RESEARCH SUMMARY
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Associations between social vulnerability and environmental quality in the southeastern United States

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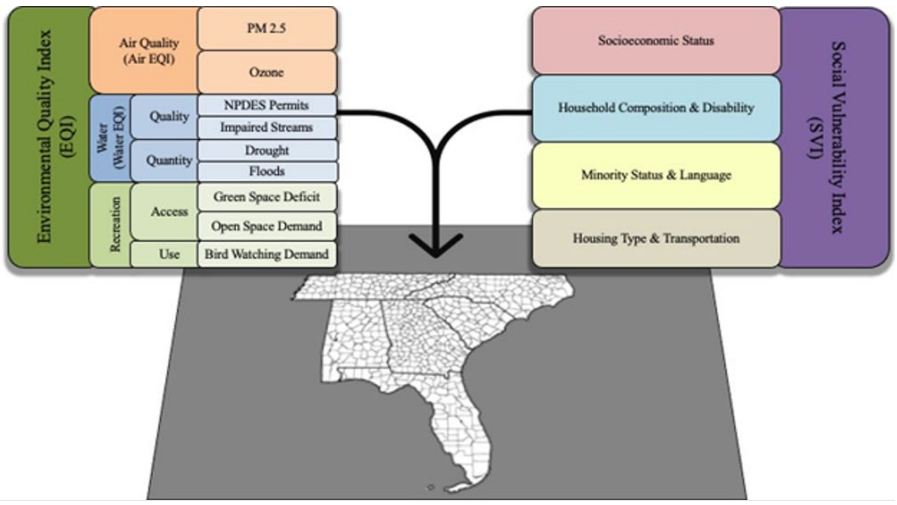
Summary of Research

We utilized the Social Vulnerability Index (SVI) from the Center for Disease Control (CDC) and indicators of environmental quality from the Environmental Protection Agency (EPA) to examine spatial correlations between sociodemographic characteristics of human communities and air quality, water quality and quantity, and recreational benefits across six states in the southeastern United States. Our overarching goal was to explore the spatial relationship of environmental quality and socially vulnerable populations across counties within the southeastern United States (Figure 1). Specifically, we ask (1) how the SVI correlates with environmental quality and (2) how particular components of SVI and environmental quality correlate with one another.

By bringing together the two indices (EQI and SVI), we are able to assess whether counties that have high vulnerability also have low environmental

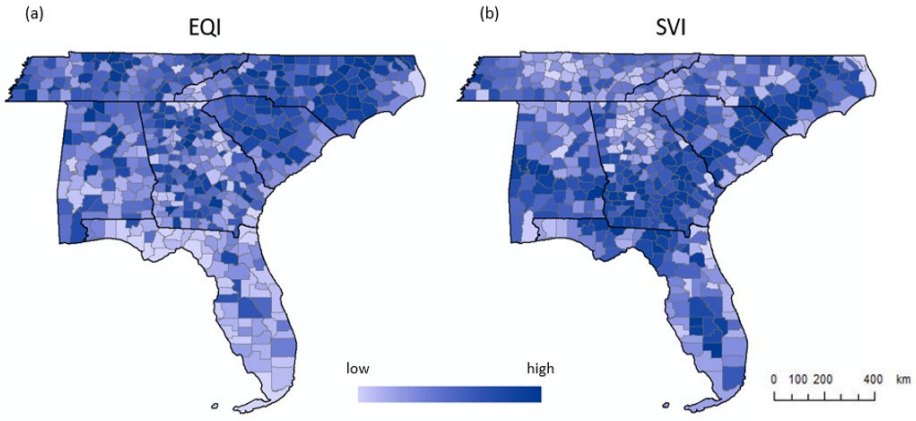
Figure 1. Framework for investigating associations between environmental quality and social vulnerability in the Southeastern United States



quality.The correlation between overall SVI and EQI is -0.115, suggesting that counties with higher social vulnerability also have higher environmental quality, given the orientation of the two indices (Figure 2). This negative correlation between the SVI and EQI can be attributed to the fact that many, socially vulnerable, rural counties experience higher environmental quality than do more urban areas.

Our results highlight how environmental monitoring could benefit from incorporating indicators describing impacts on different human communities, such as the SVI indicators. Doing so would allow decision-makers and practitioners to explicitly consider who benefits most from improved environmental quality and how they benefit, in addition to broadening future environmental monitoring efforts. Future studies should expand the examined indicators to gain a more-comprehensive view into the geographic patterns. In particular, including ecosystem services more directly could aid in mapping services that overlap with environmental quality and the Social Vulnerability Index. This could, in part, demonstrate more clearly which populations derive the most benefits from ecosystem services and if the presence or absence of ecosystem services contributes to social vulnerability.

Figure 2. EQI (a) and SVI (b) values for each county in the Southeast region of the United States. Darker color indicates higher values of the respective variables.



A high EQI value indicates low environmental quality, whereas a high SVI value indicates high vulnerability for the county.

Table 1. Spearman's Rank Sum Correlation values between social vulnerability indicators and environmental quality indicators.

VARIABLES	EQI	Air EQI	PM2.5	Surface Ozone	Water EQI	Impaired Streams	NPDES Permits	Drought	Flood	Open Space Access Demand	Green Space Deficit	Bird Watching Demand
SVI	-0.11 **	-0.07	-0.04	-0.29 ****	-0.06	-0.24 ****	-0.20 **	-0.23 ****	-0.26 ****	-0.12 **	0.05	-0.42 ****
Socioeconomic Status	-0.06	0.01	0.06	-0.17 ****	-0.12 **	-0.28 ****	-0.39 ****	-014 **	-0.33 ****	-0.21 ****	-0.09 *	-0.51 ****
Household Composition	-0.05	0.03	0	-0.11 **	-0.02	-0.22 ****	-0.22 ****	-0.08	-0.22 ****	-0.03	0.07	-0.37 ****
Minority Status	-0.02	-0.15 ***	-0.15 ***	-0.26 ****	0.09 *	-0.05	0.28 ****	-0.21 ****	-0.22 ****	-0.03	0.23 ****	0.15 ****
Housing and Transportation	-0.22 ****	-0.10 *	-0.14 *	-0.31 ****	-0.05	-0.04	0.03	-0.27 ****	-0.08	-0.12 **	0.01	-0.24 ****

Significant positive correlations indicate that more socially vulnerable populations tend to have lower environmental quality with respect to the components that the indicators represent. Negative correlations indicate the opposite. Significance levels: **** p<0.0001, *** p<0.001, ** p<0.01, * p<0.05.

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View the full report here.