

Getting it Out in the Open

An Exploration of Open Space Distribution in Middlesex County, MA

Introduction

In recent years, it has become increasingly clear that the built environment plays an important role in society's well-being. Open space, one element of the built environment, has positive effects on an area's environmental quality, improves people's physical and mental health, and can even provide economic benefits. However, access to open space is not distributed equally among communities. This project aims to examine the distribution of open space throughout Middlesex County, Massachusetts. While there are many potential variables related to open space, this project focuses on its relationships with social vulnerability and with conservation institutions, such as municipal open space plans and local land trusts.

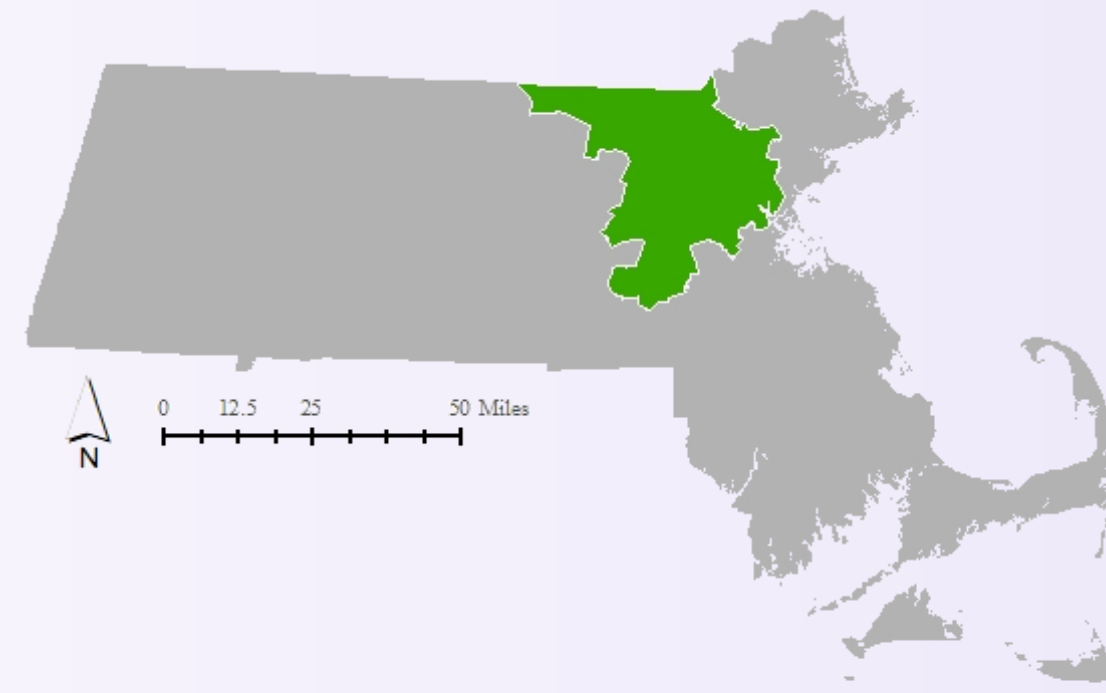
Methodology

An index, accounting for race, poverty, and education, was used to estimate social vulnerability. For each census tract, the index represents the combined proportions of residents who are non-white, those under the poverty level, and those without at least an associate/bachelor's degree. The index score for each census tract could range from 0 to 3, with higher scores indicating greater social vulnerability. For the analysis on conservation institutions, whether a municipality has a recent open space plan (<10 years) and/or a local land trust was tracked in a table, with 0 as an affirmative indication and 1 as a negative indication. The index score for each municipality could range from 0 to 2, where 0 indicated that the municipality had both conservation institutions. For both census tracts and municipalities, the open space value used in the analysis was estimated by comparing the acres of open space to the total acres of land within the boundary. STATA was used to determine the correlation between open space and the two factors of interest, with open space considered as the dependent variable. Statistical significance was determined at the 0.05 level.

Discussion & Conclusion

The results of this analysis show that there is a significant relationship between open space and social vulnerability, as well as open space and the presence of conservation institutions. While the negative correlation between open space and social vulnerability was expected, the negative correlation between open space and the presence of conservation institutions was surprising. The relationship may suggest that municipalities are more willing to put time and resources towards conservation institutions if they have less open space; in other words, municipalities with smaller amounts of open space are more inclined to actively protect what they have. The results of this analysis illustrate the uneven distribution of open space in Middlesex County. This highlights the need for further work so that, in the future, the benefits of open space can be more equally distributed.

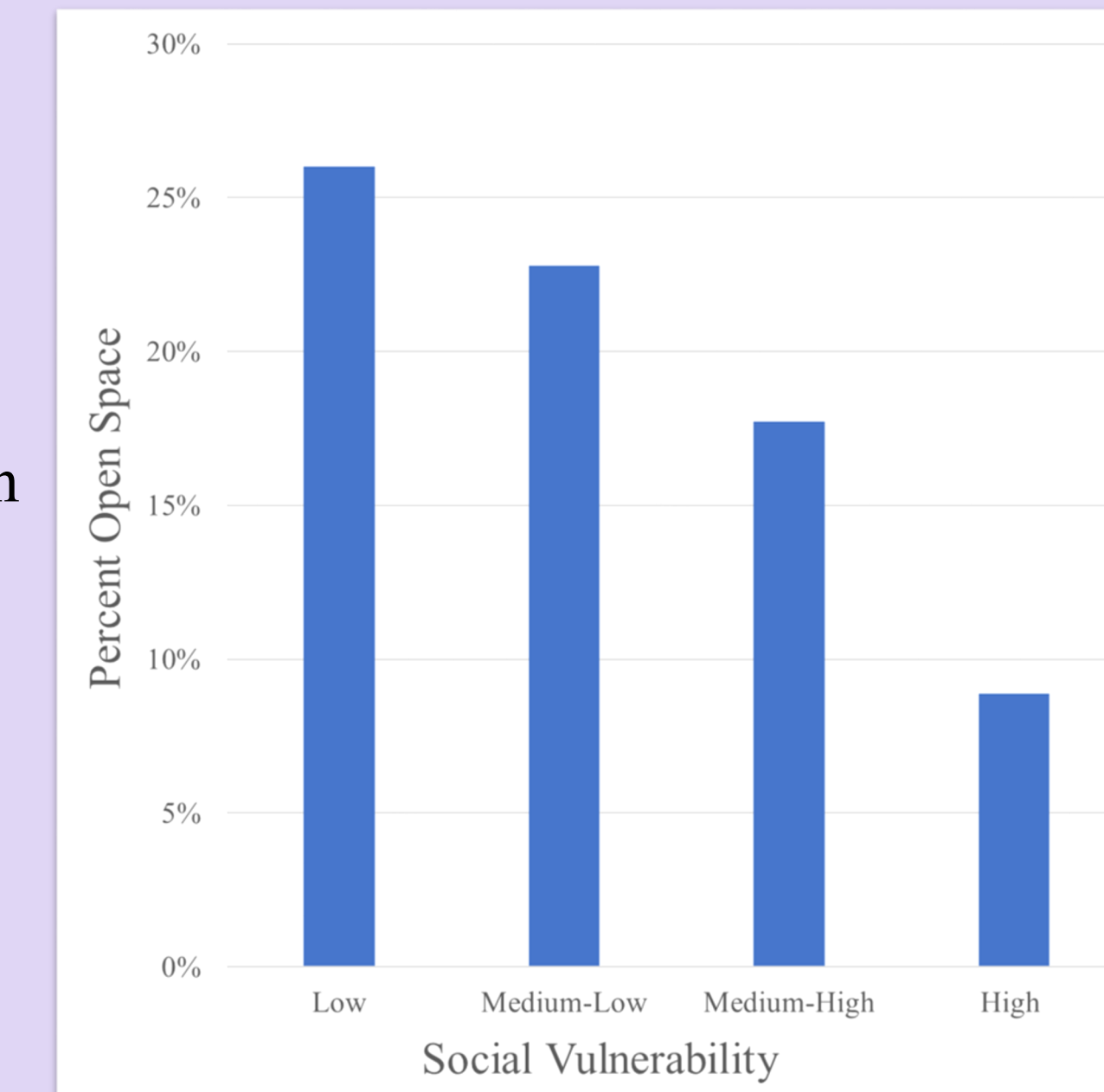
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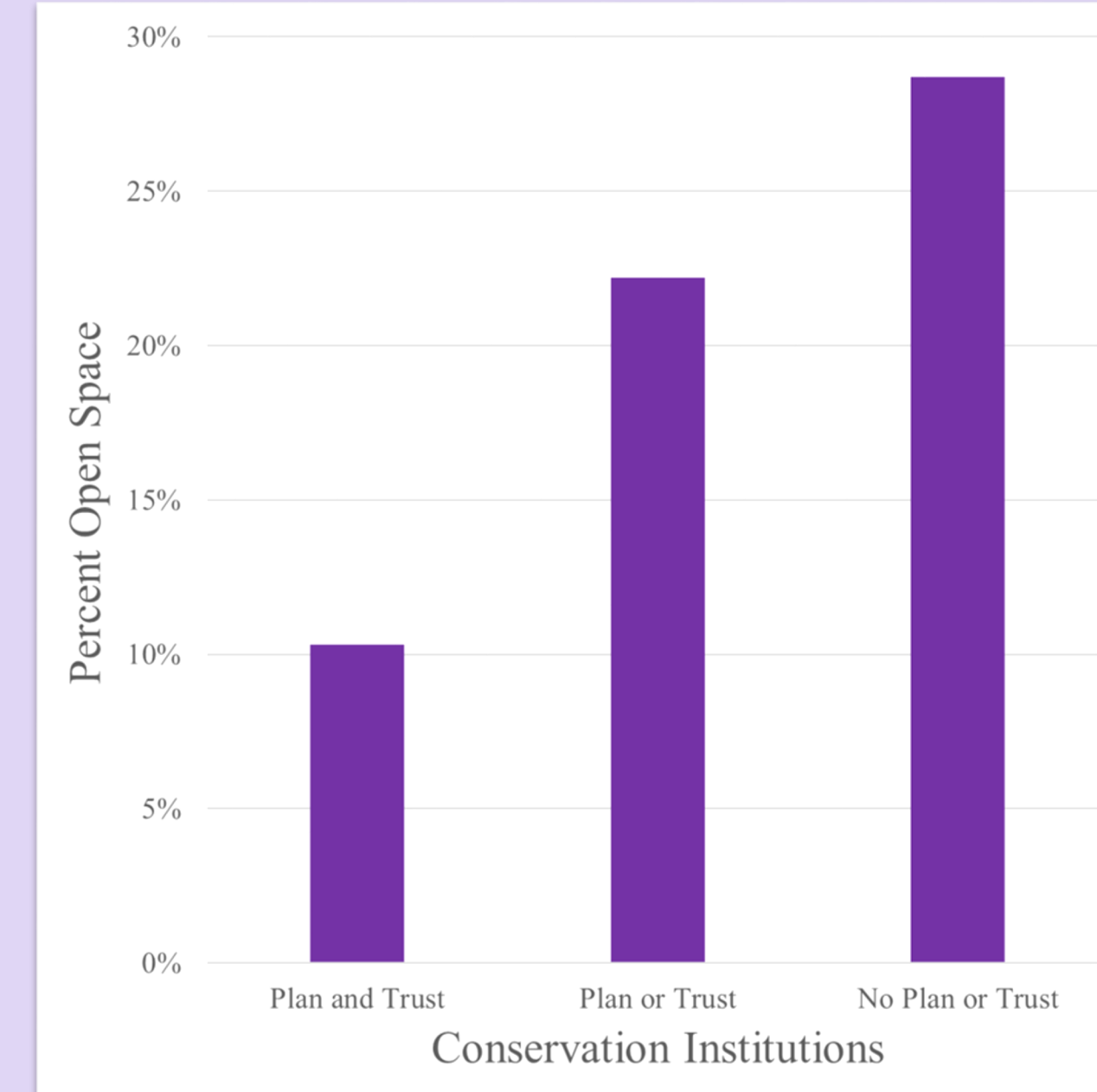
Results

This analysis of Middlesex County, MA found a correlation between open space and social vulnerability. Census tracts with greater social vulnerability have, on average, less open space. More specifically, for every 1 unit increase in a census tract's index score, the amount of open space, relative to total land area, is predicted to decrease by 15% ($p < 0.05$). This analysis also found a correlation between open space and the presence of conservation institutions. Municipalities with a stronger presence of conservation institutions, on average, have less open space. Compared to a municipality with a current open space plan and a local land trust, municipalities without either institution are predicted to have 20% more open space relative to total land area ($p < 0.05$). The graph on the left shows the amount of open space, on average, for census tracts at each level of social vulnerability; the classifications of social vulnerability mirror those in the map below. The graph on the right shows the amount of open space, on average, for municipalities, grouped by how many conservation institutions are in place.

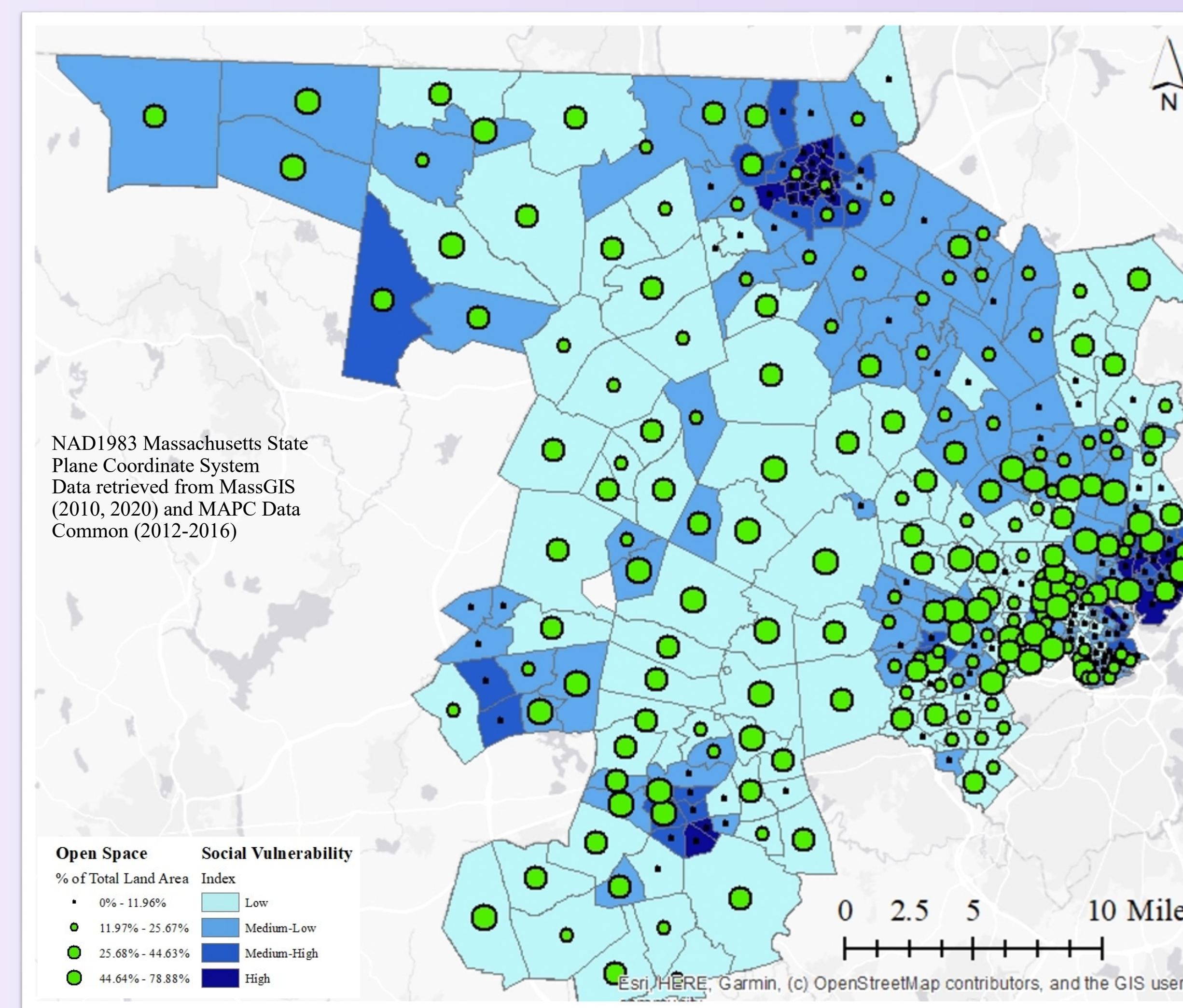
Variation in Open Space by Social Vulnerability Level



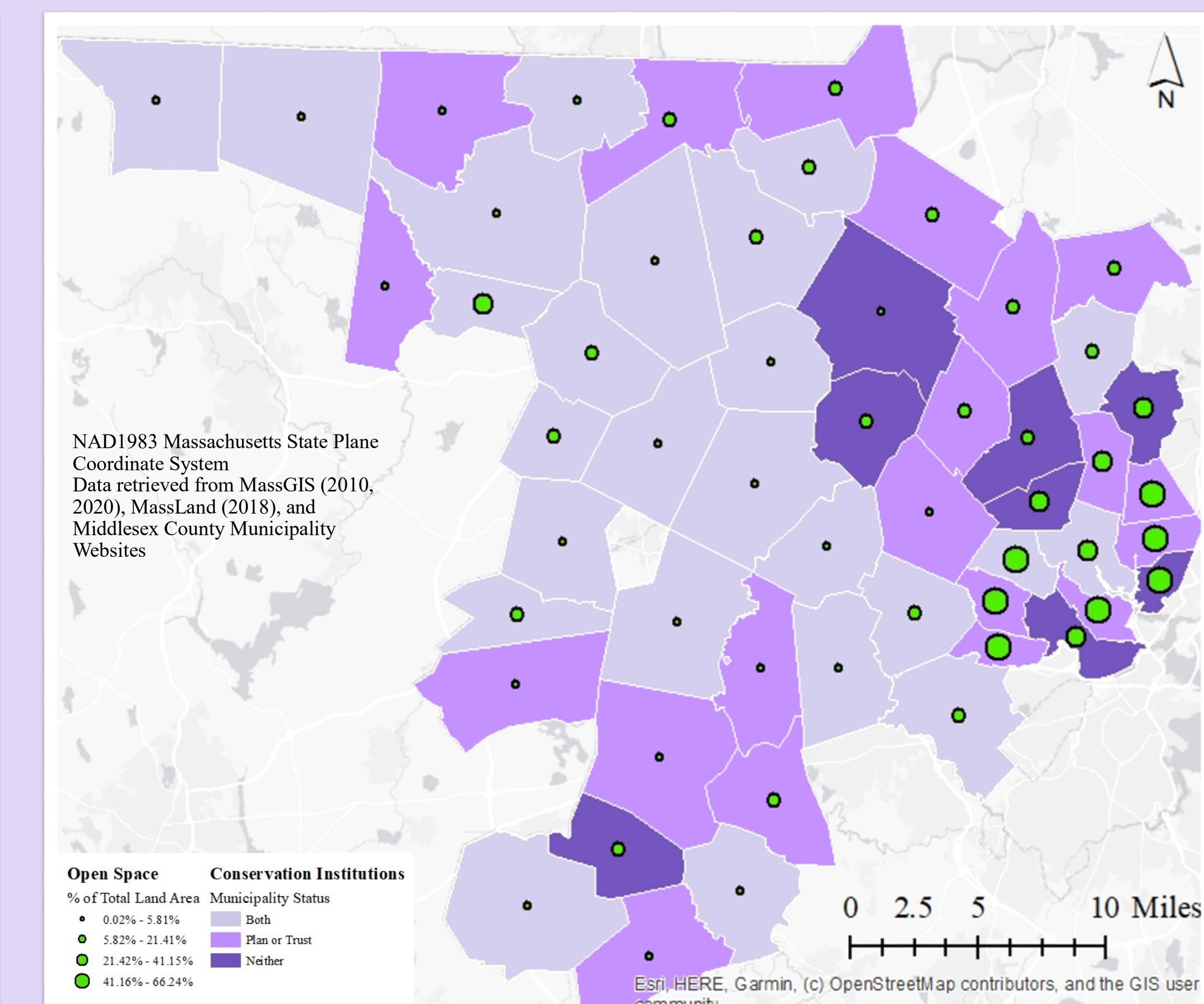
Variation in Open Space by Presence of Conservation Institutions



Open Space and Social Vulnerability



Open Space and Conservation Institutions



References

- Koohsari, M. (2011). Access to Public Open Space: Is Distribution Equitable Across Different Socioeconomic Areas? *Journal of Urban and Environmental Engineering* Vol. 5, No. 2, pp. 67-72
- Warren, P., Ryan, R., Lerman, S., and Tooke, K. (2011). Social and institutional factors associated with land use and forest conservation along two urban gradients in Massachusetts. *Landscape and Urban Planning*, 102(2), 82-92.
- Wolch, J., Wilson, J., and Fehrenbach, J. (2013). Parks and Park Funding in Los Angeles: An Equity Mapping Analysis. *Urban Geography*. DOI: 10.2747/0272-3638.26.1.4