

Exploring the mosaic of perceptions for water quality across watersheds in San Antonio, Texas

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Abstract

Past research on environmental perceptions has, for the most part, treated responses as independently distributed across a given study area. However, a random sampling of respondents may not necessarily produce a randomly distributed pattern of views on the natural environment. This article explores the degree to which perceptions of water quality are spatially correlated across two watersheds in San Antonio, Texas. Using spatial analysis techniques, we describe and map the mosaic of perceptions of water quality in Salado and Leon creeks running through the heart of the metropolitan area. Specifically, we test the degree to which responses are spatially autocorrelated across the watersheds, and then provide explanation as to why clustering of perceptions occurs in specific locations. Results demonstrate that environmental perceptions are in fact spatially dependent across the landscape and that geographic networks of issue-based activism contribute to the formation of localized “hot spots” of similar responses. Finally, we discuss how the results provide direction for more effective approaches to watershed planning and policy.

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1. Introduction

Studies on perceptions of the natural environment traditionally have been conducted with the assumption that responses are independently distributed across the

landscape. However, recent findings suggest that perceptions and beliefs about specific natural features are, in fact, related across space. The influence of social networks, location, proximity, and other geographic factors causes environmental perceptions to unfold as a clustered pattern across regions, rather than one that is randomly dispersed. These “hot spots” of spatially correlated perceptions have important implications not only for statistical modeling of responses, but also for understanding why and where perceptions occur within a policy or plan-making context.

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We build on previous studies explaining the influence of socio-demographic and location-based factors on environmental perceptions by examining the mosaic of environmental responses across watersheds in San Antonio, Texas. Using spatial analysis techniques, we describe and map perceptions of water quality in two creeks based on the results of a random survey of residents in two San Antonio watersheds. We empirically test the degree to which responses are spatially autocorrelated across the study area and attempt to explain why there is a clustering of perceptions in specific locations. Results show that responses are indeed spatially related across the geographic landscape and certain factors contribute to the formation of localized 'hot spots' of similar answers. Identifying geographic areas where residents have similar perceptions about local water quality may help planners and policy makers strategically target environmental management programs in neighborhoods where initial support for these programs is likely.

The following section reviews the past literature explaining environmental attitudes and perceptions through socio-demographic and geographic variables. We then introduce the concept of spatial autocorrelation and discuss its applications for understanding human perceptions and behavior. Next, we describe sample selection, variable measurement using Geographic Information Systems (GIS), and data analysis procedures. Our findings are reported in four phases. First, we determine if spatial dependence among views of water pollution exists for the entire sample. Second, we identify geographic "hot spots" of similar responses. Third, we test the degree to which the clusters differ from the rest of the sample in terms of socio-economic and geographic variables. Finally, we use density calculations to examine spatial overlap between the LISA "hot spots" of similar views and areas of issue-based environmental activism. Based on the results, we discuss the policy and planning implications of being able to pinpoint areas of similar environmental views across a watershed.

2. Explaining environmental perceptions

There is a long tradition of scholarly research using socio-economic and demographic variables to explain environmental perceptions (i.e., attitudes, views,

awareness, and concerns). Generally, these studies conclude that young, wealthy, educated women with liberal political views are the most likely to consider environmental protection as a priority. In their summary of over a decade of previous research, [Van Liere and Dunlap \(1980, p. 192\)](#) found that, "age, education and political ideology are consistently (albeit moderately) associated with environmental concern, and thus we have confidence in concluding that younger, well-educated, and politically liberal persons tend to be more concerned about environmental quality than their older, less educated and politically conservative counterparts." [Jones and Dunlap \(1992\)](#) and [Scott and Willits \(1994\)](#) found the same results: young, highly educated, liberal-minded individuals demonstrate greater recognition of and concern for environmental problems. Other more recent studies focusing on the role of demographic and socio-economic factors find evidence that younger age ([Fransson and Garling, 1999](#); [Nord et al., 1998](#)) and higher levels of education ([Guagano and Markee, 1995](#); [Howell and Laska, 1992](#); [Raudsepp, 2001](#)) are significant drivers of environmental attitudes and concern. Income is another variable shown to explain environmental perceptions and attitudes ([Fransson and Garling, 1999](#); [Van Liere and Dunlap, 1980](#)). For example, [Scott and Willits \(1994\)](#) found that respondents with higher income levels were more likely to demonstrate pro-environmental concerns.

Geographic factors, such as urban or rural environments, have long been recognized as important in explaining environmental perceptions ([Tremblay and Dunlap, 1978](#)). More recently, with the development of computer aided spatial analytical techniques, researchers have begun to examine factors, such as proximity and location to explain the underpinnings of environmental perceptions. The interaction between physical location and environmental values is most often conceptualized as "sense of place." The way in which an individual relates to and perceives the natural environment is manifested in his or her "sense of place." Sense of place is defined by the collection of beliefs, attitudes, and perceptions individuals associate with a particular locality ([Tuan, 1977](#); [Williams, 1995](#); [Agnew, 1996](#)). Sense of place thus marks the intersection of geographic setting and personal experience and helps to shape one's attitude toward the natural environment ([Cantrill, 1998](#)). Such a place-based theory

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