

Expect the Unexpected: Empowering Climate Resilience and Sustainability through Responsible GIScience

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ABSTRACT:

Background: Ongoing climate changes often catch us off guard, leading to unexpected catastrophic disasters, cascading societal impacts, and health crises. Embracing the philosophy of 'Expect the Unexpected' is no longer merely an optional addition but an absolute imperative for predicting possible climate impacts and taking mitigation strategies proactively, thus facilitating resilience and sustainability in changing climates. GIScience, driven by burgeoning geospatial big data, cutting-edge geospatial technologies, and growing computational capacities, equips us with a diverse array of tools and channels to monitor and predict varied, unforeseen societal impacts and human needs during hazardous events accurately and rapidly. As GIScience plays increasingly substantial roles in supporting climate resilience and sustainability research, education, and practices, various existing and emerging GIScience obstacles are attracting more attention, including privacy issues, data bias, ethical use of GIScience, and the challenges brought by GeoAI. There are emerging voices calling for directing advanced GIScience in a responsible manner and formulating frameworks that address relevant concerns systematically.

Objectives: This lightning talk delves into responsible GIScience theories and methodologies, as well as their real-world applications in empowering climate resilience and sustainability. First, this talk conceptualizes Responsible GIScience and proposes the STEP (Security, Trustworthiness, Equity, Philanthropy) paradigm. The paradigm offers definitions and descriptions of the subtopics, summarizes current solutions, rekindles what is missing, and demonstrates the cruxes. Second, the responsible GIScience framework is exemplified through a series of case studies. These include facilitating disaster response using crowdsourcing and GeoAI, planning climate-resilient cities through geospatial digital twins, and modeling climate change-intensified air pollution and water insecurity in overburdened communities to inform sustainable interventions.

Implications: This work stands at the intersection of GIScience-based decision making, integration of GeoAI and Big Data, and massive multidisciplinary collaboration, and sheds light on a potential pathway to ensure GIScience proceeds in a responsible manner. The developed tools and knowledge will shed light on pathways to prepare for unexpected disaster effects and empower a resilient and sustainable future in changing climates.

KEYWORDS: *Responsible GIScience, climate change, disaster resilience, sustainability, climate justice*

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