

A SOCIO-ENVIRONMENTAL CLUSTER ANALYSIS TO ASSESS VULNERABILITY TO PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) EXPOSURE IN BREVARD COUNTY FLORIDA

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As climate change disproportionately impacts more vulnerable communities across the globe, resources need to be allocated more efficiently and equitably. Social vulnerability indices (SVI) are used as a tool for prioritizing communities most vulnerable to the impacts of climate change driven natural disasters. Frequently used SVIs that create a single vulnerability score rely on a high level of assumptions which can diminish the importance of specific variables. This can cause SVIs to overlook the relevancy of interconnected variables and obscure complex patterns, potentially leading to contradictory policy recommendations. Furthermore, indices are limited in their ability to address cascading or cumulative effects because of the way they simplify and flatten the interactions within dynamic systems. To address this issue, we propose a model-based clustering as an alternative analysis that can rapidly identify vulnerable sub-populations by grouping together communities (e.g., census tracts) with similar socio-environmental profiles while avoiding the artificial constraints on the distribution introduced by the assumptions required to create an index. Our quantitative framework for vulnerability assessment incorporates socioeconomic, environmental and flood inundation indicators of vulnerabilities for Brevard County, Florida. We used a Bayesian profile regression (BPR) technique to identify clusters of socio-environmental profiles and jointly model associations between soil PFAS levels and identified clusters. This allowed us to identify communities facing a high level of combined social and environmental vulnerability and disproportionately elevated soil PFAS levels.

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