

Justice Can't Be Coded Alone: Integrating Local Knowledge and AI for Equitable Climate Action



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This study explores the intersection of social sustainability, climate justice, and digital innovation in climate change mitigation and adaptation policies, with a specific focus on the role of the digital society and digital governance in fostering inclusive and resilient climate action. Through a systematic review of 67 peer-reviewed studies published between 2015 and 2025, the research demonstrates how emerging digital technologies — including artificial intelligence (AI), big data analytics, and participatory mapping platforms — can be ethically integrated into climate strategies to empower marginalized communities and amplify local voices.

The study addresses a critical gap: current climate responses often prioritize technical or economic approaches while neglecting social dimensions, particularly in the design and deployment of digital tools. This oversight risks exacerbating inequalities, widening the digital divide, or excluding indigenous and local knowledge systems. To address this, the paper proposes a novel conceptual framework built on four interlinked pillars: (1) Climate Justice and Equity,

(2) Social Resilience, (3) Community-Driven Solutions, and (4) Technological Strategies for Inclusive Climate Action.

Within the digital society context, this review highlights how digital platforms can enable citizen engagement — such as flood-reporting mobile apps in Jakarta or community-sourced urban heat mapping — allowing residents to co-produce climate risk data and influence policy. However, the analysis reveals that such initiatives only achieve true inclusivity when co-designed with end-users and when barriers like limited connectivity, low digital literacy, or language gaps in informal settlements are actively addressed.

Regarding digital governance, the study advocates for “Participatory AI” models, where algorithmic tools are co-created with local stakeholders — including indigenous people, women, and youth — to align technical outputs with community values and needs. For example, AI-driven vulnerability mapping in Phoenix, Arizona, successfully directed greening investments to historically redlined, heat-vulnerable neighborhoods, reducing heat-related emergency calls by nearly 20%. Yet, the authors caution that such tools can perpetuate systemic biases if trained on incomplete or historically skewed datasets that underrepresent marginalized groups.

Crucially, the paper highlights that digital technologies should serve as complements—not replacements—for local and traditional ecological knowledge.

Indigenous fire management practices in Australia, for instance, have proven more effective and cost-efficient than high-tech aerial firefighting, yet remain sidelined due to institutional preference for Western scientific paradigms. The proposed framework calls for a redistribution of decision-making power through institutional mechanisms that grant communities genuine authority in digital climate planning.

The study also warns against “digital colonialism,” where tech corporations extract community data



without ensuring privacy, consent, or equitable benefit-sharing. It therefore emphasizes the need for ethical digital governance, including algorithmic transparency, community data sovereignty, and participatory oversight of AI systems used in public climate services.

Drawing on these insights, the paper offers actionable recommendations tailored to contexts like Qatar and the Gulf region, where investments in smart cities and digital transformation are accelerating. These include:

- Embedding social equity indicators into National Determined Contributions (NDCs) and urban resilience plans.
- Piloting community co-designed AI tools for localized climate risk assessment.
- Developing culturally and linguistically appropriate digital climate education platforms.

- Establishing inter-ministerial coordination bodies linking environment, digital infrastructure, and social development portfolios.

Ultimately, the research contends that a truly inclusive digital society is not measured by smartphone penetration, but by the capacity of every individual — regardless of socio-economic status — to shape decisions affecting their environment and well-being. It asserts that integrating justice, participation, and ethics into digital climate governance is not optional, but essential for effective, legitimate, and enduring climate action.

For more information about the research, please scan the QR code:

