

# A GIS-BASED METHODOLOGY FOR QUANTIFYING AND COMPARING ENVIRONMENTAL JUSTICE IMPACTS OF INFRASTRUCTURE PROJECTS

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## ABSTRACT

Advances in geospatial analysis technology have resulted in new data-gathering techniques for environmental justice (EJ) assessments. Frequently investigated metrics relate to race and income due to the relative ease of acquiring Census data. Geographic information systems (GIS) offer the ability to represent the geography underlying these data in maps in order help identify spatial patterns that may indicate undesirable outcomes or discriminatory practices. Many indicators of disproportionate negative effects exist and can be assessed using GIS. Geospatial analyses can also be used to assess proximity to various features. However, expert human analysis is typically used to interpret analysis results, which may lead to arbitrary or subjective conclusions. This thesis discusses a GIS methodology developed to overcome the limitations of image-based analyses for evaluating spatial relationships in community infrastructure by employing metrics of environmental quality, such as noise, air quality, safety and access to neighborhood features in order to move beyond identification of those affected to quantification of the impacts on their lives. Understanding who is affected, and to what extent, can assist in comparing how daily life can be influenced by infrastructure improvements. This information can be used to assess how effects of these parameters compare to the effects from the same parameters in alternative projects. Impacts on people from these parameters effects can be quantified to offer planners greater decision-making confidence.