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A Case Study of Environmental Justice and Federal Tourism Sites in Southern Appalachia: A GIS Application

ROB PORTER AND MICHAEL A. TARRANT

This article uses an environmental justice framework to determine whether inequalities exist for certain socioeconomic and racial groups with respect to the distribution of federal tourism sites in Southern Appalachia (SA). Federal tourism sites and campsites were mapped along with the census block groups (CBGs) using geographic information systems. CBGs within a 1,500-meter radius of these federal lands were identified and examined based on five socioeconomic variables (race, education, household income, occupation, and local heritage). These CBGs were then compared with the remaining CBGs in SA that were outside the 1,500-meter radius. Results show that a negative relationship exists between income and occupation and location of a number of federal tourist sites. CBGs with a low-income, blue-collar makeup were significantly more likely to be situated within the 1,500-meter radius than outside. Additional study should determine the desirability of tourism-based land use with respect to factors such as urban sprawl, noise, and pollution.

INTRODUCTION

Background

In 1994, President Clinton issued a mandate (Executive Order 12898) requiring all federal land management agencies to assess the impacts of their programs with regard to policies and practices in the context of environmental justice (Federal Register 1994). Many of these federal lands play an important role in providing tourism opportunities, and as such, any impacts (costs and benefits) associated with these opportunities should be addressed within Executive Order 12898. Examples of these benefits include attracting tourism demand, resource-based income (i.e., timber production), and outdoor recreation-generated income. Examples of the costs include noise, pollution, and urban sprawl associated with infrastructure and tourism development (e.g., hotels, condominiums, etc.) (Lundberg, Krishnamoorthy, and Stavenga 1995).

Environmental justice may be defined in several ways when assessing it in the context of federal tourism site location. If a federal tourism site is perceived as being a locally undesirable land use (LULU), the crowding and resultant pollution experienced in communities in close proximity to the tourism site may result in a lower quality of life for local

inhabitants. This may be especially true for those who live in town or on major thoroughfares. Lewis (1997) has indicated that many highways were purposefully built through non-white neighborhoods. In addition, during the initial development of the site, individuals are inevitably displaced from homes and land that they have lived on for years and, in some cases, for generations. For example, in the Chattahoochee National Forest near Helen, Georgia (a town with a tourism-dependent economy), families who made a living through logging, farming, and other occupations once inhabited the forest area. When the National Forest acquired this land, these families had to leave their homes and land. This impoverished white population has historically been a population with little voice or power in the political arena (Gibson 1996). Similarly, in 1855, a community named Seneca Village was displaced to allow for the development of New York City's Central Park (Martin 1997). Seventy percent of its 284 residents were African American. The discriminatory practices against this population are common knowledge. In addition, the site may attract visitors who bring with them negative behaviors. Littering, loud radio playing, and abuse of the resource have been documented as negative behaviors at a federal tourism site (Ruddel and Gramann 1994). These factors would likely infringe on the quality of life for local residents. The negative aspects of federal tourism sites would likely cause their locations in specific communities to be perceived as issues of environmental justice.

Alternatively, federal tourism sites may represent locally desirable land use (LDLU) to local populations. The positive economic impact of tourism on a community has been well documented (Lundberg, Krishnamoorthy, and Stavenga 1995; Eadington and Redman 1991). Some residents may view the jobs created by tourism as outweighing the negative aspects. However, only those who are able to invest in and run businesses may experience the major impacts of this benefit. Therefore, the economic boost and resulting profits may be directed at middle and upper classes, while the blue-collar workers and the unemployed receive little, if any, additional benefit. Also, the open space and recreational opportunities that these sites afford local residents have been documented as positive (Turco and Lee 1996; Allen 1991). Therefore, the

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location of these sites near one community and not another may represent environmental injustice for the community or population that is denied the resource.

Purpose

This study uses an environmental justice framework to determine whether certain socioeconomic and racial groups are discriminated against with respect to the distribution of federal tourism sites. Census block groups (CBGs) within 1,500 meters of these sites in the Southern Appalachian (SA) region of the United States are examined to see if residents' status differs significantly from those outside a 1,500-meter perimeter. The identification of these CBGs is accomplished through the use of geographic information systems (GIS). The data and the results are interpreted to determine whether inequality exists with regard to the location of the federal tourism sites.

Theoretical Framework

Environmental justice has traditionally been studied in the context of LULUs such as prisons, industry, and toxic waste sites under the assumption that the closer individuals live to a site, the higher are the perceived and real costs of locating a LULU there (Lober 1996). These costs consist of threats to the economic, social, and physical safety of the residents in the surrounding community. In 1990, the U.S. Environmental Protection Agency established an environmental equity taskforce to determine whether minority communities were more commonly exposed to waste facilities. Since then, a number of studies have found that race was a primary discriminating factor in the siting of these LULUs (Bullard 1994; Bullard and Wright 1992). A study by Mohai and Bryant (1992) found that nonwhite residents in Detroit were four times as likely as white residents to live within one mile of a hazardous waste facility. In addition, Hamilton (1995) found that zip codes of neighborhoods that were targeted for expansion of hazardous waste facilities between 1987 and 1992 had a higher percentage of minority residents than did those zip codes without plans for expansion.

A number of studies have looked at the relationship between income and the location of LULUs (Hamilton 1995; Kriessel, Centner, and Keeler 1996; Mohai and Bryant 1992). The siting of pollution sources has also been found to be inequitable with respect to median income in addition to race (Mohai and Bryant 1992). Kriessel, Centner, and Keeler (1996) found that impoverished neighborhoods were associated with a higher degree of exposure to environmental risks. Lavelle and Coyle (1992) found that waste site cleanup took longer in poor, as well as minority, neighborhoods. Also, poor and minority neighborhoods are shown to have a higher exposure to air pollution and hazardous waste facilities than are more affluent communities. To the contrary, Hamilton (1995) concluded that the possibility existed that the siting of the pollution sources occurred first. As a result, housing prices dropped, which attracted low-income homebuyers. Therefore, the residents may have been willing to trade environmental risks for the opportunity to own their own home. Regardless, most findings indicate that discrimination occurs with regard to race and income in the siting of LULUs.

While most studies of environmental justice have looked at locally undesirable land uses, little attention has been

given to the concept of studying environmental justice in the context of land uses such as recreation sites or tourist destinations. As mentioned previously, these can have both negative and positive consequences for the communities they border. For instance, a group of homeowners in Bloomington, Illinois, signed a petition to prevent a hiking trail from being developed near their subdivision (Turco and Lee 1996). In opposition, outdoor recreation-oriented land use is cited as locally desirable because it attracts tourism. Tourism has the potential to revitalize local economies by attracting money and jobs to rural communities (Eadington and Redman 1991; Lengkeek 1995; Lundberg, Krishnamoorthy, and Stavenga 1995). In the single study that linked environmental justice and parks siting, Wemett and Henderson (1998) found that "a striking lack of park space exists, as well as a lack of diversity in what is available, in areas inhabited by less affluent persons or persons of color" (p. 31). The opposite was found to be true in white or affluent neighborhoods, leading to the conclusion that recreation sites are unequally distributed when considering race and income.

The concept of studying environmental justice and the effects of tourism sites has received very little attention, yet racial and economic groups can be discriminated against by the location of tourism sites if these sites are seen to improve the quality of life for local residents. Parks and natural lands provide opportunity for local residents to enjoy solitude, relaxation, and contemplation and to engage in desired recreational activities. In addition, they may add to the attractiveness of an area or raise land prices for those who live on their immediate borders. Alternatively, if recreation sites are seen to attract crowds of tourists and their resulting negative impacts (and these impacts outweigh the benefit of increased revenue), then the location of them near nonwhite or impoverished communities may represent environmental injustice. Therefore, not only must the problem of social inequity and outdoor recreation land use be considered but also the question of what type of land use is considered desirable.

Methodological Approaches

Two primary methodological approaches were used in the previous studies of environmental justice: spatial analysis and statistical analysis. This study follows this methodological approach.

Spatial Analysis

Early environmental justice studies sought to determine the proximity of certain economic and/or racial groups to locally undesirable land use. GIS presents a powerful and sophisticated tool in analyzing the spatial relationships between different geographical phenomena in the form of points, lines, or areas. This power lies in the ability of GIS to collect, store, analyze, and display geographic data (DeMers 1997). The resulting information can be examined visually or analyzed using statistical methods to compare or contrast phenomena. Because of the versatile nature of GIS, the processes can be performed quickly, providing results that would be otherwise time-consuming or impossible if done using analog maps (DeMers 1997). Johnson (1990) found GIS to be a useful tool in natural resources studies because of its ability to perform analysis of spatial overlay. With this process, two maps can be layered and data analyzed using

processes such as spatial proximity, the topology of two geographic phenomena. Also, the distance of two geographic phenomena from one another can be calculated using GIS.

Because the use of GIS in the context of environmental justice is relatively new, only a few studies have employed it as a method of determining spatial relationships. Stockwell et al. (1993), using GIS and the Toxic Release Inventory database, found that a large number of toxic chemicals had been released into areas of high population density in eight southern states. They noted the usefulness of this GIS database in interpreting and explaining the health risks to the general public due to chemical exposure. Wemett and Henderson (1998) used GIS to combine aerial photography, demographic, demand analysis, and land cover data and found that parks are less likely to be present in areas of low-income or minority populations. These data were then analyzed, and paper maps were created with GIS software.

Although the use of GIS techniques, software, and hardware is a new method of analysis in the travel and tourism field, a few studies have been conducted. Ribiero de Costa (1996), for example, used GIS to create a map of tourism potential in the Mediterranean area of Europe. The results indicated that a great deal of tourism potential existed in the area, supporting the assumptions of local authorities. This study also had environmental justice implications. The areas studied were economically depressed and suffered from chronic unemployment. Tourism was seen as a panacea for these ills. Lovett, Brainard, and Bateman (1997) used GIS to develop a model oriented toward predicting the number of visitors to a recreational woodland in England. Using this model, they found that residents of large towns tend to travel further for woodland recreation. They concluded that GIS would significantly improve the calculation of distances and times in recreation demand modeling.

Statistical Analysis

Early environmental justice studies used simple correlation to determine the relationships between race and/or income with land use. Correlational analysis was not appropriate for the purposes of this study because the procedure cannot be used to analyze the relationship between several variables simultaneously. Multiple regression, however, allows the effects of a number of independent variables to be studied together. Recent studies have used multiple-regression techniques (i.e., logistic) to combine variables of race and income in studying environmental justice (Hamilton 1995; Hird 1993; Kriessel, Centner, and Keeler 1996). Logistical regression approaches have been emphasized because, in most cases, the dependent variable was dichotomous. The spatial entities being studied were either within or outside the 1- to 1.5-mile radius of a LULU. Kriessel, Centner, and Keeler (1996) found poverty to be a "robust explanation for patterns of exposure to toxic releases" (p. 490) using logistic regression analysis on CBGs. Hamilton (1995) used the geographic area of zip code neighborhood, finding that neighborhoods near waste facilities had nonwhite populations of 25% versus 18% elsewhere. Hird (1993) analyzed demography at the county level by using Tobit analysis and found a higher percentage of nonwhite population in counties with waste facilities than without.

Objectives of Study

Federal tourism sites can be classified as desirable land uses if they are seen to represent beautiful and pristine land or if they bring rejuvenation to the local economy through the tourism demand they create. Alternatively, these tourism sites can be seen as undesirable if the tourism demand produces noise, pollution, and urban sprawl. Regardless of desirability, the issue of environmental equity with respect to the allocation of these federal tourism sites exists. For example, are CBGs with higher proportions of low-income or nonwhite population more or less likely to be in close proximity to federal tourism sites than CBGs with lower nonwhite and low-income populations? Our study sought to examine the following two objectives:

1. to describe, for SA, five socioeconomic characteristics—median household income, race, education, heritage, and occupation—of CBGs contained within 1,500 meters of each of six types of federal tourism sites;
2. to identify the relationship between CBGs within a 1,500-meter radius of federal tourism lands and facilities and those outside this radius to determine whether any environmental injustice exists in the siting of these federal areas.

METHOD

Study Area

Data from the Southern Appalachian Assessment (SAA) GIS Database (version 3.0) (Hermann 1996) were used to spatially locate and represent federal tourism lands (national parks, forests, and recreation areas; wilderness areas; campsites; and recreation areas exceeding capacity). The SA region reaches from the Potomac River in the north and includes the mountain regions of Alabama, Georgia, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia, covering 37 million acres and including 135 counties. The area is a primary source of drinking water for the Southeast, and it contains the headwaters of nine major rivers. Seventy percent of the SA is covered by forest, 18% by pastures, and 3% by croplands (*Southern Appalachian Man and the Biosphere [SAMAB]* 1996). Almost 17% of the land is publicly held and managed partially by the U.S. Forest Service (12.2%), the National Parks Service (2.2%), and state agencies (1.5%) (*SAMAB* 1996).

Six Types of Federal Lands Used for Tourism

The six federal tourism land use sites examined in our study were the following: (1) national forest service lands (NFS), (2) national parks service lands (NPS), (3) national recreation areas (NRA), (4) wilderness areas (WA), (5) campsites (CAMP) in the above federal lands, and (6) recreation areas exceeding capacity (REC) (areas in the above lands where rangers have subjectively decided that use has exceeded the biological carrying capacity, causing resource deterioration). Other federally managed lands such as wild and

scenic rivers and national scenic areas were not included in the study because they were absent or minimally present ($n = 1$).

National recreation areas are managed by various federal agencies and represent land set aside specifically because of its utility for recreation and tourism activities. Likewise, wilderness areas are managed by different federal agencies but receive no development in terms of roads or facilities. Recreation areas exceeding capacity are overused or overcrowded sites (i.e., bare campsites, overused trails). Locational and spatial data for these land use variables were gathered from the SAA database.

Five Demographic Variables

There were five demographic variables considered in the study: (1) median household income was a continuous-level variable measured in dollars per household, (2) race was categorized as white versus nonwhite, (3) education was college graduate versus noncollege graduate, (4) heritage was local (i.e., having lived in the same county since 1985) versus nonlocal (i.e., lived in different county than present since 1985), and (5) occupation was white collar (professional, technical, managerial, clerical, and sales occupations) versus blue collar (all other occupations).

The demographic data were retrieved from the 1990 Census Summary Tape File (STF3) of the U.S. Bureau of the Census (1990). The data were grouped in geographic neighborhoods of CBGs. The CBG is the smallest scale at which most census data have been measured. CBGs represent a combination of census blocks, containing about 250 to 550 housing units. All census block groups within the SA region were selected ($n = 5,487$).

Spatial Analysis

Using Arc View GIS software, version 3.1 (Environmental Systems Research Institute 1996), maps were created by layering the shape file of a land use variable over the shape file of all the CBGs in the SAA region. A shape file is a digital file consisting of one layer of mapped geographic information, usually with only one theme. For example, in this study, a shape file of national forests consists of a digital image of all the national forest lands in the SAA region mapped in their exact geographic location and proximity to one another. This can be layered with the CBG shape file, and the two can be analyzed in unison. Layering refers to placing one shape file on top of another in context of their geographic coordinates. The NPS, NFS, NRA, and WA variables were represented spatially as polygon areas (a border and the area contained within it). Their attribute information included data on location and size (acres). The REC and CAMP variables were represented as a point coverage (no area) with attribute information of location (single geographic coordinate pairs). All CBGs were represented as polygon coverages with attribute information on size and location.

After a view was created, CBGs within 1,500 meters of the chosen land use variable were selected. The 1,500-meter¹ radius was chosen as the proximity criterion to be consistent with recent GIS/environmental justice research that has done the same (Hamilton 1995; Hird 1993; Kriessel, Centner, and Keeler 1996; Tarrant and Cordell 1999). The CBGs selected were then exported to be analyzed in SPSS, version 8.0 (SPSS 1996) as database (.dbf) files. Those CBGs outside the

1,500-meter radius were then selected using the File: Invert Selection command and exported as database files.

Statistical Analysis

Once the relevant CBGs were selected, the data contained in each were analyzed using logistical regression in SPSS, version 8.0 (SPSS 1996). Logistical regression is used to predict a dichotomous dependent variable from a set of (linear and/or dichotomous) independent variables. The logistical model identifies the odds of an event occurring, defined as the ratio of the probability that the event will occur to the probability that the event will not occur. Hamilton (1995) used logistical analysis in an environmental justice study. In this analysis, the dependent variable was assigned a "dummy" variable of 1 if a CBG was within 1,500 meters of an outdoor recreation site (e.g., campground, wilderness area, etc.) and 0 for those CBGs where no sites were located. The independent variables were percentage nonwhite, percentage white-collar occupation, percentage local, and household income in dollars. A significance level of $p = .05$ was used for all statistical tests.

RESULTS

Descriptive Findings for the Entire SA Region

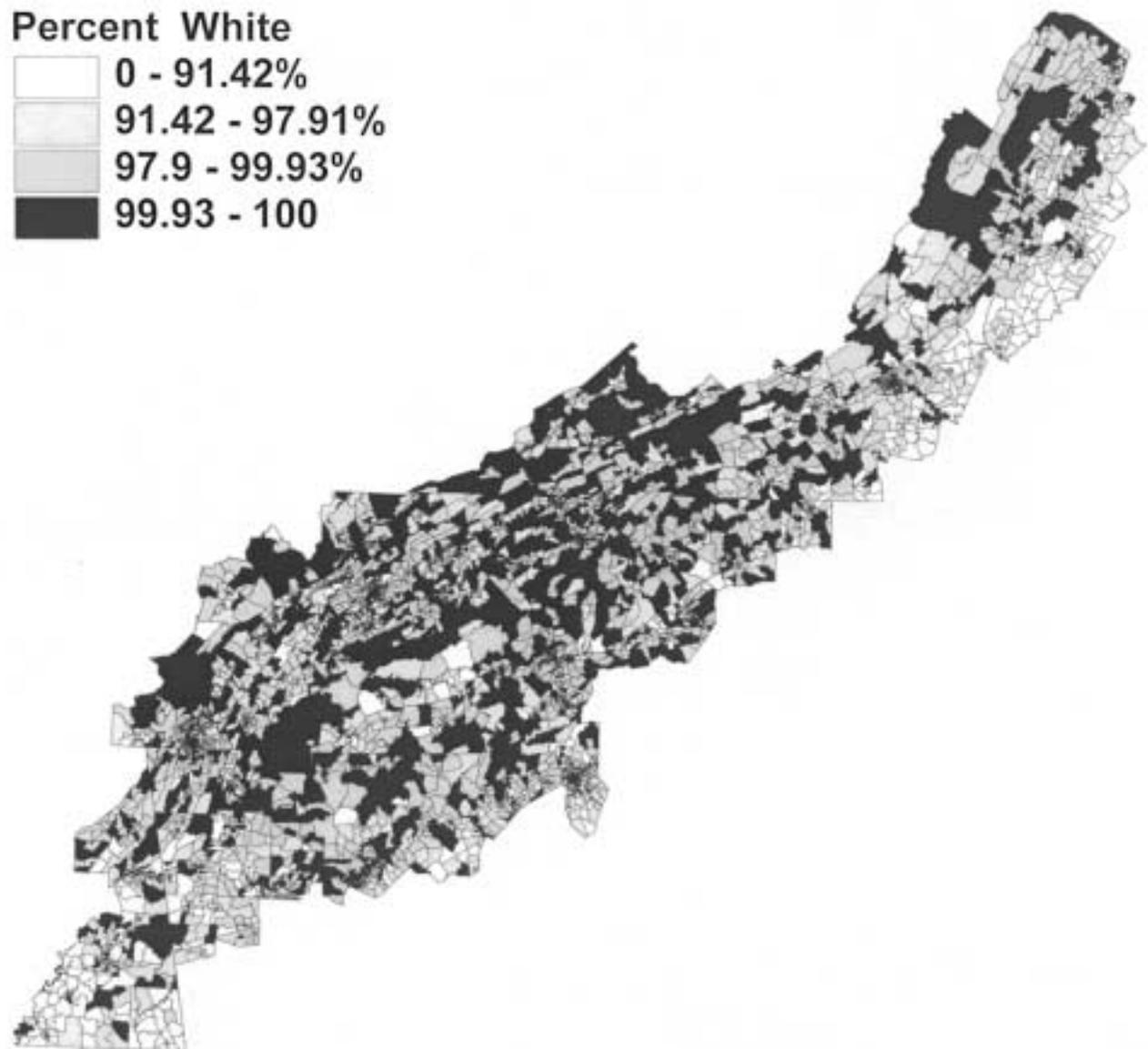
There were 5,487 CBGs in the SA region. Figures 1 through 5 show the dispersion of the demographic variables across the SA region. The demographic sample was composed of mostly whites (mean = 91.0%, $SD = 18.0\%$), local heritage (mean = 81.2%, $SD = 13.1\%$), and noncollege graduates (mean = 66.4%, $SD = 18.3\%$). The mean household income was almost \$25,000 ($SD = \$9,704$), and slightly more than half of the sample was made up of blue-collar workers (mean = 53.9%, $SD = 17.4\%$).

The SA region contains 58 national forest areas, 7 national parks, and 8 national recreation areas. In addition, there are 48 wilderness areas, 234 recreation areas exceeding demand, and 218 campsites. Figures 6 through 7 show the locations of these federal tourism sites. These areas represent varying degrees of preservation/conservation as the national parks, wilderness areas, and national recreation areas are more preservation oriented, and the national forests are more conservation or multiple-use oriented. The recreation areas exceeding demand represent overused or abused areas, while the campsites represent established areas for camping.

Objective 1

Median household income ranged from a low of \$19,366 for CBGs surrounding national recreation areas to a high of \$23,268 for CBGs within 1,500 meters of national parks. Percentage of college graduates was lowest near national recreation areas and highest near campsites (20.3%-32.8%). The highest number of individuals of local heritage was near national recreation areas (85.8%); the lowest was near campsites (79.5%). The lowest percentage of white individuals was found near campsites (89.3%) and the highest near national recreation areas (98%). The percentage of people with white-collar occupations ranged from 37.2% near

FIGURE 1
 PERCENTAGE OF WHITE RESIDENTS PER CENSUS BLOCK GROUP IN THE SOUTHERN APPALACHIANS



campsites to 44.4% near national recreation areas. Table 1 shows the means and standard deviations of demographic variables for the CBGs located within 1,500 meters of the various federal land use variables.

Objective 2

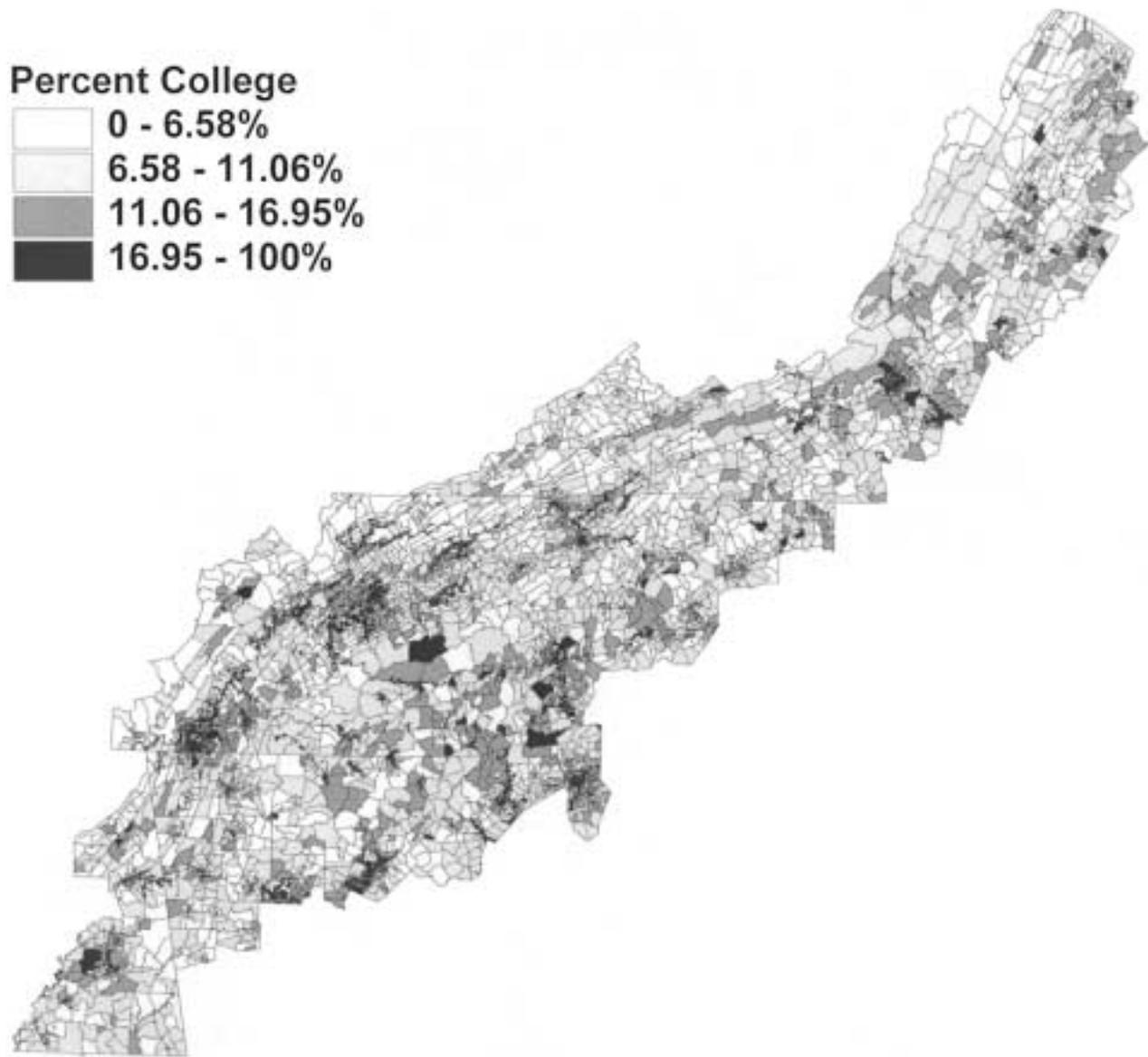
Of the five independent variables examined, race and income demonstrated the most significant relationships with the federal lands. Race was found to be a factor in the spatial distribution of all recreation sites with the exception of national parks ($r = .09$ to $.15$); the CBGs surrounding the selected sites had a higher percentage of whites than did those outside the 1-mile perimeter. Also, percentage white collar was negatively related to national forests and national recreation areas ($r = -.10$ to $-.12$). Thus, the percentage white collar was higher outside the 1,500-meter perimeter. The

tourism areas indicating the highest relationship were the national forests, which demonstrated a positive relationship with percentage local, white, and college ($r = .03$ to $.14$). A negative relationship attributed to income was also observed with respect to campsites, national forests, national recreation areas, and recreation areas exceeding capacity ($r = -.06$ to $-.10$). Table 2 shows the standardized regression coefficients for selected sites.

CONCLUSIONS AND IMPLICATIONS

This study examined the demographic variables of CBGs located within 1,500 meters of federal tourism sites. Results suggest significant relationships between race, median

FIGURE 2
PERCENTAGE OF RESIDENTS HAVING ATTENDED COLLEGE
PER CENSUS BLOCK GROUP IN THE SOUTHERN APPALACHIANS



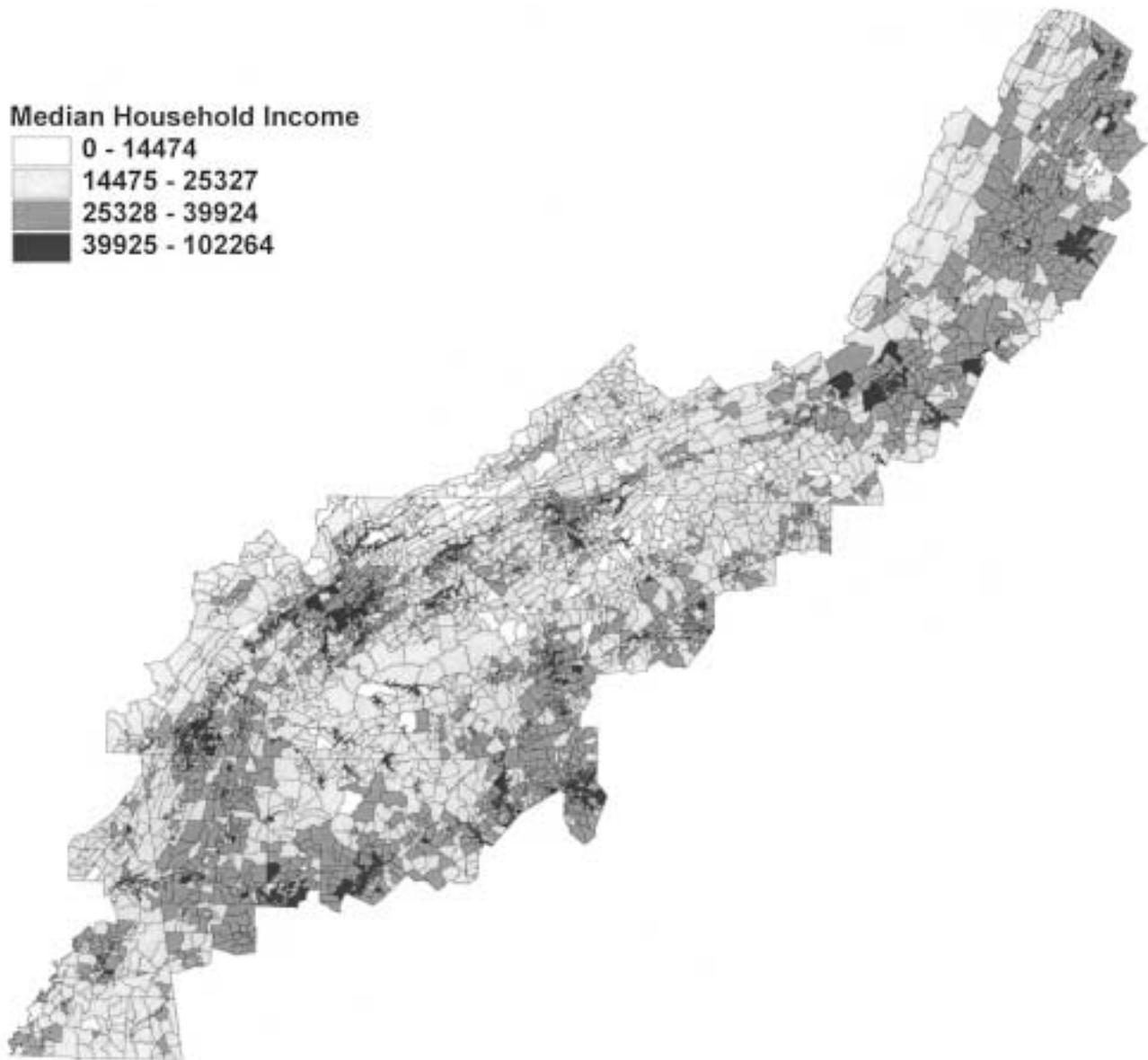
household income, and occupation and location of various federal tourism sites (i.e., national forests, wilderness areas). Put in context with past studies of environmental justice, in which a higher percentage of nonwhites was closer to undesirable land uses, the occurrence of predominantly white people with blue-collar occupations with lower incomes near tourism sites may indicate that some inequality exists. Future studies should explore the relationship of specific types of sites to the specific demographic makeup of local residents.

Our results suggest that the present location of federal tourism and recreation areas may be advantageous to white populations and disadvantageous to minority populations. However, we do not believe that these lands were sited through intentional discrimination. These results support a number of earlier studies in which race was found to be the

primary factor in the situation of individuals near LULUs (Hamilton 1995; Mohai and Bryant 1992). If one considers federal lands to have positive benefits in terms of solitude, recreational opportunities, and aesthetics, then inequality may or may not exist when race is concerned. If one considers the benefits (e.g., solitude, recreational opportunity, employment) of living next to a national park, then unarguably this inequality most certainly exists. However, when put in context of the costs (e.g., urban sprawl, noise, congestion) of living near a national park, this inequality may diminish.

Tourism development, in the form of hotels, amusement parks, specialty shops, and so on, is considered to provide a positive economic impact on communities (Eadington and Redman 1991; Lengkeek 1995). However, the negative

FIGURE 3
MEDIAN HOUSEHOLD INCOME OF RESIDENTS PER
CENSUS BLOCK GROUP IN THE SOUTHERN APPALACHIANS

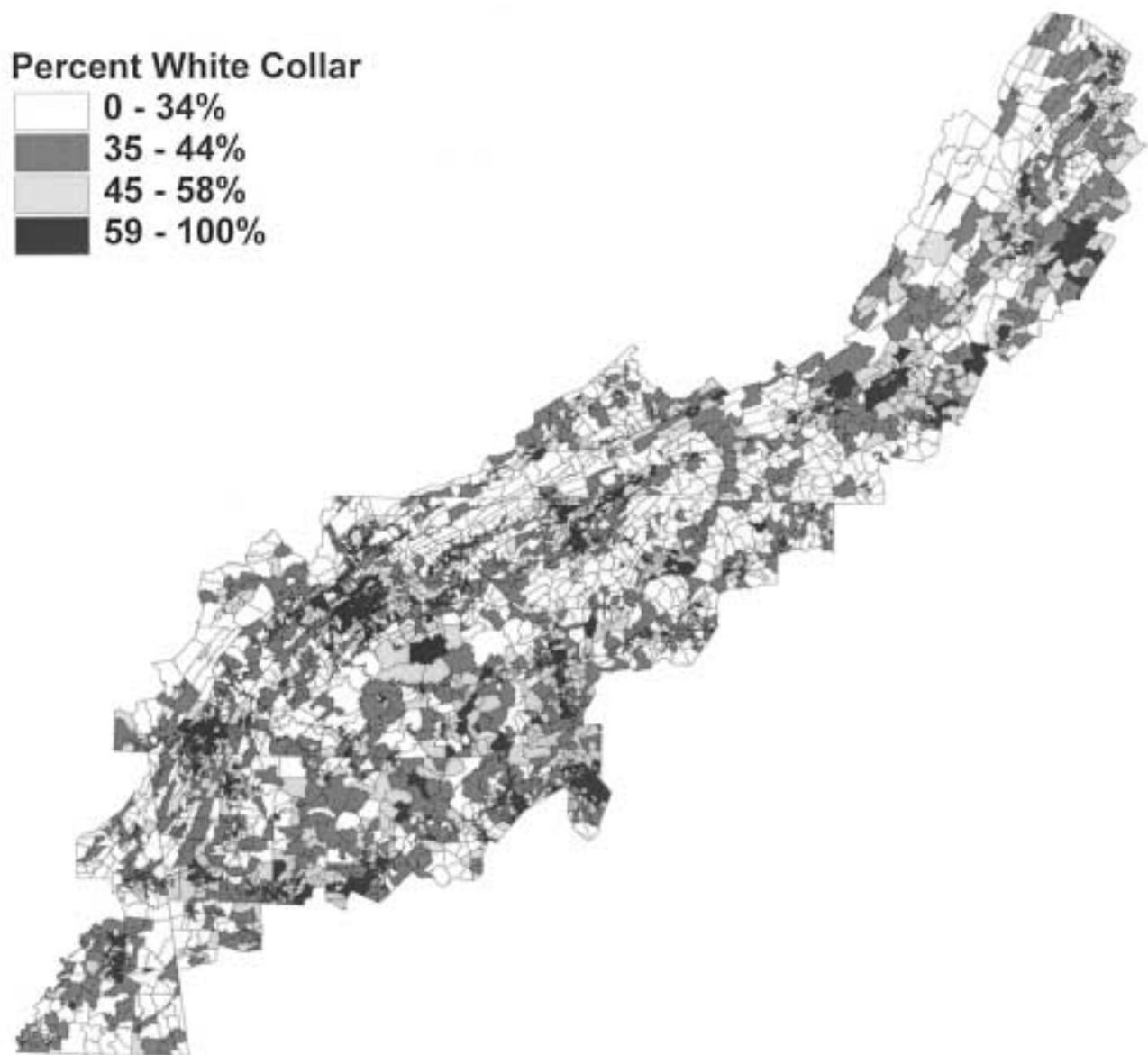


correlation of percentage white collar with three types of sites (NRA, WA, and NF) indicates that the employment in these tourism areas is not of a white-collar nature. Additional support for this conclusion may be indicated by the data, which suggest that income is lower on average within the 1,500-meter perimeter of campgrounds and national recreation areas than it is outside it. Our results suggest that tourism, while providing a positive impact on the local economy in terms of revenue, may not provide positive benefits for people in terms of job quality and personal income. This is the case in many tourism areas similar to the ones examined in this research. The results of this study tend to confirm this point.

Previous research on the costs and benefits of tourism seems to indicate that while tourism may revitalize the local

economy, it does not provide a positive impact on the types of jobs created and the income they provide. Eadington and Redman (1991) suggest that when tourism is introduced to a community, the immediate positive economic impact is usually a result of new construction. Also, a lasting impact results from tourism revenues arising from purchased goods and services. "The job and income creation that results is typically viewed as a benefit" (p. 50). This revitalization of the economy also indirectly supports the production sector of the local economy by providing an opportunity to replenish purchased goods or raw materials used in construction. Lengkeek (1995) also notes that while tourism is a threat to the environment, it does maximize economic profits and is a source of income and work. In addition, many texts list a number of benefits associated with tourism, which invariably

FIGURE 4
PERCENTAGE OF RESIDENTS IN WHITE-COLLAR OCCUPATIONS IN THE SOUTHERN APPALACHIANS



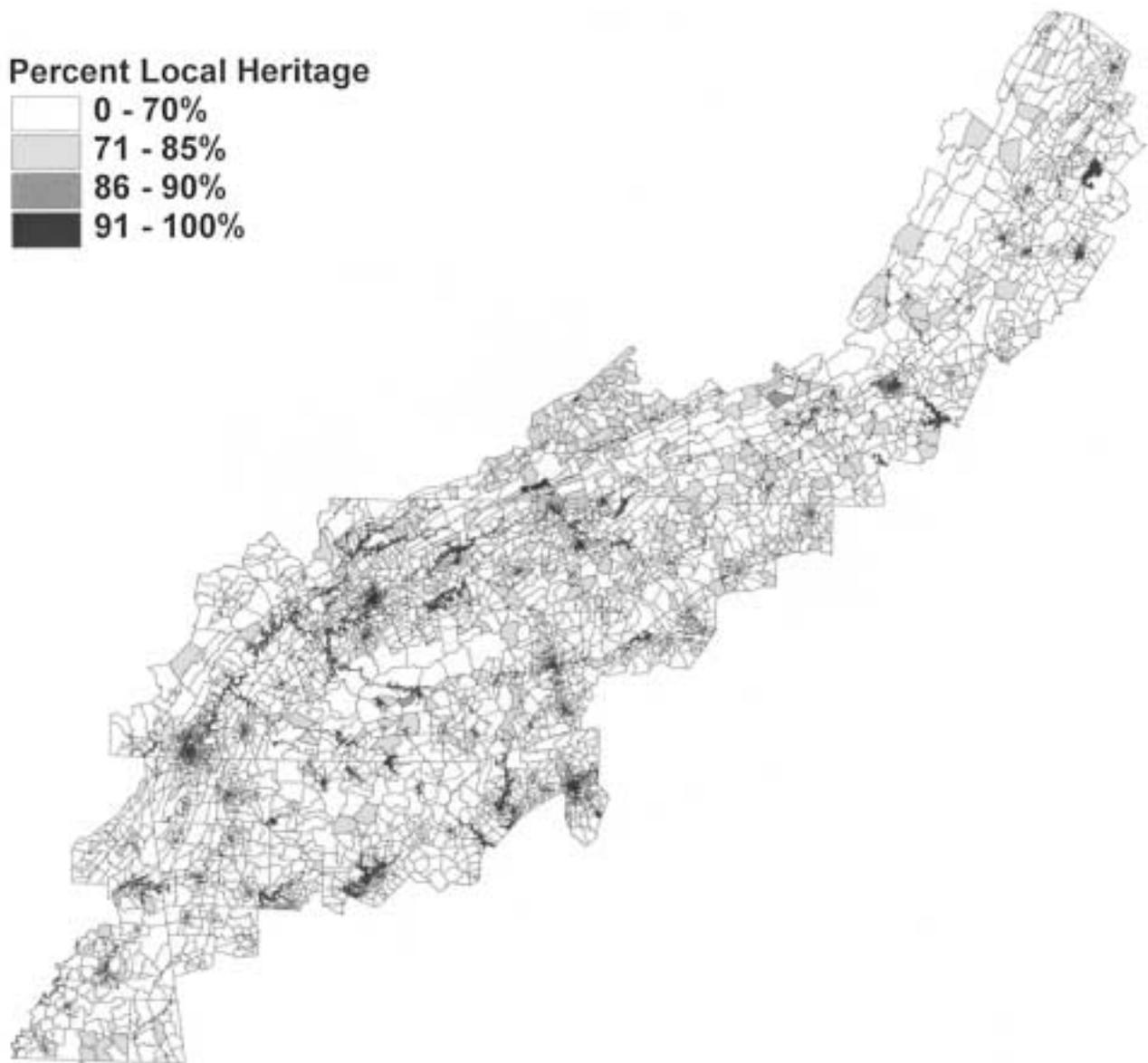
include income and employment generation (McIntosh and Goeldner 1990; Wahab and Pigram 1997). These texts make little, if any, mention that the jobs created pay minimal wages to the individuals who perform them.

At least one past study supports our assertion. LaFlamme (1979) found that the benefits of tourism went to the white portion of the population in the Bahamas. While blacks made greater relative gains in income, the white population increased in both wealth and influence as a result of tourism. However, black entrepreneurial activity had not yet taken advantage of the opportunities presented by tourism.

More recently, Lundberg, Krishnamoorthy, and Stavenga (1995) stated that while tourism may bring in income and employment, the jobs generated are often in the service sector and pay less than half of those in the manufacturing and industry sectors. They do, however, include management

positions with salaries that can be quite high. Tooman (1997b) found that in two SA region counties (Swain County [North Carolina] and Sevier County [Tennessee]), the advent of tourism saw the percentage of the population below the poverty level *increase* between 1970 and 1990, while the state averages of those under poverty level decreased. These counties are on the edge of Smoky Mountain National Park, a federal tourism resource considered in our study. A second study by Tooman (1997a) presented a stronger illustration of this phenomenon. This study showed that while tourism did provide employment and income, most of the jobs created were those requiring low-skill or unskilled labor associated with blue-collar work. Another consequence that Tooman found was high average and seasonal unemployment. Thus, not only were the jobs produced by tourism of a low-wage, blue-collar nature, but they were also highly unstable and

FIGURE 5
PERCENTAGE OF RESIDENTS OF LOCAL HERITAGE IN THE SOUTHERN APPALACHIANS



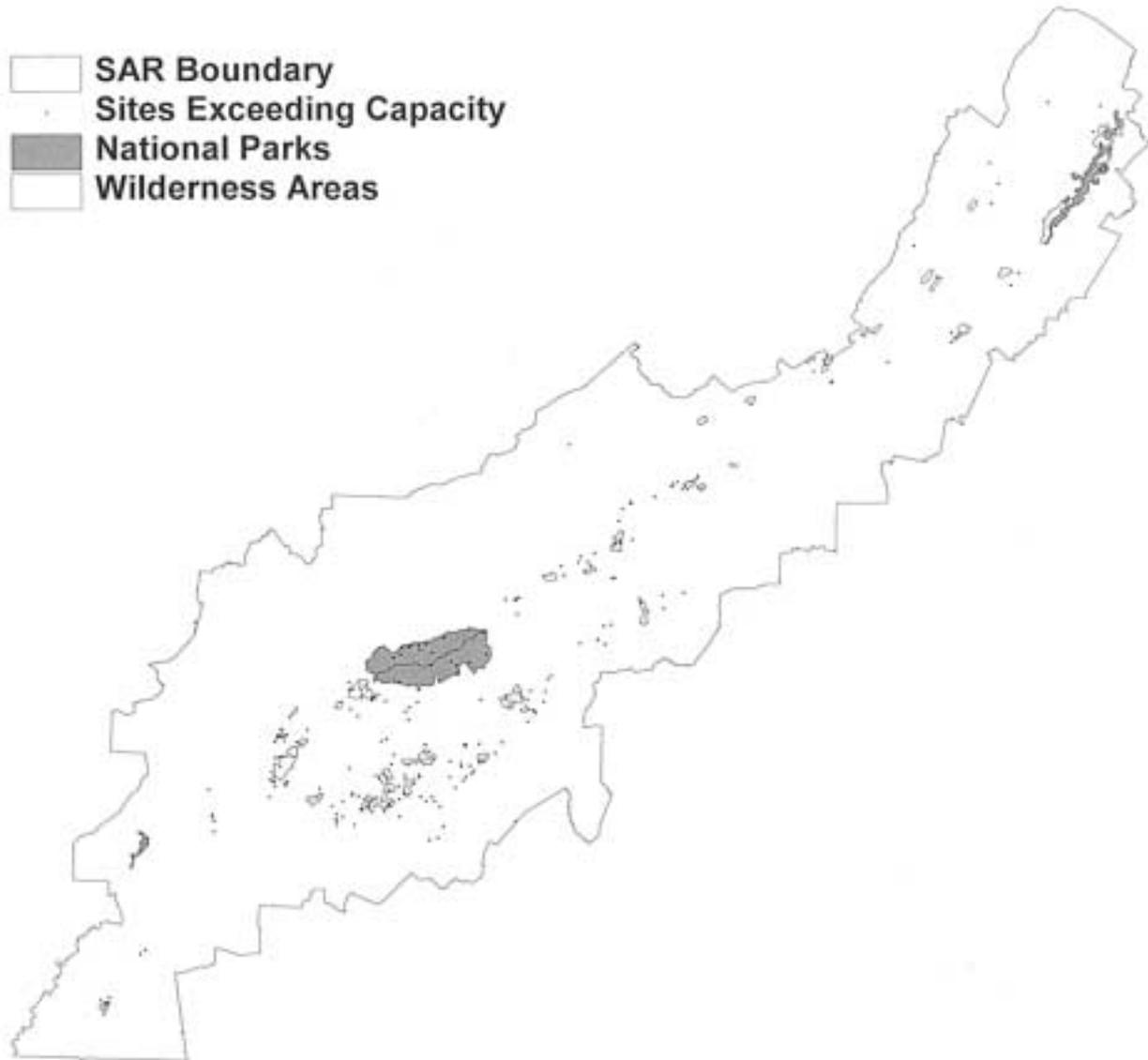
unsustainable. He also found that the increase in land use devoted to tourism (i.e., motels, malls, specialty stores, second homes) drove up land prices, making low-income housing scarce. In addition, economic diversity was diminished, causing the economic sustainability of the communities to be threatened by their reliance on tourism as a principal source of viability. The results of our study and the ones related above suggest that communities and research should take a harder look at the costs of tourism alongside its benefits.

In addition to confirming previous studies that looked at the concept of social inequity with regard to tourism, this study provides a solid basis for future inquiries into social-demographically related studies of tourism. The spatial analysis performed allowed us to select and analyze CBGs within a 1,500-meter radius of federal tourism lands on a number of variables. The versatility of the GIS program employed allowed great latitude in deriving data that were

easily converted and analyzed statistically. The spatial analysis was performed by placing a layer of federal lands of a specific type (e.g., national forests) on another layer covering demographic data (CBGs) (see Figure 8). CBGs that were within the selected radius were then selected and analyzed, as were those outside the radius. By combining different layers of data together, we were able to simultaneously analyze both geographic and demographic data. This represents a powerful method for analyzing the data in unison. Therefore, this method allowed for a complex study to be performed on a large base of data in a relatively quick and simple manner. For this reason alone, this study succeeds in providing tourism researchers with a new method for analyzing seemingly incongruent data.

In addition, we were able to use secondary data that prevented the costly and time-consuming process of collecting demographic data on more than 5,000 CBGs—a task that

FIGURE 6
LOCATIONS OF SITES EXCEEDING CAPACITY, NATIONAL PARKS,
AND WILDERNESS AREAS IN THE SOUTHERN APPALACHIAN REGION



would be wasteful, if even possible, without GIS technology. A further benefit of the method used is that it is easily reproduced in different situations with different data. Therefore, researchers and managers can take advantage of this method in future studies to save time and money. Few studies have been performed in the area of tourism using GIS (Lovett, Brainard, and Bateman 1997; Ribiero de Costa 1996). The fact that the use of this method served to strengthen the findings of previous studies indicates that it will be a useful tool for tourism researchers in the future.

Limitations

First, the sample had a nonwhite population that was on average lower than the national average (9% as opposed to 16.1% nationally). Therefore, environmental justice compa-

risons made to this study from areas elsewhere in the United States should take this into consideration. Second, the sample area is representative only of the Southern Appalachians. The federal lands studied are in most cases great distances from urban, metropolitan areas. Studies performed on federal lands closer to urban areas may produce different results. Therefore, the generalizability of this study is limited.

Third, the extent to which outdoor recreation/tourism land uses are locally desirable or undesirable has yet to be determined. Factors such as solitude and aesthetic beauty make recreation areas a desirable land use. But, to the extent that they attract tourist crowds and air or noise pollution, they may be perceived by local residents as undesirable uses of land. Further study must be done on this issue to determine both resident perception and actual impacts on the land.

FIGURE 7
LOCATIONS OF CAMPSITES, NATIONAL FORESTS, AND
NATIONAL RECREATION AREAS IN THE SOUTHERN APPALACHIANS



Implications

Tourism is often considered one way of sustaining or building local economies. Placing tourism and outdoor recreation opportunities at the center of a local economy will have far-reaching long-term effects for the citizens of that community. The study of spatial relationships that influence this development and affect the community in both positive and negative ways is necessary to determine both desirability and undesirability of specific recreation-oriented land uses. The results of our study back previous research, which suggests that environmental injustice exists with respect to income and job quality surrounding tourist areas (Tooman 1997a). Thus, the reliance on outdoor recreation and tourism by a community will have limited effect on raising incomes in rural areas. The increase in individuals living barely above or below the poverty level then contributes to an increase in

public social welfare payments. These payments cause increased taxes. Therefore, more research is needed both on the community and national levels to further illuminate the cost-benefit relationship attributed to tourism and outdoor recreation.

Other factors that communities turning to tourism as a means of economic viability should consider in this process include the undesirable issues of crowding, traffic, overdevelopment, and noise (Lundberg, Krishnamoorthy, and Stavenga 1995; Tooman 1997a). Positive factors for local citizens may include the recreation facilities themselves, job creation, and preservation of natural land. However, these factors and their relationship to the local demography may also be seen as negative.

As mandated by President Clinton, federal agencies that manage lands should also begin to look at the effects their

TABLE 1
SUMMARY OF MEANS AND STANDARD DEVIATIONS FOR CENSUS
BLOCK GROUPS WITHIN 1,500 METERS OF FEDERAL TOURISM SITES

Variable	Median Household Income (\$)	% Local	% White	% White Collar	% College
National Forest Service					
Mean	23,020	83.4	96.1	40.7	29.1
Standard deviation	6,888	9.9	8.2	13.7	13.8
National Parks Service					
Mean	23,268	80.9	92.8	41.2	27.2
Standard deviation	6,428	10.3	18.4	13.7	11.9
National recreation area					
Mean	19,366	85.8	98	31	20.3
Standard deviation	3,700	8.6	3.1	7.1	6.3
Campsites					
Mean	22,547	79.5	89.3	44.4	32.7
Standard deviation	8,651	14.8	19.2	16.6	18.3
Wilderness areas					
Mean	22,690	83.5	97.6	37.2	25.6
Standard deviation	5,626	8.4	4.8	9.9	10.2
Sites exceeding capacity					
Mean	22,590	82.4	97.2	38.7	28.4
Standard deviation	7,195	9.3	8.6	12.5	12.7

TABLE 2
SUMMARY OF REGRESSION WEIGHTS FOR FEDERAL
TOURISM SITE VARIABLES PREDICTING SOCIOECONOMIC STATUS

Variable	Median Household Income (\$)	% Local	% White	% White Collar	% College
National Forest Service					
<i>R</i> -value	-.0647***	.0360**	.1473***	-.1089***	.0488***
Standard error	.0000	.0036	.0043	.0040	.0041
National Parks Service					
<i>R</i> -value	.0000	-.0687*	.0000	.0000	-.0698*
Standard error	.0000	.0098	.0077	.0118	.0129
National recreation area					
<i>R</i> -value	-.0728*	.0000	.0985**	.1193**	.0000
Standard error	.0000	.0177	.0387	.0175	.0223
Campsites					
<i>R</i> -value	-.1028***	-.0524***	.0000	-.0053	.0084
Standard error	.0000	.0032	.0020	.0038	.0039
Wilderness areas					
<i>R</i> -value	.0000	.0000	.1115***	-.1023***	.0000
Standard error	.0000	.0086	.0180	.0094	.0105
Sites exceeding capacity					
<i>R</i> -value	-.0413*	.0000	.1186***	-.1238***	.0423*
Standard error	.0000	.0069	.0136	.0078	.0081

* $p < .05$. ** $p < .01$. *** $p < .001$.

practices have on the local population. The data in this study indicate that the jobs created directly and indirectly through their management activities are not sustainable for the general population. Also, since the population within a 1,500-meter radius of these lands was found to be predominantly white, managers should consider the social implications of both their management activities and their hiring practices.

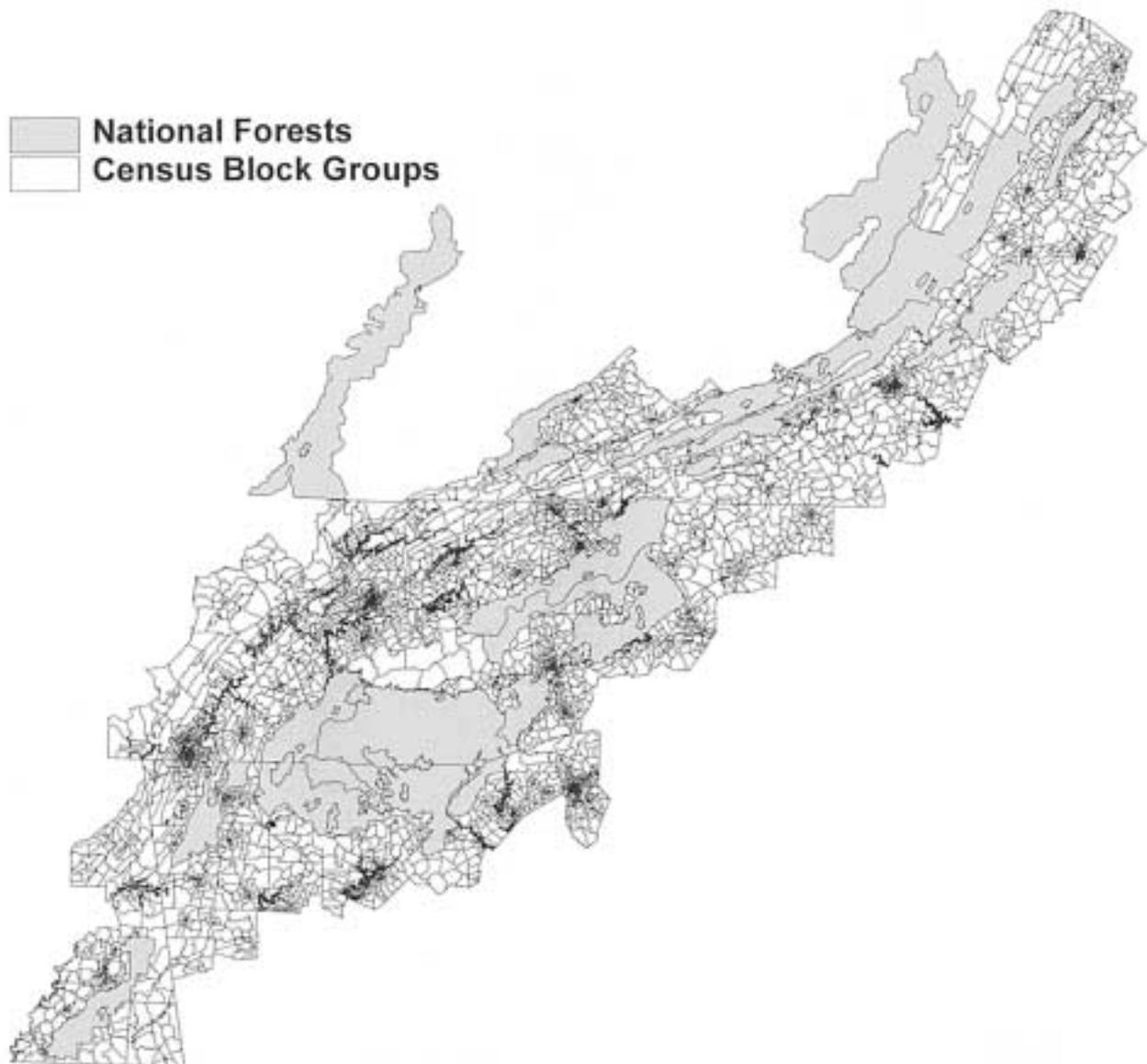
In addition, the relationship between LDLUs and socioeconomic variables should be further explored to build a conceptual basis for what types of land use constitute desirable land use in the outdoor recreation/tourism context. Con-

sequently, further study would be beneficial in determining the relationships between land used for outdoor recreation (LULU or LDLU) and demographic factors. Of importance as well is the determination of whether federal tourism resources are in fact desirable land uses.

NOTE

1. One mile has been established by traditional environmental justice studies as the appropriate distance for judging the effects of land use on the local population. For the purposes of this study, we

FIGURE 8
LAYER OF NATIONAL FOREST DATA ON LAYER OF CENSUS BLOCK GROUP DATA



could have set this distance at 2,000 meters, 5,000 meters, or possibly further, but no previous support exists for doing so. Therefore, we set the distance at 1,500 meters, in keeping with previous environmental justice studies within and outside the context of outdoor recreation/tourism.

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