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ChiVes: Integrating Chicago Environmental Justice Data, Researchers, and Communities with Decentralized Web Architecture, Open GIS, and Participatory Design

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To better understand environmental challenges and advocate for improved policy and resources, communities need more accessible data, the ability to update their own stories, and carefully cultivated environmental justice (EJ) frameworks that strive to ensure that injustice is not reproduced in the research process itself. The EJ movement long holds a tradition of calling for place-based analyses to determine root causes of injustices, as well as incorporating grass-roots advocacy and community engaged connections. However, common approaches to EJ GIS app development include top-down design processes and closed coding infrastructures. Modern web design using service-oriented architecture, open GIS tools, and distributed data stream integration can be adapted to break free of these restrictions. The ChiVes platform, a mapping application linking dozens of environmental indicators at the neighborhood level in Chicago, serves as a decentralized spatial data infrastructure focused on stakeholder relationships in order to minimize reproduction of inequity. Open GIS is used to wrangle and visualize data, with new data streams, resources, and standards able to be updated using transparent protocols. To develop a baseline of ecological assessment, the platform integrates multiple measures of pollution exposure from varying sources and methodologies, multiple drivers of pollution exposure, green infrastructure metrics, as well as socioeconomic and health indicators. A new flexible, multi-criterion "index builder" enables residents to develop new metrics with available data on-the-fly. Using co-design participatory approaches, the ChiVes platform interface continues to be refined by city residents. Future research in EJ GIS frameworks may benefit from participatory design and Open Science approaches.

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