The Debate over Environmental Justice*

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One of the problems in doing research in the environmental justice area is sensitivity to criticism that often draws more heat than light. Let us begin by clearing the air. In general, we feel that there are important issues in environmental justice and that these are probably damaging with respect to minorities and the poor. Furthermore, some of these damages may be due to racism, and some may be due to institutional racism. That having been said, however, it does not make every individual study correct with respect to these issues.

Downey has correctly identified several key issues of our concern in his first four points at the beginning of his response and we stand by each. The lesson of the Bowen et al. (1995) study had to do with the “modifiable areal unit” problem, which means the results of an analysis can differ with different levels of data aggregation—i.e., block face vs. census tract vs. zip code vs. county. The point was that arbitrarily basing one’s conclusion on one geographical scale while rejecting the findings at another geographical scale becomes a problem, especially when the conclusions differ at different geographical scales, as they appear to in Downey’s study. Moreover, the use of zip codes as a unit of analysis has been evaluated and found wanting specifically with respect to environmental justice issues (Monmonier, 1994). Since the physical process of interest in environmental justice is one in which exposure to environmental hazards creates public health risks for local communities at an even smaller scale than zip codes, it seems only reasonable to use census tracts or smaller spatial units of analysis in assessing environmental justice.

There is also another related but distinct issue here about basing one’s conclusion on a statewide rather than on an exclusively urban scale. This issue does not have so much to do with selecting the smallest spatial units of analysis, but with selecting the proper and appropriate geographical scale for the process of interest apart from the units of analysis with which it is analyzed. The basic question in most environmental justice assessments

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SOCIAL SCIENCE QUARTERLY, Volume 81, Number 3, September 2000
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is whether the observed environmental hazards exhibit any systematic spatial pattern in relation to minority and low-income households, as opposed to being distributed at random over the population in a study region. In our view, this is essentially a question about spatial distributions, and as such the methods used to obtain an answer are most appropriately based upon spatial data analysis as distinguished from other forms of data analysis (Bailey and Gatrell, 1995). More specifically, since observations that are closer together in space tend to be related more than are observations farther apart, spatial data often violate the standard regression model assumption that the off-diagonal elements in the residual variance-covariance matrix are all equal to zero. Moreover, often, when the pairs of observations that correspond to the non-zero off-diagonal elements are plotted on a map of a study region, geographical patterns or clusters are found. These portray definite violations of regression assumptions with implications in terms of the appropriate approach to such assessments.

First, instead of assuming the observations to be spatially independent, the proper way to handle them analytically is to first test for spatial autocorrelation problems and, if they are found, to use spatial regression models that explicitly enable estimation in the presence of a covariance structure that reflects local effects. Second, one way to select an appropriate scale as a basis for one’s conclusions is by ensuring that there are no patterns or clusters when the residuals for the relevant pairs of observations are plotted on a map. This can be accomplished only if the mean, variance, or covariance of the process does not exhibit significant variation or spatial “drift” across the study region. This is relevant specifically in terms of environmental justice assessments because one is likely to find clusters around urban areas in the relevant observations. Both industry and the populations of interest tend to be located there. If researchers analyze entire states without using the appropriate spatial analysis to adjust for this urban clustering of industry and demographic groups, then they are apt to unwittingly confound the effects of violations of the regression assumptions with statistically significant and decisive results. Since urban areas alone, as distinct from urban areas taken within the larger geographical context of entire states, are likely to be relatively homogeneous with respect to the distribution of industry and demographic groups, associated violations of the modeling assumptions may be less apt to occur when the assessments are restricted to urban areas. Thus, there seems to be little reasonable choice but either to use appropriate spatial data analysis for assessing entire states, or to base one’s conclusions on urban areas alone.

In summary, to give appropriate and systematic consideration to space would entail first specifying the process of interest conceptually, and then using the appropriate spatial data analytic techniques to detect and model any patterns in the process. Without such consideration, the results of environmental justice analyses are not apt to stand up to strict scientific
scrutiny. Rather, the likely results are not simply biased estimates but, more important, (the greater error of) inconsistent findings.

REFERENCES


