. *International Journal of Environmental Research and Public Health*, 16(18), 3232. <https://doi.org/10.3390/ijerph16183232>
- Friedmann, J. (1987). *Planning in the public domain: From knowledge to action*. Princeton University Press.
- Gold, M. R. (Ed.). (1996). *Cost-effectiveness in health and medicine*. Oxford University Press.
- Hahnel, U. J., Mumenthaler, C., & Brosch, T. (2020). Emotional foundations of the public climate change divide. *Climatic Change*, 161(1), 9–19. <https://doi.org/10.1007/s10584-019-02552-0>
- Healey, P. (2020). *Collaborative planning: Shaping places in fragmented societies*. Bloomsbury Publishing.
- Healey, P. (2024). Planning and caring: A reflection. *Planning Theory*, 23(3), 266–277. <https://doi.org/10.1177/14730952231226411>
- Hess, J. J., McDowell, J. Z., & Luber, G. (2012). Integrating climate change adaptation into public health practice: A framework for action. *Environmental Health Perspectives*, 120(2), 4–10. <https://doi.org/10.1289/ehp.1103515>
- Holecck, J. L., Geli, H. M., Sawalhah, M. N., & Valdez, R. (2022). A global assessment: Can renewable energy replace fossil fuels by 2050? *Sustainability*, 14(8), 4792. <https://doi.org/10.3390/su14084792>
- Holmes, T., & Eisenman, D. (2020). Incremental advancements in public health adaptation to climate change in Florida. *Cities & Health*, 4(1), 66–81. <https://doi.org/10.1080/23748834.2019.1614725>

- Hügel, S., & Davies, A. R. (2020). Public participation, engagement, and climate change adaptation: A review of the research literature. *Wiley Interdisciplinary Reviews Climate Change*, 11(4), e645. <https://doi.org/10.1002/wcc.645>
- Innes, J. E., & Booher, D. E. (2010). *Planning with complexity: An introduction to collaborative rationality for public policy*. Routledge.
- Kaffrell-Lindahl, A., & Sewpaul, V. (2024). Disrupting neoliberalism and human-induced climate change: Emancipatory social work for ecosocial justice. *Critical and Radical Social Work*, 1, 1–18. Accessed April 22, 2025. <https://doi.org/10.1332/20498608Y2024D000000023>
- Keating, W. D., & Krumholz, N. (2000). Neighborhood planning. *Journal of Planning Education and Research*, 20(1), 111–114. <https://doi.org/10.1177/073945600128992546>
- Kinsella, E. A. (2010). The art of reflective practice in health and social care: Reflections on the legacy of Donald Schön. *Reflective Practice*, 11(4), 565–575. <https://doi.org/10.1080/14623943.2010.506260>
- Klein, N. (2015). *This changes everything: Capitalism vs. the climate*. Simon & Schuster.
- Kotcher, J., Maibach, E., Miller, J., Campbell, E., Alqodmani, L., Maiero, M., & Wyns, A. (2021). Views of health professionals on climate change and health: A multinational survey study. *The Lancet Planetary Health*, 5(5), e316–e323. [https://doi.org/10.1016/S2542-5196\(21\)00053-X](https://doi.org/10.1016/S2542-5196(21)00053-X)
- Krawisz, B. (2020). Health effects of climate destabilization: Understanding the problem. *WMJ: Official Publication of the State Medical Society of Wisconsin*, 119(2), 132–138.
- Krumholz, N. (1982). A retrospective view of equity planning Cleveland 1969–1979. *Journal of the American Planning Association*, 48(2), 163–174. <https://doi.org/10.1080/01944368208976535>
- Krumholz, N., & Hexter, K. W. (2022). *Advancing equity planning Now*. Cornell University Press.
- Kuecker, G., & Hartley, K. (2021). Disaster risk reduction and the development narrative: Towards a new public policy epistemic. In A. Brik & L. Pal (Eds.), *The future of the policy sciences* (pp. 85–102). Edward Elgar Publishing. <https://doi.org/10.4337/9781800376489.00013>
- Lange, Z. (2020). Discovering through experience. Embodiment caught between planning and theater. *Liminalities*, 16(3), 1–24. <http://liminalities.net/16-3/discovering.pdf>
- Lange, Z. (2022). I've never seen a map depict a life: Actualizing the intimacy inherent to therapeutic planning. *Liminalities*, 18(2), 1–26. <http://liminalities.net/18-2/therapeutic.pdf>
- Lehoux, P., Daudelin, G., Demers-Payette, O., & Boivin, A. (2009). Fostering deliberations about health innovation: What do we want to know from publics? *Social Science and Medicine*, 68(11), 2002–2009. <https://doi.org/10.1016/j.socscimed.2009.03.017>
- Lewandowsky, S. (2021). Climate change disinformation and how to combat it. *Annual Review of Public Health*, 42(1), 1–21. <https://doi.org/10.1146/annurev-publhealth-090419-102409>
- Lluch, C., Galiana, L., Doménech, P., & Sansó, N. (2022). The impact of the COVID-19 pandemic on burnout, compassion fatigue, and compassion satisfaction in healthcare personnel: A systematic review of the literature published during the first year of the pandemic. *Healthcare*, 10(2), 364. <https://doi.org/10.3390/healthcare10020364>
- Louis, M. E. S., & Hess, J. J. (2008). Climate change: Impacts on and implications for global health. *The American Journal of Preventive Medicine*, 35(5), 527–538. <https://doi.org/10.1016/j.amepre.2008.08.023>
- Lyles, W., White, S. S., & Lavelle, B. D. (2018). The prospect of compassionate planning. *Journal of Planning Literature*, 33(3), 247–266. <https://doi.org/10.1177/0885412217735525>
- Maibach, E., Frumkin, H., & Ahdoot, S. (2021). Health professionals and the climate crisis: Trusted voices, essential roles. *World Medical & Health Policy*, 13(1), 137–145. <https://doi.org/10.1002/wmh3.421>
- Marinucci, G. D., Luber, G., Uejio, C. K., Saha, S., & Hess, J. J. (2014). Building resilience against climate effects—a novel framework to facilitate climate readiness in public health agencies. *International Journal of Environmental Research and Public Health*, 11(6), 6433–6458. <https://doi.org/10.3390/ijerph110606433>
- Munasinghe, M. (2001). Implementing sustainable development: A practical framework.” the economics of nature and the nature of economics, Edward Elgar. Cheltenham/UK, 134–192.
- Nguyen-Trung, K., Saeri, A. K., & Kaufman, S. (2024). Incorporating pragmatism in a behaviour change-led climate adaptation project: A collaborative reflection. *Qualitative Research Journal*. <https://doi.org/10.1108/QRJ-11-2023-0168>
- Nicholls, W. J., & Baran, I. (2024). Bureaucratic politicisation and insurgent bureaucrats: A theoretical framework. *Antipode*, 56(6), 2293–2320. <https://doi.org/10.1111/anti.13072>
- Nussbaum, M. C. (1990). *Love's knowledge: Essays on philosophy and literature*. OUP USA.
- Nyantakyi-Frimpong, H. (2021). Climate change, women's workload in smallholder agriculture, and embodied political ecologies of undernutrition in Northern Ghana. *Health & Place*, 68, 102536. <https://doi.org/10.1016/j.healthplace.2021.102536>
- Porto, M. F., Ferreira, D. R., & Finamore, R. (2017). Health as dignity: Political ecology, epistemology and challenges to environmental justice movements. *Journal of Political Ecology*, 24(1), 110–124. <https://doi.org/10.2458/v24i1.20786>
- Rayner, G., & Lang, T. (2012). Ecological Public Health. *Health of People, Places and Planet*, 617.
- Redvers, N., Guzmán, C. A. F., & Parkes, M. W. (2023). Towards an educational praxis for planetary health: A call for transformative, inclusive, and integrative approaches for learning and relearning in the anthropocene. *The Lancet Planetary Health*, 7(1), e77–e85. [https://doi.org/10.1016/S2542-5196\(22\)00332-1](https://doi.org/10.1016/S2542-5196(22)00332-1)
- Roxon, J., Ulm, F. J., & Pellenq, R. M. (2020). Urban heat island impact on state residential energy cost and CO2 emissions in the United States. *Urban Climate*, 31, 100546. <https://doi.org/10.1016/j.uclim.2019.100546>
- Sandercock, L. (2024). Reimagining the soul of urban planning. *Nature Cities*, 1(1), 5–6. <https://doi.org/10.1038/s44284-023-00010-8>
- Scott, J. C. (2020). *Seeing like a state: How certain schemes to improve the human condition have failed*. Yale University Press.

- Sharifi, A., Pathak, M., Joshi, C., & He, B. J. (2021). A systematic review of the health co-benefits of urban climate change adaptation. *Sustainable Cities and Society*, 74, 103190. <https://doi.org/10.1016/j.scs.2021.103190>
- Smith, G. S., Anjum, E., Francis, C., Deanes, L., & Acey, C. (2022). Climate change, environmental disasters, and health inequities: The underlying role of structural inequalities. *Current Environmental Health Reports*, 9(1), 80–89. <https://doi.org/10.1007/s40572-022-00336-w>
- Surugu, J. I. M., & Chutab, D. N. (2021). Going beyond incrementalism: Climate projects' beneficiaries' perspective on what could be described as transformational adaptation. *International Journal of Rural Management*, 17(1), 55–74. <https://doi.org/10.1177/0973005220950515>
- Tschakert, P. (2012). From impacts to embodied experiences: Tracing political ecology in climate change research. *Geografisk Tidsskrift-Danish Journal of Geography*, 112(2), 144–158. <https://doi.org/10.1080/00167223.2012.741889>
- Tselios, V., & Tompkins, E. L. (2019). What causes nations to recover from disasters? An inquiry into the role of wealth, income inequality, and social welfare provisioning. *International Journal of Disaster Risk Reduction*, 33, 162–180. <https://doi.org/10.1016/j.ijdrr.2018.10.003>
- Wieland, M. L., Doubeni, C. A., & Sia, I. G. (2020). Community engagement with vulnerable populations. *Mayo Clinic Proceedings*, 95(9), S60–S62. <https://doi.org/10.1016/j.mayocp.2020.05.041>