an open access journal

EDITORIAL

Tipping Points for a Seminal New Era of Climate Resilience and Climate Justice

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Globally, we are living in an era of unparalleled population growth, rapid loss of undeveloped lands and forests, and tipping points of natural resource extractions serving 21st-century societal needs. Since the onset of industrialization in the 18th century, human actions have altered the planet and its atmosphere on a staggeringly large scale. Over the past 150 years, greenhouse gas (GHG) emissions from human actions have increased by 30% (UCAR et al., n.d.), creating a greenhouse effect, which in turn causes global temperatures to rise. As noted in the Sixth Assessment Report, *AR6 Synthesis Report: Climate Change 2023*, of the International Panel on Climate Change (IPCC) , human activities, principally through emissions of GHGs, have unequivocally caused global warming, with global surface temperatures reaching 1.1°C above 1850–1900 levels in 2011–2020 (IPCC, 2023). Increased temperatures influence global weather patterns, creating climate nonstationarity, breaking down certainty of climate "normal" and the ability to accurately predict impacts of extreme weather events and the associated risks this poses to communities (Revi et al., 2014). Many theorize that our outsized impact on the natural world has propelled us into an entirely new geological time interval, dubbed the "Anthropocene." The formal definition of the Anthropocene is an epoch in which many of the Earth's conditions and processes are profoundly altered by human influence (Berkes, 2017; Steffen et al., 2007, 2011). In layperson's terms, it describes the era when the consequences of our actions catch up to us in a series of tipping points.

Furthermore, the Anthropocene is a period of immense social and environmental injustice. While global GHG emissions continue to rise due to historical and ongoing contributions arising from unsustainable energy production, past and present land uses, and development patterns, the impacts of climate change are disproportionately impacting the livelihoods and well-being of the most vulnerable and underserved populations (IPCC, 2023). Thus, the Anthropocene is largely defined by these anthropogenic forces, which cause climate tipping points around the world, triggering widespread adverse impacts and related losses and damages to nature and people (IPCC, 2023). These tipping points actuate more frequent and higher magnitude extreme natural hazards including heat waves, prolonged periods of drought, sea-level rise, and ecosystem disturbance. This era of severe global environmental and demographic change is felt differently in different regions of the world, and disproportionately across societies, races, and cultures. Furthermore, vulnerable communities who have historically contributed the least to current climate change—and therefore also experienced the least benefit and wealth creation from industrialization—are disproportionately affected.

The remarkably disparate burden of climate impacts on underserved and marginalized regions exacerbates other stresses, including food insecurity, reduced water security, and exposure to poor air quality and extreme heat. In the United States, the roots of these inequities

Citation: Follingstad, G. (2023). Tipping Points for a Seminal New Era of Climate Resilience and Climate Justice. *Journal of Climate Resilience & Climate Justice*, *1*, 3–7. https://doi.org/10.1162/crcj_e_00011

DOI:
https://doi.org/10.1162/crcj_e_00011

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The MIT Press

stem from discriminatory land use, planning, zoning, and design decisions that shaped the built environment. The hangover (and in many cases, continuing enforcement) of these types of decisions has created multigenerational assaults on marginalized and underserved neighborhoods, which can now be used as a predictor of highly vulnerable areas to climate impacts. For example, the role of historic housing policies known as "redlining"—the practice of refusing home loans or insurance to whole neighborhoods based on a racially motivated perception of safety for investment (Hoffman et al., 2020)—has subjected generations of Black and Brown communities to increased exposure to climate inequities such as intra-urban heat, flooding, poor air quality and other climate change impacts. Yet, this type of structural racism lives on today in BIPOC (Black, Indigenous, People of Color) and underserved neighborhoods. These type of zoning decisions, which determine the placement of industrial areas that drive the concentrations of pollution, became racialized when the placement of these land uses are biased based on proximity to affluent suburbs, working-class suburbs, and downtown areas (Pulido, 2017). There are numerous studies that confirm the role of these structural and hegemonic forms of racism contributing to inequalities (Bullard, 2008; Pulido, 2017). These practices encompass the concepts of environmental racism, which were first studied in the late 1980s with the United Church of Christ's study on Toxic Waste and Race in the United States (Pulido, 2017). Environmental racism has been extensively verified in communities of color and BIPOC neighborhoods commonly located adjacent to toxic industrial facilities, putting residents at higher risk of air pollution impacts (Terrell & St. Julien, 2022). Other analyses show that subsidized housing is frequently located in the floodplain and features poor building quality, such as deficient insulation, leading to a decreased ability to effectively cope with climate challenges such as severe heat or strong storms (Simmons, 2020). Moreover, these types of exclusionary land use practices still plague efforts to address the affordable housing crisis faced by communities nationwide, by constraining housing supply and raising prices, which contributes to growing inequalities by making housing less affordable (Stegman, 2019).

Climate justice refers to the process of dismantling the systemic determinants of differing social, economic, public health, and environmental outcomes that stem from climate change and the disproportionate harm underserved, BIPOC, and marginalized populations experience. Pointedly, not all people feel the effect of climate change equally (Sultana, 2022). This highlights the fact that climate change is as much a social, ethical, and political issue as it is a physical and atmospheric sciences issue. Climate justice builds upon the fundamental concepts of environmental justice, including meaningful public engagement, certainty in how distributive justice is defined and implemented, and substantive requirements for addressing distributional inequities (Ulibarri et al., 2022). David Schlosberg (2004) stresses four important components of environmental justice, paraphrased here: *1. Distributive justice*—equity in the distribution of benefits and burdens for all social groups; *2. Procedural justice*—fair, equitable, and inclusive integration of impacted parties into decision-making processes; *3. Restorative justice*—improvement of risk and ensuring that perpetrators of harm are brought to justice; and *4. Recognitional justice*—diversity of the participants and experiences in affected communities, and participation in the political processes that create and manage environmental policy. Fundamentally, the components of environmental justice must be embedded in climate justice to responsibly redress the uneven and disproportionate impacts of climate change (Sultana, 2022).

The compounding extremes of climate nonstationarity (when long-term climate trends are no longer reliable for predicting or monitoring climate extremes and anomalies), coupled with the impacts of current and historic land use decisions guided by environmental racism, creates

a "wicked problem" (Kwakkel et al., 2016). While the direct processes by which environmental injustices occur may differ according to local and regional contexts, the patterns of insecurity and vulnerability are reproduced across the global scale. This is highlighted in the *Climate Change 2023* synthesis report, noting that between 2010 and 2020 human mortality from floods, droughts, and storms globally was 15 times higher in extremely vulnerable areas, characterized by low-income, underserved, and unplanned development zones (IPCC, 2023). These colliding circumstances leave many feeling that we are concurrently facing tipping points in Earth's natural systems and a global social emergency of climate injustices across human society. As societal systems continue to be impacted and the falling dominoes of interconnected dependences ricochet through communities, equitable and resilience-focused community planning and disaster response are vital for responsible and ethical climate action. Addressing the multiple layers of "wickedness" highlights a fundamental responsibility to position environmental and social justice at the center of climate action and adaptation. This in turn depends on the use of diverse and equitable methods to recalibrate natural and social systems to protect social cohesion and minimize environmental catastrophes (Schlör et al., 2018).

Instituting climate resilience requires building knowledge and awareness about social and ecological systems (SES), where human systems are an embedded and conjunctive component of the natural environment, ecosystems, and ecosystem services (Berkes, 2017; Berkes et al., 2003). Implementing an SES approach to resilience requires evaluating environmental and social vulnerabilities and their interdependencies as one synergized system (Berkes, 2017; Berkes et al., 2003; Desouza & Flanery, 2013; Folke, 2006; Folke et al., 2005). The entwined nature of SES depends upon coevolution (Folke et al., 2016) and requires the convergence of diverse expertise to build equitable resilience to vulnerabilities. Fundamentally, resilience deals with systems change, learning, and adaptation (Berkes, 2017), and is useful for gauging a community's capacity to equitably recover from external torments, social injustices, environmental changes, hazards, and the subsequent economic impacts.

When trying to account for both social and environmental systems in a planning process, scale can quickly become a challenge. Resilience thinking is most easily understood at a scale where the relationships embedded within the SES are changing at a rate in which the impact of human actions are conceivable (Folke et al., 2011; Steffen et al., 2007; Turner et al., 2003). Yet, the challenges of the Anthropocene are enormous and encompass both global ecosystems and social justice systems. How a particular community's SES dynamics influence the challenges of diminishing resources and societal upheaval depends upon the capacity to respond, political structures, and ensuing resources (natural and monetary). The goal here is to focus on the gradual changes in the fundamental variables within the localized SES (Folke, 2016). In so doing, SES-based planning reinforces the social and environmental capacities needed to reorganize, adapt, learn, and rebound from an event (hazard events, disasters). When this occurs at the local level, the appropriate capacities and dynamics can be gauged to appropriately work toward equitable transformation, innovation, and preparation (Berkes et al., 2003; Folke, 2016; Olsson et al., 2014).

Climate resilience planning positions environmental and climate justice at the core of equitably rebuilding and regenerating our communities. The goal is to determine the critical elements of risk and vulnerability and simultaneously build social capital and environmental justice (Folke, 2016; Folke et al., 2010; Luthe & Wyss, 2015). This approach intentionally breaks down sectoral and societal silos to transform standard processes and assure the well-being of the tightly coupled dynamic of the whole SES (Folke, 2016). Furthermore, adapting to climate risks requires restructuring current institutions and governance systems, shifting away

from status quo governance and management systems (Sabatier & Weible, 2014). Thus, preparing for the impending risks and impacts of climate change also requires evaluation of vulnerabilities embedded in key processes, procedures, and interactions within the SES (Desouza & Flanery, 2013). Climate resilience solutions must create synergies and solutions that prioritize protecting human rights and redressing past, present, and future losses to underserved and vulnerable communities. This includes unpacking past climate injustices in the context of reenvisioning and regenerating resilient systems. A cognizant approach to addressing the social and environmental tipping points conjunctively is an opportunity for regenerative pathways for resilient social-ecological futures.

The promising pathways of climate resilience and climate justice are dependent upon interconnected, multidisciplinary, and coordinated efforts. These synergies guide adaptation in such a way that generates new norms (social and ecological), which is fundamental to changing both the process and the outcomes. Braiding together the planetary circumstances of the Anthropocene and pejorative community-planning decisions of the past (and present), necessitates a resounding call for "just transitions" to resilient communities. Climate impacts are cascading and will continue to intensify even as mitigation efforts take place. Climate justice–centered solutions are requisite to creating climate resilient communities. Furthermore, climate resilience and climate justice are fundamental components to responding to the tipping points and veracities of the Anthropocene embedded in every sector and scale of decision-making processes.

The *Journal of Climate Resilience and Climate Justice* (*CRCJ*) aims to amplify the diverse voices and multidisciplinary facets of Climate Resilience/Climate Justice by building a platform for sharing case studies, strategies, lessons learned, research, and pathways for just transitions. The *CRCJ* provides an accessible and sharable suite of articles that explore the challenges and tipping points of the Anthropocene and opportunities for whole-systems transformation toward brighter, more resilient futures.

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