

Challenges with Data Scale for Mapping Environmental Justice Stories

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Abstract:

In Fall 2025, we co-taught a new, cross-listed undergraduate course on mapping and communication for environmental justice, offered jointly through the University of Oregon's College of Arts & Sciences and School of Journalism and Communication. The course was funded through the Provost's Office Initiative on the Environment and intentionally designed without prerequisites, bringing together students with varied backgrounds in geography, spatial data science, journalism, environmental science, and psychology. The course had two primary goals. First, we sought to train students to communicate complex environmental justice issues through maps and narratives, drawing on best practices from environmental justice geospatial tools, cartography, and science communication research. Second, we aimed to provide students with real-world experience by partnering with the Oregon Health Authority (OHA), which is currently developing a statewide Environmental Justice Mapping Tool for Oregon (Governor of Oregon: EJ Mapping Tool, n.d.).

While the course was successful in many respects, it also surfaced a persistent and underexamined challenge in environmental justice mapping: a disconnect between the scale at which reliable, comparable data are available and the scale at which environmental justice harms are experienced, communicated, and made meaningful. This disconnect became especially apparent as students attempted to craft place-based narratives focused on individual communities while simultaneously engaging with data designed to support statewide screening and policy decision-making across nearly 100,000 square miles (U.S. Census Bureau QuickFacts: Oregon, n.d.).

Environmental justice mapping tools—such as Oregon's forthcoming tool and national efforts like the U.S. Environmental Protection Agency's EJSCREEN (EJScreen, n.d.)—are necessarily built on standardized, verified datasets collected using consistent methodologies. These data are often aggregated at census tract, county, or regional scales to allow for comparability across jurisdictions and to support equitable, defensible policy decisions. However, environmental justice concerns are rarely experienced at these scales. Instead, they are felt at the level of neighborhoods, households, tribal lands, and specific communities, where lived experience, historical context, and localized conditions shape both harm and resilience. As a result, the data most suitable for statewide or national screening often lack the granularity needed to support compelling, community-centered narratives.

Our course provided a concrete setting in which this tension of data scale disconnect played out. Over a ten-week term, students were introduced to ArcGIS Pro, ArcGIS Online, and ArcGIS StoryMaps while also engaging with the conceptual foundations of environmental justice, the structure and interpretation of environmental justice indicator data, narrative construction, and stakeholder communication. The majority of the term centered on a final group project in which students worked in groups to produce an ArcGIS StoryMap that combined data journalism, cartography, and science communication to tell a clear and compelling environmental justice story.

Students worked in groups intentionally designed to pair those with stronger spatial data skills with those trained in narrative journalism and communication. Although the project prompted students to focus on environmental justice within Oregon, nearly all groups chose to further localize their stories. Projects examined topics such as pollution exposure in low-income communities located within 20 minutes of campus, urban heat island effects in Portland, and wildfire impacts on Indigenous tribal lands in central Oregon. In each case, students attempted to “zoom in” from statewide or regional datasets to tell stories centered on specific communities and lived experiences.

It was through this process that the limitations of scale became most visible. Students struggled to reconcile the coarse resolution of verified environmental justice datasets with the demands of local storytelling. In some cases, data that were appropriate for identifying broad areas of concern proved insufficient for making claims about specific neighborhoods or populations. In others, locally relevant data existed but potentially lacked the consistency, documentation, or comparability required for inclusion in a statewide tool or for broader generalization. These

challenges were not the result of poor student work or insufficient technical training, but rather reflected a structural tension embedded in environmental justice mapping itself.

The partnership with OHA provided important context for understanding how environmental justice data are produced and used. Under Oregon House Bill 4077 (2022), OHA is developing a statewide screening tool that integrates environmental, public health, demographic, and socioeconomic data to support policy decision-making. Examining these data in this classroom setting focused on local storytelling revealed challenges that arise when datasets designed for statewide assessment are applied to finer geographic and narrative scales.

While this paper centers on an Oregon-based example, the issues it highlights extend far beyond a single state or tool. We routinely navigate tradeoffs. By examining this tension in regard to data scale, we argue that scale mismatch should be understood not as a failure of tools or users, but as a fundamental constraint that must be acknowledged, communicated, and addressed more explicitly. Specifically, this case illustrates the need for greater transparency about what environmental justice data can support at different scales and how to bridge quantitative tools with community-based knowledge.

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