

Joseph Karanja

Ph.D. Candidate and Instructor of Record

Arizona State University

School of Geographical Sciences and Urban Planning

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Education

- 2021-2025 **Ph.D., Geographic Information Science**, Arizona State University (ASU), Tempe, Arizona
Dissertation: *Enhancing Heat Risk Modeling for Spatially Targeted Interventions*
Committee: Dr. Matei Georgescu (co-chair), Dr. Amy Frazier (co-chair), Dr. David Hondula and Dr. Jennifer Vanos.
- 2019-2021 **Master of Science, Geosciences (Geography)**, Georgia State University (GSU), Atlanta, Georgia
Thesis: *Evolution of Composite Heat Vulnerability Indices in Atlanta using Multiple Weighting Mechanics*.
Committee: Dr. Lawrence Kiage (chair), Dr. Dajun Dai, and Dr. Ricardo Nogueira
Postgraduate Certificate in GIS, GSU, Atlanta, Georgia
- 2014-2017 **Master of Environmental Science (Climate Change and Sustainability)**, Kenyatta University (KU), Nairobi, Kenya
Thesis: *Quality of Geothermal Effluents and Emissions from Climate Change Resilient Technologies in Eburru and Olkaria, Nakuru, County*
Committee: Dr. Daniel Mang'uriu (chair) and Dr. Ezekiel Ndunda
- 2009-2013 **Bachelor of Environmental Planning and Management**, KU. *First Class Honours*
Project: *Understanding Settlement Challenges in Kihoto Informal Settlement along the Lake Naivasha Floodplain*

Research Interests

- **Geographic Information Science:** Advancing spatial representation and analysis of hazards and health by addressing scale issues (e.g., the uncertain geographical context problem), spatial processes, sensitivity and uncertainty of spatial statistical models, and effective geovisualization.
- **Vulnerability Assessment and Modeling:** Developing and testing social and environmental vulnerability indicators to capture interactions between sociodemographic

and environmental factors, and improving composite indices for disaster risk reduction, resilience planning, and equity in health outcomes.

- **Hazards, Climate Extremes, and Health Impacts:** Integrating satellite-derived, simulated, and meteorological datasets to examine spatial-temporal dynamics of hazards (e.g., heat, precipitation, air quality), their physiological and health impacts (e.g., emergency calls, hospitalizations), and their role in shaping vulnerability processes.

Peer-Reviewed Publications

1. **Karanja, Joseph**, Jennifer Vanos, Matei Georgescu, Amy E. Frazier, and David Hondula (2025). The Imperative for Hazard-and Place-Specific Assessment of Heat Vulnerability. *Environmental health perspectives*, 133(5), 055003. doi: 10.1289/EHP14801.
2. **Karanja, Joseph**, Vanos, J., Joshi, A., Penner, S., Guzman, G. E., Connor, D. S., & Rykaczewski, K. (2024). Impact of Tent Shade on Heat Exposures and Simulated Heat Strain for People Experiencing Homelessness. *International Journal of Biometeorology*, 1-14. <https://link.springer.com/article/10.1007/s00484-024-02751-0>
3. Salamanca-Palou, F., Svoma, B., Walter, J., Insua-Costa, D., Miguez-Macho, G., **Karanja, Joseph**, & Georgescu, M. (2024). Modeling Salt-Verde Watershed Winter Precipitation Using Convection-Permitting WRF-Simulations With Water Vapor Tracers. *Journal of Geophysical Research: Atmospheres*, 129(12), e2024JD041029. <https://doi.org/10.1029/2024JD041029>
4. **Karanja, Joseph**, Vieira, J., & Vanos, J. (2023). Sheltered from the Heat? How Tents and Shade Covers May Unintentionally Increase Air Temperature Exposures to Unsheltered Communities. *Public Health in Practice*, 6, 100450. <https://doi.org/10.1016/j.puhip.2023.100450>
5. **Karanja, Joseph**, Svoma, B. M., Walter, J., & Georgescu, M. (2023). Southwest US Winter Precipitation Variability: Reviewing the Role of Oceanic Teleconnections. *Environmental Research Letters*, 18(5), 053003. <https://iopscience.iop.org/article/10.1088/1748-9326/accd84>
6. **Karanja, Joseph**, Kiage, L.M. (2022). Scale Implications and Evolution of a Social Vulnerability Index In Atlanta, Georgia, USA. *Natural Hazards*. <https://doi.org/10.1007/s11069-022-05324-9>
7. **Karanja, Joseph**, Kiage, L., & Wanyama, D. (2021). Weighting Mechanics and the Spatial Pattern of Composite Metrics of Heat Vulnerability in Atlanta, Georgia, USA. *Science of the Total Environment*. <https://doi.org/10.1016/j.scitotenv.2021.151432>
8. **Karanja, Joseph**, & Kiage, L. (2021). Perspectives on Spatial Representation of Urban Heat Vulnerability. *Science of the Total Environment*. Vol 774 (220). <https://doi.org/10.1016/j.scitotenv.2021.145634>

Manuscripts in Preparation

1. **Karanja, Joseph**, Tiffany Cousins, and Mary Angelica Painter. (2025). Missing Ingredient in Vulnerability Mapping: Capacity as a Measure of Need. Submitted to *Natural Hazards* (under review).
2. **Karanja, Joseph**, Aaron Flores, Jennifer Vanos, Matei Georgescu, Amy E. Frazier, and David Hondula (2025). Historical Redlining and Heat-Related 911 Calls in Phoenix, Arizona. To be submitted to *Nature Cities* (in preparation).

3. **Karanja, Joseph**, Jennifer Vanos, Matei Georgescu, Amy E. Frazier, and David Hondula (2025). Model Specification and Data Characteristics Influence Heat Vulnerability Assessment. To be submitted to the International Journal of Disaster Risk Reduction. (in preparation).
4. **Karanja, Joseph**, Jennifer Vanos, Matei Georgescu, Amy E. Frazier, and David Hondula (2025). Socio-Spatial Determinants of Heat-Related 911 Calls. To be submitted to *the Annals of the American Association of Geographers*. (in preparation).

Book Chapters

1. Garima, J., Malladi, T., & **Joseph Karanja**. (2025). Spatial Vulnerability: Concept and Application for Decision Making in the Changing Climate. Handbook on Climate Change Vulnerability, Environments and Communities. (Accepted for publication).

Non-Peer Reviewed Reports

1. Lant, Tim, Patricia Solis, Kerri Rittschof, Michael Simeone, Patrick Wightman, Anna Gaylord, Talia Hernandez, Brajesh Karna, Krishna Vijay Gala, Mason Mathews, Anna Hartman, Maame Amoah-Asare, Abdulrahman Alsanad, Susan Coates, Bryna Koch, Praveena Kulanthaivel, Jennifer Vanos, and **Joseph Karanja**. (2024). Arizona Social Vulnerability Index (AZSVI). Produced by Arizona Health Improvement Plan (AzHIP) Data Advisory Committee, Arizona State University, Arizona Department of Health Services (ADHS) Geographical Information System (GIS), and the ADHS Office of Health Equity. Technical Documentation available from the Knowledge Exchange for Resilience KEEP Solutions Series. Tempe: Arizona State University. <https://hdl.handle.net/2286/R.2.N.195086>
2. **Karanja, Joseph**. (2013). Assessing settlement challenge in Kihoto informal settlement along the Lake Naivasha flood plain (KU library).
3. Assessing land-use conflicts on the sustainability of land use of the Maasai Mara ecosystem. February 2013 (KU library). Part of the team that drafted the report.
4. Assessing the effectiveness of Community Forest Associations (CFAs) in forest management in Kieni East district. October 2012 (KU library). Part of the team that drafted the report.
5. Sustainable spatial plan of Nyahururu municipality to the year 2030. September 2011. (KU library). Part of the team that drafted the report.

Working Experience

2021-Present	<p>Arizona State University, Tempe, Arizona <i>Teaching Instructor</i></p> <ul style="list-style-type: none"> • Instructor of record for Geography of Middle East and Northern Africa, a level 300 course. • Instructor of record for World Geography, a level 100 undergraduate course focusing on world regions. • Instructor for Introduction to Meteorology, a level 200 undergraduate lab course focusing on general concepts of meteorology.
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Teaching Assistant (TA)

- **Global Change**, a level 300 undergraduate **interdisciplinary course** focusing on the dynamics of the atmosphere, lithosphere, and hydrosphere.
- Introduction to **Physical Geography lab**, a level 100 course.

Graduate Research Assistant

- **Coordinator and liaison for the Southwest Urban Corridor Integrated Field Laboratory (SWIFL)** funded by the US Department of Energy. Coordinated research activities for the modeling, observations, geospatial solutions, and resilient solution teams.
- A student researcher on a team that developed an **Arizona-specific Social Vulnerability Index** used in health planning by the Arizona Department of Health Services.
- Worked as a student researcher on a National Oceanic and Atmospheric Administration (NOAA) Pathfinder project on the **intersection of health, air pollution, and heat vulnerability**. Also involved in stakeholder evaluation of **value chain identification for the next-generation GeoXo satellites** through a tabletop exercise.
- Developed several manuscripts at the intersection of vulnerability science, health geography, hazards, and GIScience.
- Analyzed data, prepared visualizations, and slides for stakeholder engagement, community engagement, and peer-reviewed publications.

2019-2021

Georgia State University, Atlanta, Georgia

Teaching Assistant

- **Lead teaching assistant** managing 12 teaching assistants and 29 labs for Intro to weather and climate.
- Implemented and steered the **lab innovation plan** for the Department of Geosciences.
- Aligned the lab modules with the principles of **culturally responsive pedagogy** and **implemented online delivery** of lab materials during the COVID-19 pandemic.
- Courses I taught: 1) **Introduction to Weather and Climate Lab** (level 100 undergraduate course); **Introduction to GIS** (level 400/500 course); **Advanced GIS** (level 400/500 course); **Introduction to Remote Sensing** (level 400/500 course).
- **Roles as a TA:** Guiding students to complete lab assignments; grading labs, quizzes, and exams, and providing feedback; responding to general student queries.

2017-2019

M & N Enterprises, Naivasha, Kenya

Manager

- **Implemented a business management** system for the coordination and control of stocks, workers, and banking.
- Managed 33 permanent employees

2012-2013

Kenya Electricity Generating Company, Naivasha, Kenya

Trainee

- Attached to several sections, including meteorology, occupational safety and health, community liaison, environmental laboratory, and GIS lab.
- Monitored daily air quality and noise levels, and conducted statutory inspections of work sites and toxicity analysis for geothermal effluents.

Grants and Fellowships

2024-2025	School of Geographical Science and Urban Planning at ASU , international travel award. Award amount USD 1,500.
2024-2025	National Science Foundation , Doctoral Dissertation Research Improvement (NSF-DDRI). Award amount USD 30,150. Supported research on enhancing heat risk modeling for spatially targeted interventions. Funds also supported a heat tabletop exercise with city officials along the Interstate-10 corridor.
2024-2025	ASU's School of Geographical Sciences and Urban Planning professional development award . Award amount USD 660.
2024-2025	University of Washington , Increasing Diversity in and Equitable Access to Applied Learning in Disaster Research Response (IDEAAL DR2) Fellowship. Award amount USD 6,200.
2023-2024	Headwaters Economics research grant for comparing different federal vulnerability maps (i.e., Community Disaster Resilience Zones [CDRZ] and the Climate and Economic Justice Screening Tool [CEJST]) and community capacity. Award amount USD 18,480.
2023-2024	NATURA Global Roadmap fellowship . Award amount USD 10,000 (declined the award).
2023-2024	ASU's Graduate and Professional Student Association travel grant . Award amount USD 950.
2023-2024	ASU's School of Geographical Sciences travel grant . Award amount USD 5,000.
2022-2023	Research America Civic Engagement Microgrant Award amount USD 2,300. Collaborated with NOAA and the city of Phoenix to organize a two-day tabletop exercise on heat vulnerability.
2022-2023	ASU Flagship program – Future Leaders and Geoscience High Road Internship. Award amount USD 1,300 (declined the award).
2022	William Averett Anderson Fund (BAF) fellowship.
2021-2022	ASU's School of Graduate and Professional Students Association travel grant . Award amount USD 950.

2021-2022 **ASU's Interdisciplinary Enrichment Fellowship.** Award amount USD 47,925.

2021-2022 **ASU Graduate College Conference Award.** Award amount USD 245.

Honors, Awards, and Recognition

2025 **Southwest Urban Integrated Field Laboratory (SW-IFL)** design challenge. First position. Award amount USD 2,000. This was a competitive multi-university challenge.

2025 **ASU's Urban Climate Research Center** poster competition, First place. Awarded USD 150.

2024 **American Association of Geographers**, Urban Specialty Group Access award in Honolulu, USA. Awarded USD 250.

2024 **ASU's Urban Climate Research Center** poster competition, third place. Awarded USD 50.

2023 **International Association of Urban Climate.** Best student presentation award during the International Conference of Urban Climate in Sydney, Australia. Awarded USD 100.

2023 **ASU's College of Liberal Arts and Sciences**, College Leader award 2022-2023.

2023 **ASU's Urban Climate Research Center** poster competition, third place. Awarded USD 50.

2021 **Georgia State University**, geography graduate student of the year 2020-2021

2021 **Georgia State University**, teaching assistant of the year 2020-2021

2021 **Georgia State University**, nominee for International Student of the Year

Conference Presentations (where I presented)

1. **Joseph Karanja**, Vanos, J., Georgescu, M., Frazier, A., & D. Hondula, Aaron Flores (2025). Historical Redlining and Heat-Related 911 Calls in Phoenix, Arizona. The Natural Hazards Workshop and Researchers Meeting, Broomfield, Colorado, July 2025. Oral presentation.
2. **Joseph Karanja**, Jennifer Vanos, Ankit Joshi, Scott Penner, Gisel E. Guzman, Dylan S. Connor, Konrad Rykaczewski (2025). Tent Shades: Heat Relief or Added Heat Strain for People Experiencing Homelessness? International Conference on Urban Climate, Rotterdam, Netherlands, July 2025. Oral presentation.
3. Peter J. Crank, Xinjie Huang, **Joseph Karanja**, Negin Nazarin (2025). Meet your ICUC Co-host: The AMS Board on the Urban Environment. Rotterdam, Netherlands, July 2025, Poster presentation.

4. **Karanja, Joseph.**, Vanos, J., Georgescu, M., Frazier, A., & D. Hondula **(2025)**. Spatial Determinants of Heat Health Outcomes. Annual Conference of the American Association of Geographers, Detroit, Michigan, March 2025. Oral presentation.
5. **Joseph Karanja**, Jennifer Vanos, Ankit Joshi, Scott Penner, Gisel E. Guzman, Dylan S. Connor, Konrad Rykaczewski **(2024)**. Impacts of Different Tent Cover Materials on the Mean Radiant Temperature. American Association of Geographers Conference, Honolulu, USA, April 2024. Oral presentation.
6. **Karanja, Joseph.**, Vanos, J., Georgescu, M., Frazier, A., & D. Hondula **(2023)**. Relationships between Heat Health Outcomes and the Choice of Input Variables in Heat Studies. International Conference on Urban Climate, Sydney, Australia, August 2023. Oral presentation.
7. **Karanja, Joseph.**, Vanos, J., Vieira, J **(2023)**. Thermal Discomfort for Unhoused Communities using Different Tent Cover Materials, Natural Hazards Workshop, Broomfield, Colorado US, July 2023. Oral presentation.
8. **Karanja, Joseph.**, and Vanos, J **(2023)**. Heat, Air Pollution, and Health Outcomes Nexus. Overview of Current, Future, and Synthetic Data that can Inform Air Quality Coordination and Decision-Making Activities. Presented during the ASU-NOAA Air Quality Tabletop Exercise at Skysong, Arizona, June 2023. Oral presentation
9. **Karanja, Joseph.**, Vanos, J., Vieira, J. **(2023)**. Thermal Discomfort for Unhoused Communities using Different Tent Cover Materials, International Conference of Biometeorology, Tempe, US, April 2023. Oral presentation.
10. **Karanja, Joseph.**, Georgescu, M., Svoma, B., & J., Walter. **(2023)**. Southwest US Winter Precipitation Variability: Reviewing the Role of Oceanic Teleconnections. American Meteorological Society Annual Meeting January 2023, Denver, Colorado. Poster presentation.
11. **Karanja, Joseph.**, Wanyama, D., Kiage, L. **(2022)**. Weighting Mechanics and the Spatial Pattern of Composite Metrics of Heat Vulnerability in Atlanta, Georgia, USA. International Conference on Urban Climate, August 2022. Virtual poster presentation.
12. **Karanja, Joseph.**, Vanos, J., Georgescu, M., & D. Hondula. **(2022)**. Methodological Rationale for Heat Vulnerability Indices as Predictor Variables of Heat-Health Outcomes. American Association of Geographers (AAG) Annual Meeting, February 2022. Virtual oral presentation.

Invited Talks, Lectures, and Other Presentations

- Panelist, workshop on professional development on grant writing at the School of Geographical Sciences and Urban Planning (in-person). **February 2025**.
- Invited presenter, African Urban Heat Summit, **February 2025** in Freetown, Sierra Leone (Presented remotely). Presentation titled “Heat Vulnerability: Concepts, Context, and Challenges”.
- Panelist for Tulane University Intercity/County Management Association panel on Environment and Disasters at Tulane University (in-person). **November 2024**.
- Panelist for a book launch, ‘Designing Democracy in a Hotter Time’. **August 2024** at Arizona State University (in-person). [Link to the website advert](#)

- Invited guest speaker to Singapore Management University (in-person). Presentation titled “Heat Vulnerability: Spatial Dynamics to Personal Heat Modeling”. **August 2024**.
- Panelist for Webinar, A Missing Ingredient: Adding Capacity to the Federal Vulnerability Mix. Hosted by Natural Hazards Center, **June 2024**. [Link to the NHC Workshop](#)
- Substitute instructor for GPH 213; Climate and Weather at Arizona State University (**Spring 2024**).
- Panelist for a Webinar, ‘It Gets Hotter Every Year: How to Proactively Fund the Heat Crisis. Hosted by the Center for Disaster Philanthropy, **June 2024**. [Link to the CDP webinar](#).
- Presenter for ASU’S Knowledge Exchange webinar. Implications of Model Types and Input Variables for Understanding Heat-Health Outcomes. Hosted by ASU Knowledge Exchange. **November 2023**. [Link to the presentation](#)

Technical Skills

- Proficiency in ArcGIS Pro, QGIS, Erdas Imagine, and SPSS software
- Python programming (Intermediate)
- R-programming (Intermediate)
- Spatial statistics

Leadership

2023-present	Student leader for the Urban Climate Research Center, ASU. Leading and representing student interests.
2022-present	Student board member , board of Urban Environment of the American Meteorological Society (AMS).
2022-2023	Graduate student representative to the faculty committee on graduate affairs, School of Geographical Sciences and Planning, ASU.
2020-2021	Student representative to the graduate council, College of Arts and Sciences, GSU.
2020-2021	President , Geosciences Graduate Student Alliance, GSU
2020-2021	Student representative to the College of Arts and Sciences Curriculum Committee. Participated in the review of the college curriculum and voted on committee discussions.

Service

2024	AAG 2024 session organizer: Symposium on Geospatial Data Science for Sustainability Development and Application of Spatial Models for Human-Environmental Systems to Address Social and or Environmental Challenges. Honolulu, USA.
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- 2024 **Committee lead** for the Lightning Talks group, Bill Anderson Fund Fellowship.
- 2023 **Co-chair of the session** on Urban Environment and Health Impacts I during the AMS annual meeting, in Denver, Colorado.

Journal Reviewing

Journal Name	Total manuscripts
▪ Environmental Research: Health	1
▪ Energy, Science, and Engineering	1
▪ Environmental Research Letters	3
▪ Natural Hazards Review	1
▪ International Journal of Biometeorology	3
▪ Environmental Research Communications	1

Professional Certifications

- **Hazard and emergency-related certifications 2024:**
 - a. Reciprocity in Hazards and Disaster Research
 - b. Positionality in Hazards and Disaster Research and Practice
 - c. Introduction to the National Incident Management System, IS-700B
 - d. Introduction to Incident Command System, ICS-100
 - e. Institutional Review Board Procedures and Extreme Events Research
 - f. Collecting and Sharing Perishable Data
 - g. Broader Ethical Considerations for Hazards and Disaster Researchers
- **Certificate on Policy and Science** sponsored by Research America and training offered by the Federation of American Societies for Experimental Biology (FASEB), March 2023.
- **Certified associate expert for environmental impact assessment**, Kenya. Certificate issued by National Environmental Management Authority since September 2016.
- **Certificate in transformational leadership skills** awarded by Kenyatta University, December 2013.
- **Certificate on entrepreneurial promotion** sponsored by Kenyatta University, University of Lüneburg (Germany), and UNESCO (United Nations Educational, Scientific, Cultural Organization), November 2012.
- **Introduction to GIS and remote sensing certification** awarded by Regional Center for Mapping of Resources for Development, Nairobi, April 2012

Research Mentorship

- Ashmit Amit Pai. Undergraduate student at ASU (Computer Science), helping with data analysis through the NSF DDRI funding.

Professional Associations

- Member, Board of Urban Environment, **American Meteorological Society (AMS)**

- Student member, **American Association of Geographers (AAG)**
- Student member, **International Congress of Biometeorology (ICB)**
- Student member, **International Association on Urban Climate (IAUC)**
- Member, **NATURA Early Career Network**
- Member, **Global Climate Change Homelessness Network Initiative**

Media and Community Outreach

- Web post titled “**ASU workshop trains educators, professionals from marginalized communities in disaster science**” by ASU news. November 2024. [link to the web post](#)
- Web post on **the source of Winter precipitation for Arizona** by ASU news titled ‘Computer Modeling shows where Arizona’s winter precipitation originates. [Link to the web post](#). June 2024.
- Headwaters Economics Web post on **how Federal Climate Vulnerability Maps Overlook Low-Capacity Communities** by Headwaters. [Link to web post](#). June 2024.
- **Urban Climate Quarterly newsletter** research highlights issue 89, 2023. [Link to the newsletter](#).
- Research highlights on Phoenix's most heat-vulnerable communities by ASU news, “**Shedding Light on Phoenix's most heat-vulnerable**. [Link to research highlight](#). 2022.
- Interview by Aarong Stingle, “**Environmental Justice and Inequality in Downtown Phoenix**’ 2022. [Link to web post](#).
- Research feature by the American Association of Geographers, ‘Finding Heat Vulnerability Before it’s too Late. [Link to AAG feature](#). April 2022.

Community Service

- Note taker, Natural Hazards Workshop 2025
- Volunteered with the city of Freetown, Sierra Leone, by developing visualizations for their climate data, which were incorporated into Freetown’s heat adaptation plan 2025.
- Unibuddy Student Ambassador volunteer – responding to queries from prospective students to ASU. 2022-2024
- Note taker, Natural Hazards Workshop 2024
- Volunteer, City of Phoenix, Office of Heat Mitigation and Response, Summer 2022
- Counselor, Naivasha District Hospital. Volunteered at the comprehensive care center for HIV-infected people and checked their daily progress. 2013.