RACIALIZED TOPOGRAPHIES: ALTITUDE AND RACE IN SOUTHERN CITIES*

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ABSTRACT. This study examines altitudinal residential segregation by race in 146 cities in the U.S. South. It begins by embedding the topic in recent theorizations of the social construction of nature, the geography of race, and environmental justice. Second, it focuses on how housing markets, particularly in the South, tend to segregate minorities in low-lying, flood-prone, and amenity-poor segments of urban areas. It tests empirically the hypothesis that blacks are disproportionately concentrated in lower-altitude areas using GIS to correlate race and elevation by digital elevation-model block group within each city in 1990 and 2000. The statistical results confirm the suspected trend. A map of coefficients indicates strong positive associations in cities in the interior South—where the hypothesis is confirmed—and an inverse relationship near the coast, where whites dominate higher-valued coastal properties. Selected city case studies demonstrate these relationships connecting the broad dynamics of racial segregation to the particularities of individual places. *Keywords: environmental justice, residential segregation, urban housing, U.S. South.*

Do minorities tend to live disproportionately in low-lying parts of cities? The question appears straightforward, yet its determination involves a complex multitude of epistemological and methodological issues pertaining to the social construction of urban space and the dynamics of residential segregation. Although a small body of literature is concerned with the impacts of altitude and topography on urban dynamics—all of it analyzed from positivist or empiricist vantage points—the relationships between altitude and the location of different ethnic communities has remained unexamined (for example, Willie 1961; Montz and Gruntfest 1986; Meyer 1994; Arguea and Hsiao 2000).

This article explores the altitudinal zonation of blacks and whites in southern cities. It opens with a brief review of the pertinent literature on natural hazards, topography, and environmental racism, seeking to overcome the analytical differences that have thwarted the effective integration of these topics. Particular emphasis is placed on the social construction of risk, joining the chorus that seeks to denaturalize "natural" hazards. It then points to the specific context of southern cities, in which residential housing, labor markets, and institutionalized racism conspired to relegate African Americans to the most low-lying, flood-prone, and amenity-poor regions. The article does not explicitly attempt to examine the racial dynamics of floods; rather, it argues that low-lying regions tend to be more flood prone—and historically more likely to be at risk for diseases such as malaria—and occupied by residents in lower-priced housing, who all too often tend to be minorities. The altitudinal distribution of risk is mirrored in the distribution of environ-

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mental amenities such as views and access to clean air. Environmental vulnerability is thus an outcome and proxy for the racialized economic dynamics of the housing market. The study uses GIS to analyze these relationships empirically, using data from 1990 and 2000 to statistically test whether the relationship between altitude and race holds in 146 cities of the South. Selected brief case studies of individual cities point out the relationships between race and altitude in light of local histories; two cities defy the general trend, in that whites tend to occupy higher-priced riverfront and coastal areas. The empirical analysis points to the need to reintegrate the physical landscape into contemporary urban geography.

Toward Integrating Topography and Race

Contemporary geography has exhibited a sustained engagement with social theory, and the products of this encounter include a widespread "denaturalization" of many phenomena once assumed to lie outside the domain of human control. As topics—including gender, poverty, the body, and culture—have fallen sway to social constructivism, the discipline has recently shown renewed appreciation of how social relationships are intertwined with the physical environment (Fitzsimmons 1989; Gerber 1997; Proctor 1998). Much of the geographical literature on this issue has revolved around the social construction of nature (N. Smith 1990; Castree 2000, 2001), a perspective that refutes the long-standing assumption that nature lies "outside" the domain of human affairs. Rather, by enfolding nature into the social relationships of material practice and discourse, the biophysical environment is depicted as shaped, molded, and even created through human action. "Nature," it seems, is no longer "natural." By jettisoning the artificial dualism between "humans" and "nature"—a schism manifested in the unfortunate bifurcation between "physical" and "human" geography—theorists in the discipline working within the broader domain of social theory and political economy have called for renewed attention to issues in which social and ecological concerns are intertwined, including matters of social and environmental justice (Harvey 1996).

Simultaneously, geography has witnessed a remarkable fluorescence of work centered on questions of race and ethnicity (Sanders 1990; Boswell 1993; P. Jackson 1987, 1989; Jackson and Penrose 1994; Kobayashi and Peake 1994, 2000; Bonnett 1996; Dwyer 1997; Mains 2000; Delaney 2002). In contrast to outdated hegemonic ideologies that depicted race and racial inequality as "natural" and hence immutable, contemporary perspectives on racial relationships maintain that they are simultaneously economic, political, cultural, and discursive relationships that shape individual and collective life chances and identity (Holloway 2000). By contextualizing race as an ideology—as a socially constructed relationship, not a biologically determined "given"—this literature has illustrated the complex ways in which race is constructed, experienced, and negotiated in everyday existence, how it intersects with class and gender, and the manner in which racial relationships of domination and subordination play out over space and time. Like gender, racial and ethnic identity is fundamentally a power relationship that typically reflects, reinforces,

and naturalizes existing lines of inequality, although it may also challenge hegemonic norms (Cornell and Hartmann 1998). Thus race, like nature, cannot simply be viewed as an asocial, biologically given relationship. Race may be illusory in that it is socially created, but, as Linda Peake and Richard Schein note (2000), its effects are nonetheless quite "real": Denaturalizing race thus unmasks the power relationships that construct it socially and discursively. Because racial and ethnic identities are important in social reproduction, individual and collective identity, and the allocation of resources over space and time, race and racism are simultaneously material and discursive processes that reflect and constitute social relationships and places.

Everyone in a society, including whites, has a racial identity. Recent works on geography and whiteness reveal that it too is socially constructed in ways that render it invisible, as the "default option" against which "ethnic" identities are assessed (Bonnett 1997; P. Jackson 1998; Dwyer and Jones 2000). The "naturalness" of whiteness—the assumption that it is not an ethnicity, hence not constructed, a position that equates ethnicity with nonwhites—is a large part of the power of institutionalized racism. Laura Pulido points out that racism also takes the form of white privilege, the existence of which is typically rendered invisible. Racism can be intentional or unintentional, although, as she notes, "by reducing racism to a hostile, discriminatory act, many researchers . . . miss the role of structural and hegemonic forms of racism in contributing to such inequalities" (2000, 12).

Despite geography's flourishing interest both in the social construction of nature and in matters pertaining to race and place, connections between these two lines of thought remain surprisingly infrequent. Traditional environmentalism tended to focus on the nonhuman world, and the literature on race—studiously avoiding any hint of the environmental determinism that was long used to justify racial inequalities—has turned a blind eye to matters of nature. The United Church of Christ's Commission for Racial Justice offered a path-breaking study that in many ways initiated the study of environmental justice and injustice (1987). A growing body of work has sought to combine analyses of the environment and race by uniting the struggles for environmental preservation with those seeking to protect the rights of minorities (including issues such as minority public health concerns—for example, residential concentrations near hazardous waste sites and lead exposure of children); by focusing on environmental quality (for example, air pollution) in minority urban neighborhoods; and by addressing racial inequalities in the impacts of various environmental problems (for example, vulnerability to natural hazards), including ecological degradation in the developing world. Environmental racism and environmental justice are topics that have generated a lively literature (Bryant and Mohai 1992; Bullard 1994; Cutter 1995; Pulido 1996, 2000; Pulido, Sidawi, and Vos 1996; Westra and Lawson 2001). Such works often point to the relative lack of political power afforded to minorities, a major contributor to their enhanced vulnerability to hazards, toxins, pollutants, and other threats to health, comfort, safety, and environmental quality of life (Heiman 1996). In this reading, race/ethnicity,

class, and the environment are fused in such a way that the resolution of any one set of problems necessarily invokes the resolution of others.

This study is concerned with the ways in which the dynamics of racial segregation in housing markets have played out across the landscapes of southern cities with respect to topography and altitude. Although residential segregation along topographic lines probably occurs in many regions of the United States, southern cities constitute a useful study area for the exploration of this topic by virtue of the unique historical trajectory of the region, the legacy of slavery, its relatively high proportion of African Americans, and the especially contentious political relationships between blacks and whites, often characterized by widespread, overt, and virulent white racism. The South thus offers a meaningful region in which to investigate this topic, given its long, sad history of adverse race relationships and continued occasional racial strife. Although similar arguments and observations may pertain to cities elsewhere in the United States, the historical durability and unique character of southern race relationships is particularly important in the context of the issues analyzed here.

The analysis focuses on the central issue: whether historically disenfranchised African American communities have been relegated to low-lying topographic areas in their respective cities while their white counterparts have commandeered higher elevations. The issue of altitude is important to understanding the quality of urban life because low-lying areas typically have low property values and are disproportionately swampy and flood prone, whereas higher-elevation areas usually have higher property values, are less susceptible to hazards, and command amenities such as views (Palmquist 1992; B. Smith 1994; Arguea and Hsiao 2000; Paterson and Boyle 2002). Low-lying areas have historically often been rendered—or interpreted—as aesthetically unattractive, disease ridden, frequently situated near railroad lines or deindustrialized sites such as abandoned warehouses, and tending to suffer smog inversions. Conversely, higher-elevation places more often than not escape these negative externalities. This is not to suggest that low-lying regions are universally prone to hazards while higher-elevation ones escape such difficulties. But evidence indicates that the higher one lives—literally—within a city, the more likely one is to be free of floods, smog, and proximity to noxious land uses (Holway and Burby 1993).

The geography of race and urban topography are fused: Compared with whites, blacks should be expected to be disproportionately concentrated in lower elevations. The conceptual point of departure is not some form of renewed environmental determinism; rather, this article approaches the topic from within the recent traditions of the social construction of nature and environmental justice. Nor should such a hypothesis be taken as evidence of a simple conspiracy on the part of whites; rather, the complex, contingent forces that generate racial residential segregation, including mortgage availability, exclusionary zoning ordinances, and informal discriminatory pressures, have facilitated the occupation of relatively high-altitude places within cities by whites, whereas black or African American residents have

found themselves relegated to communities in typically less desirable, lower-altitude areas. By connecting white privilege to living at higher elevations, the study seeks to uncover the ways in which the broad dynamics of institutionalized racism are intertwined with the local physical topography of individual places.

A growing body of literature concerned with the social construction of vulnerability has denaturalized "natural" hazards by pointing to the power relationships that underlie and accompany uneven distributions of social resources (Marston 1983; Platt 1999). Kenneth Hewitt's pathbreaking *Interpretations of Calamity* (1983) argued that the very notion that natural hazards were "natural," in the sense of being removed from the social construction of advantage and disadvantages, was deeply misleading and legitimated technological solutions that failed to address the issue in class terms. Neil Smith and Phil O'Keefe (1989) initiated a scathing review of conventional perspectives that simply omit references to social categories, and Piers Blaikie and others (1994) decisively demonstrated that hazards can only be defined relative to the vulnerability of different social groups. Whereas most work concerning natural hazards has paid scant attention to questions of race, a body of work does examine the vulnerability of minorities to environmental risk, particularly floods (for example, Montz and Gruntfest 1986). In the Latin American context, Mark Pelling and Erik Swyngedouw examined the political ecology of urban water flows in Guyana and in Guayaquil, Ecuador, respectively (Pelling 1999; Swyngedouw 1997). In North America, Mike Davis's (1998) litany of disasters in Los Angeles noted that African Americans in the city's south-central part were at greater risk to floods than whites. Thus, the disproportionate exposure of African Americans to flooding constitutes a form of environmental injustice.

A political economy approach emphasizes that "environmental perils . . . do not exist independently of society because those perils are defined, reshaped, and redirected by human actions" (Mileti 1999, 18). Risk is the estimated probability that a given group is exposed to a hazard; vulnerability reflects how well a place and its occupants resist or withstand a given hazard's impacts (Cutter 1996; Cutter, Mitchell, and Scott 2000). Roger Kasperson and others define vulnerability as "the differential susceptibility to loss from a given insult" (2001, 8). This also invokes newer, less well-understood concepts such as resistance (the ability to absorb impacts and maintain functioning) and resilience (the ability to recover after impacts). Thus the topology of risk and environmental uncertainty is never simply given but is socially constructed and experienced through relationships of class, gender, and race/ethnicity.

The multiple, complex, contingent ways in which the literal shape of the urban physical topography reflects and sustains racialized social relationships have largely escaped serious scholarly scrutiny. If the ties between race and urban physical form have been overlooked, the close, positive relationship between altitude and income or property values has long been noted by urban economists and geographers. William Meyer, noting that "geographers from otherwise conflicting theoretical traditions have united in disregarding the physical environment as a factor in city form"

(1994, 507), pointed out that in the 1920s Ernest Burgess, famed for the concentric ring model, also sketched another, less well-known model that stressed amenities such as high-altitude views in residential location decisions. Hans Blumenfeld (1948) demonstrated that housing values rise consistently proportionate to their elevation within urban areas. Charles Willie (1961) found a close, positive relationship between elevation and a composite socioeconomic index in Syracuse, New York. Richard Solomon (1969) uncovered much the same result for Hobart, Australia in 1847, 1901, and 1954. In a multitude of contexts it is evident that higher-elevation locales command higher residential rents and are occupied by persons with comparatively higher disposable incomes. None of these earlier works, however, dealt with the dynamics of racial segregation that accompany and reinforce these observations, particularly from the vantage point of contemporary urban political economy, or used contemporary methodologies such as GIS.

Racial Segregation and Topography in Southern Cities

"No discussion of the settlement patterns of the American people," noted Kenneth Jackson in *Crabgrass Frontier,* "can ignore the overriding significance of race" (1985, 289). American cities exhibited a differentiation between blacks and whites throughout their history, a pattern intertwined with class and one that accelerated dramatically with the waves of white flight to the suburbs following World War II. A vast ocean of literature has explored urban residential racial segregation (for example, Clark 1986; Galster and Hill 1992; Massey and Denton 1993; Farley 1995; Smith and Feagin 1995; Jacoby 1998; van Kempen and Ozuekren 1998; Gotham 2000; S. Meyer 2000; Squires and O'Connor 2001; Krysan and Farley 2002; Quillian 2003), particularly the key role played by redlining and discriminatory mortgage practices (Holloway 1998; Coffey and Roberts 1999).[1]

Often such works focused on the sharp boundaries between "chocolate cities" and "vanilla suburbs" (Farley and others 1993). Early work by Harold Rose examined the geography of the black ghetto as well as subsequent modest suburbanization by some African Americans (Rose 1971, 1976). Minorities have remained clustered in inner cities primarily because of their access to low-wage, relatively unskilled jobs—which reflect the urban division of labor and the agglomeration of labor-intensive functions there—the presence of public housing, and the constraints they face to suburbanization (low incomes, restrictive covenants, minimum-lot-size zoning). Concern for the inner-city "underclass" centers on high unemployment and poverty rates, crime, drug addiction, the collapse of the nuclear family, and similar associated predicaments (W. Wilson 1987; Kasarda 1989; Cohen and Dawson 1993; Cutler, Glaeser, and Vigdor 1997). Other works have turned to the perpetuation of racial inequality in a globalized, post-Fordist urban economy (McCall 2001). Although this literature is invaluable in understanding poverty in large cities, equally important dynamics in smaller cities lower in the urban hierarchy have received much less attention. Very few such studies have included the environment, hazards, or the physical landscape as factors intertwined with the empirical patterns of racial

discrimination. The deleterious effects of "spatial isolation" (W. Wilson 1987) on minorities—the frequent disconnect from the propulsive dynamics of the metropolitan economy and exclusion from high-paying jobs, particularly in producer services—have been amply studied, but the distinct influences of topographic isolation—the effects of residential segregation in low-lying areas—have been generally overlooked.

Racial segregation in the South has a long and ignoble history reflecting residues of earlier rounds of segregation stretching back to slavery and the ongoing reproduction of a racist social order (Cobb 1999). In many respects, the formation of minority communities in the South differed considerably from that in the North (Kellogg 1977), including the lack of in-migration that underlay the creation of northern, but not southern, African American working-class districts in the early twentieth century. Many black communities in southern cities took shape after the Civil War and during the long years of Jim Crow (Aiken 1998),[2] in which African Americans—because of low purchasing power, exclusionary zoning, restrictive covenants, and naked oppression—often found themselves consigned to the least desirable areas, many of which were swampy, mosquito infested, prone to smoke from fires, and frequented by floods (Wiener 1979; Silver and Moeser 1995; Hale 1998). John Kellogg noted that "the damp, poorly drained lowlands were of considerably lower value than the better-drained land, owing in some part to the association of bottomlands with disease" (1977, 313). Whites, in contrast, were often able to escape such unpleasantries by settling in higher-elevation locations, many of which afforded views and freedom from floods, railroad lines, and malaria and typhoid fever, often associated with swampy lowlands. In this way, labor and, especially, housing markets conspired to generate a vertical zonation along racial lines, relegating blacks to low-altitude regions and allowing whites to reside above them—economically, discursively, and literally. Robert Bullard (1990), applying environmental racism to the specific context of the urban South, noted how African Americans—by far the region's largest racial/ethnic minority—lived disproportionately in communities routinely targeted for locally unwanted land uses; he went on to point out how southern struggles for environmental equity resembled the civil rights movement. Local governments in the region, often dominated by hostile or indifferent whites, have done little to remedy racial inequities in access to housing, public services, or environmental quality.

Despite five decades having passed since the initiation of the civil rights movement and the end of legalized discrimination and segregation, as well as economic and demographic growth at rates above the national norm, southern cities remain sharply differentiated on the basis of race (Deskins and Bettinger 2002). Many cities saw an increase in their African American populations after decades of decline as African Americans returned to the South in a reversal of long-standing migration trends; black return immigrants tended to move to historically black neighborhoods (W. Johnson 1975). Thus the segregation of these cities was reinforced even though the institutional barriers of segregation had been lifted. Since the 1960s the repro-

duction of racist geographies occurs not so much through institutionalized, legal channels as through informal and occasionally illegal means, including discrimination at work and in housing markets. Only recently has modest black suburbanization been evident. Reynolds Farley and William Frey (1994) noted that segregation of blacks and whites diminished slightly in the 1980s but remains persistent.

The separate but intertwined worlds in which southern blacks and whites live and work are both reflective and constitutive of unequal economic and social opportunities in various domains of urban life, including housing, schools, and public services, and have dramatic consequences for the quality of life for their respective residents. Although race is frequently claimed to be "declining" in its significance, the fact remains that most southern cities exhibit distinct black and white neighborhoods, to which, recently, an emerging Hispanic/Latino population has been added. In this analysis, a simple distinction between whites and blacks is made, with the caveat that racial identities and relationships are rarely so obviously dualistic.

Empirical Analysis

We collected data for 146 areas classified as urban by the U.S. Census Bureau (2000). These data included demographic characteristics reported at the block-group level and elevation above sea level.[3] The units of analysis for this study are the Census Urban Areas (CUAs), which comprise contiguous, densely populated regions with a minimum of 50,000 residents and a density of at least 2,590 inhabitants per square kilometer (some smaller cities may be included if they are part of a larger metropolitan region). CUAs differ from Metropolitan Standard Areas (MSAs) in that they include only urbanized areas, whereas MSAs are defined along county boundaries and may include large, low-density, and even nonurban spaces.

The demographic data were taken from the 1990 and 2000 censuses. Elevation data were calculated at the block-group level from U.S. Geological Survey digital elevation models (DEMs) (U.S. Census Bureau 2000; U.S. Geological Survey 2000). The area of study was delimited as the southeastern United States, including all states commonly associated with the Confederacy and two—Oklahoma and Missouri—adjacent to it. Combined, the 146 urban areas had 38,447 block groups, which are vector data. The number of block groups ranged from 35 (in Ocala, Florida) to 2,854 (in Dallas–Ft. Worth, Texas). The block-group data for this study consisted of percentage of African American residents, median house value, and median rent. Because race and income are closely related in the United States, in many respects the racial patterns observed here are proxies that reflect the strong class biases also present in American housing markets. Given our focus on racial segregation, the use of race rather than income reflects not only the differential earning and spending abilities of blacks and whites but also the impacts of a variety of other forces, such as formal and informal discriminatory pressures (for example, mortgage lending or zoning laws), different residential preferences between ethnic or racial groups, and other socioeconomic constraints such as education and access to information about housing opportunities.

Elevation data were extrapolated from DEM data to gain the mean elevation of each block group. DEMs are raster data with a spatial resolution of 30 square meters. The incorporation of these data with the vector block groups involved additional processing. Both data sets were merged into a GIS, and zonal analysis was applied for this purpose. Zonal analysis allows for the counting of the elevation values for all raster cells that intersect a particular vector-based, polygon boundary (in this case a block group). These values were averaged to yield the mean elevation of each bounded area. Additional information, such as minimum elevation, maximum elevation, and number of cells intersecting the area, was calculated. The elevations for each block group were then analyzed against the demographic data in order to establish bivariate relationships using a Pearson correlation technique. Block groups designated from the same urban area were analyzed to assess the relationship between race and elevation. Spatial differentiation could then be investigated between cities by examining the strength and significance of each urban area's correlation coefficient.

Race and racism are constituted at multiple spatial scales, ranging from the global economy to the racialized body (Jackson and Penrose 1994; Bonnett 1996; Cornell and Hartmann 1998). Our analysis approaches urban racial segregation and its relationship to altitude through two interrelated scales, including interurban comparisons across the urban hierarchy of the region (146 cities) and intraurban analyses using block-group data. In this way, the effects of various social forces that separate blacks and whites within and among cities can be compared and contrasted.

As Table I shows, the communities examined included a wide variety of cities, ranging from the smallest, Kissimmee, Florida (31,043 in 2000) to the largest, the Washington, D.C. region (3.8 million in 2000). The proportion of residents who were African American ranged in 2000 from 0.9 percent (in Parkersburg, Virginia) to 62.9 percent (in Pine Bluff, Arkansas). The topography of these cities varied widely: The lowest mean elevation was 0.3 meters above sea level (in New Orleans, Louisiana), the highest, 669 meters above sea level (in Asheville, North Carolina). Almost without exception, cities with the lowest relief were located in coastal areas, riverfront areas, and/or in Florida, a state known for its flat topography. House values and rental prices also reflected the diversity of residential options among cities, which had median sales prices ranging from a low of $52,496 to a high of $228,341 in 2000; similarly, mean monthly rents ranged from $280 to $908 in 2000. Any consistent relationship between altitude and race across this spectrum is thus testimony to an enduring, robust relationship that persists across a variety of city sizes, costs of living, and minority communities.

The results of the study include correlations between topographic relief within each urban area and the three sociodemographic variables under consideration (percent black, median house value, median rent) in 1990 and 2000. Selected cities are listed in Table II. Of the 146 cities studied, 51 (35 percent) exhibited statistically significant correlations ($p < .05$) between percent black and mean block-group altitude in 1990, indicating that whites lived at greater elevations than did blacks. Conversely, in 24 cities (16 percent), blacks lived at greater elevations than did whites. In

2000 the highest negative correlations between block-group elevation and percent black occurred in Longview, Texas (–0.65), Alexandria, Louisiana (–0.61), Montgomery, Alabama (–0.59), Albany, Georgia (–0.56), Lynchburg, Virginia (–0.55), Ocala, Florida and Monroe, Louisiana (–0.54), Raleigh, North Carolina (–0.51), and Texarkana, Arkansas-Texas (–0.50). In 2000, 52 cities (36 percent) exhibited a significant, negative relationship between percent black and mean block-group altitude (that is, whites lived at greater elevations than did blacks), and in 25 cities

TABLE I—SUMMARY MEASURES OF VARIABLES USED IN THE ALTITUDE-AND-RACE ANALYSIS OF URBAN AREAS IN THE U.S. SOUTH, 1990 AND 2000

VARIABLE	MEAN	MINIMUM	MAXIMUM
Topography			
Elevation (meters)	669	0.3	930
Relief (meters)[a]	68	1.9	417
1990			
Population	313,473	26,661	3,314,011
Black population	67,882	338	967,600
% black population	20.7	0.1	62.9
Median house value ($)	61,610	32,329	175,678
Median rent ($/month)	397	231	695
2000			
Population	345,518	31,043	3,885,654
Black population	81,916	838	1,101,562
% black population	25.7	0.9	52.6
Median house value ($)	91,300	52,496	228,341
Median rent ($/month)	454	280	908

Sources: Calculated by the authors from data in U.S. Census Bureau 2000.

[a] Relief is the difference between the highest and lowest elevations.

(17 percent), the reverse relationship held. The highest positive correlations (indicating that blacks lived at greater elevations than did whites), included Pascagoula, Mississippi (0.62), Shreveport, Louisiana (0.54), and Lakeland and Spring Hill, Florida (0.51). Notably, all of these—with the exception of inland Shreveport on the Red River—are located on or close to (Lakeland) the coast and exhibit very little relief. The two measures of housing markets—median rents and house values—tend to be inversely related to the proportion of people who are African American, indicating that higher elevations have higher prices and tend to exclude lower-income residents, who, given the racial dynamics of wealth in the United States, disproportionately comprise racial minorities. Table III summarizes the distribution of cities with statistically significant positive and negative relationships in 1990 and 2000 between elevation and percent black, median rent, and median house value, indicating that, despite fluctuations in the status of a few individual cities, the association between race and ethnicity theorized here held constant.

TABLE II—CORRELATION COEFFICIENTS BETWEEN MEAN BLOCK-GROUP ELEVATION AND THREE SOCIAL MEASURES IN SELECTED CITIES OF THE U.S. SOUTH, 1990 AND 2000[a]

	1990				2000			
URBAN AREAS	Percent Black	Median House Value	Median Rent	Number of Block Groups	Percent Black	Median House Value	Median Rent	Number of Block Groups
Albany, Ga.	–0.44*	0.42*	0.31*	76	–0.56*	0.49*	0.27*	69
Alexandria, La.	–0.53*	0.12	0.21	70	–0.61*	0.09	0.07	50
Alton, Ill.	0.35*	–0.31*	0.06	86	0.46*	0.17	–0.03	65
Anderson, S.C.	–0.37*	–0.09	–0.12	47	–0.43*	0.07	0.20	37
Auburn-Opelika, Al.	0.38*	–0.20	–0.04	43	0.45*	–0.62*	–0.32*	39
Augusta, Ga.-S.C.	–0.37*	0.41*	0.38*	232	–0.38*	0.43*	0.25*	171
Austin, Tex.	–0.28*	0.17*	0.36*	489	–0.29*	0.13*	0.40*	456
Baton Rouge, La.	0.31*	–0.25*	–0.11*	327	0.41*	–0.29*	–0.27*	279
Birmingham, Al.	–0.40*	0.41*	0.19*	576	–0.37*	0.39*	0.34*	409
Bryan–College Station, Tex.	0.33*	–0.50*	–0.37*	92	0.33*	–0.58*	–0.50*	75
Burlington, N.C.	–0.17	–0.44*	–0.27*	69	–0.28*	0.25	0.22	57
Columbus, Ga.	–0.40*	0.42*	0.39*	186	–0.43*	0.43*	0.40*	160
Florence, S.C.	0.34*	–0.21	–0.14	55	0.37*	–0.36*	–0.21	50
Ft. Myers–Cape Coral, Fla.	0.40*	–0.51*	–0.47*	214	0.46*	–0.32*	–0.41*	217
Ft. Pierce, Fla.	0.31*	–0.47*	–0.48*	106	0.34*	–0.35*	–0.27*	95
Ft. Smith, Ark.-Okla.	–0.34*	–0.36*	–0.22*	114	–0.42*	0.38*	0.40*	86
Goldsboro, N.C.	–0.43*	–0.35	–0.49*	30	–0.27*	0.09	0.12	24
Greensboro, N.C.	–0.48*	0.31*	0.30*	179	–0.53*	0.19*	0.43*	135
Hattiesburg, Miss.	–0.45*	0.70*	0.35*	62	–0.39*	0.73*	0.43*	44
Kingsport, Tenn.-Va.	–0.25*	–0.17	–0.19	70	–0.36*	0.13	0.08	47
Lafayette, La.	0.42*	–0.44*	–0.39*	107	0.47*	–0.48*	–0.44*	88
Lakeland, Fla.	0.53*	–0.26*	–0.36*	62	0.51*	–0.12	–0.15	59
Little Rock, Ark.	–0.41*	0.60*	0.45*	253	–0.51*	0.61*	0.48*	225
Longview, Tex.	–0.51*	–0.47*	–0.41*	72	–0.65*	0.20	0.21	61
Louisville, Ky.	–0.34*	0.51*	0.37*	781	–0.34*	0.48*	0.40*	611

Lynchburg, Va.	−0.51*	−0.17	−0.35*	114	−0.55*	−0.30*	−0.19	67
Miami-Hialeah, Fla.	0.32*	−0.09*	−0.12*	1,008	0.32*	−0.07*	−0.13*	1,143
Mobile, Al.	−0.46*	0.36*	0.20*	309	−0.47*	0.40*	0.38*	218
Monroe, La.	−0.47*	−0.59*	−0.40	103	−0.54*	0.32*	0.17	87
Montgomery, Al.	−0.50*	0.30*	0.17*	215	−0.59*	0.36*	0.27*	176
Myrtle Beach, S.C.	0.33*	−0.10	0.06	54	0.33*	0.08	−0.10	51
Nashville, Tenn.	−0.32*	0.45*	0.29*	490	−0.33*	0.44*	0.25*	489
Ocala, Fla.	−0.43*	0.51*	0.40	42	−0.54*	0.67*	0.38*	35
Panama City, Fla.	0.28*	−0.20	−0.28*	85	0.36*	−0.07	−0.28*	64
Pascagoula, Miss.	0.58*	−0.40*	−0.15	61	0.62*	−0.53*	−0.21	53
Petersburg, Va.	0.37*	−0.41*	−0.23*	86	0.41*	−0.05	−0.09	74
Pine Bluff, Ark.	−0.34*	0.00	0.24*	98	−0.48*	0.17	0.04	54
Raleigh, N.C.	−0.42*	0.20*	0.31*	178	−0.51*	0.09	0.30*	164
Richmond, Va.	−0.41*	0.30*	0.33*	439	−0.47*	0.28*	0.34*	428
Roanoke, Va.	−0.25*	−0.37*	−0.24*	158	−0.26*	0.54*	0.64*	139
Shreveport, La.	0.43*	−0.17*	−0.14*	249	0.54*	−0.30*	−0.29*	199
Slidell, La.	−0.41*	−0.50*	−0.39*	34	−0.41*	−0.18	0.47*	29
Spartanburg, S.C.	−0.27*	−0.54*	−0.46*	106	−0.26*	−0.21	0.01	84
Spring Hill, Fla.	0.34	−0.14	0.08	30	0.51*	−0.21	0.17	31
Steubenville-Weirton, W.Va.–Ohio–Pa.	−0.48*	−0.66*	−0.62*	68	−0.44*	0.66*	0.37*	52
Tallahassee, Fla.	−0.32*	0.36*	0.24*	128	−0.49*	0.35*	0.28*	125
Texarkana, Ark.-Tex.	−0.55*	0.43*	0.35*	71	−0.50*	0.41*	0.33*	62
Waco, Tex.	−0.45*	0.37*	0.45*	170	−0.43*	0.39*	0.44*	116
Washington, D.C.	−0.45*	0.25*	0.29*	2,182	−0.47*	0.20*	0.32*	2,303
West Palm Beach–Boca Raton, Fla.	0.34*	−0.45*	−0.20*	430	0.26*	−0.42*	−0.15*	514
Wichita Falls, Tex.	−0.33*	−0.26*	−0.27	103	−0.35*	0.11	0.35*	72
Wilmington, N.C.	0.29*	0.28*	−0.11	93	0.24*	−0.26*	−0.18	77
Winston-Salem, N.C.	0.29*	−0.11	−0.03	163	0.26*	0.00	−0.08	131

Sources: Calculated by the authors from data in U.S. Census Bureau 2000.

* $p < .05$

[a] The selected cities correspond to the four categories of greatest significance in Figure 1; the cities in italics correspond to the case studies highlighted in the text.

Figure 1 reveals a surprisingly strong pattern: Inland cities, including towns in Appalachia, the Fall Line of the Piedmont states, the old cotton belt, and those in the western part of the region, exhibited strong correlations in the range between −0.39 to −0.65, indicating a close association between race and altitude. Cities that exhibited significant inverse correlations—indicating that blacks tended to live at greater elevations than did whites—were concentrated in coastal areas, particularly Florida and the Carolinas. To some degree, confirmed by the following case studies,

TABLE III—NUMBERS OF CITIES IN THE U.S. SOUTH IN WHICH CORRELATIONS WITH MEAN BLOCK-GROUP ELEVATION ARE STATISTICALLY SIGNIFICANT, 1990 AND 2000 ($n = 146$)

YEAR	PERCENT BLACK	MEDIAN RENT	MEDIAN HOUSE VALUE
1990			
Positive	24	49	51
Negative	51	30	20
2000			
Positive	25	46	46
Negative	52	25	31

Sources: Calculated by the authors from data in U.S. Census Bureau 2000.

this pattern reflects the proximity of whites to higher-value coastal and waterfront properties. In part, urban areas in Florida may reflect the relatively late date at which housing markets generated patterns of residential segregation; that is, after the end of Jim Crow and the civil rights movement began to open opportunities for African Americans to realize their residential preferences in other areas.

These variations play out across the urban hierarchy of the region as well. Although the black proportion of metropolitan populations is relatively invariant to city size, the distribution of statistically significant correlation coefficients across the urban system indicates a tendency for the racialized dynamics of altitudinal segregation to be manifested more obviously among smaller cities than among larger ones (Figure 2). This observation may be counterintuitive with respect to traditional social ecology: Given the long history of social ecological research that argued that the competitive dynamics for housing space were intensified in the upper tiers of the urban system (Hawley 1950; Bulmer 1984), one would expect higher correlations between race and altitude in larger cities compared with smaller ones. The evidence does not appear to support this assertion.

LOCAL STORIES OF RACE, TOPOGRAPHY, AND HISTORY

Geographers have long taken seriously the local uniqueness of place, the ways in which no social process unfolds in precisely identical manners in varying time and

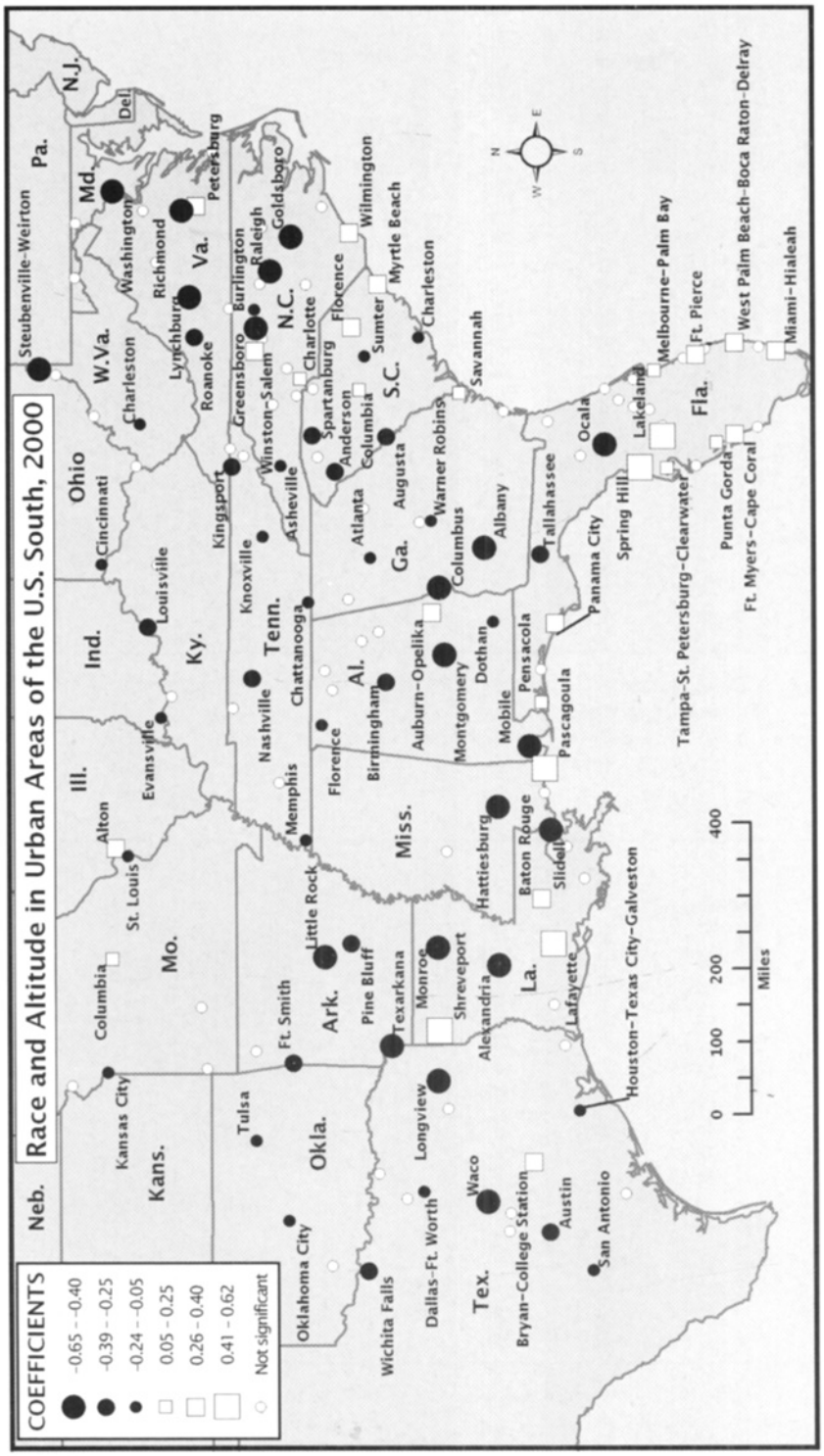

FIG. 1—Correlation coefficients between percent black and mean block-group altitude in urban areas of the U.S. South in 2000. The map reveals that the highest negative correlations—indicating that whites lived at higher elevations than did blacks—are found inland, whereas the highest positive ones—indicating that whites lived at lower elevations than did blacks—generally occur along rivers and coastal areas. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors)

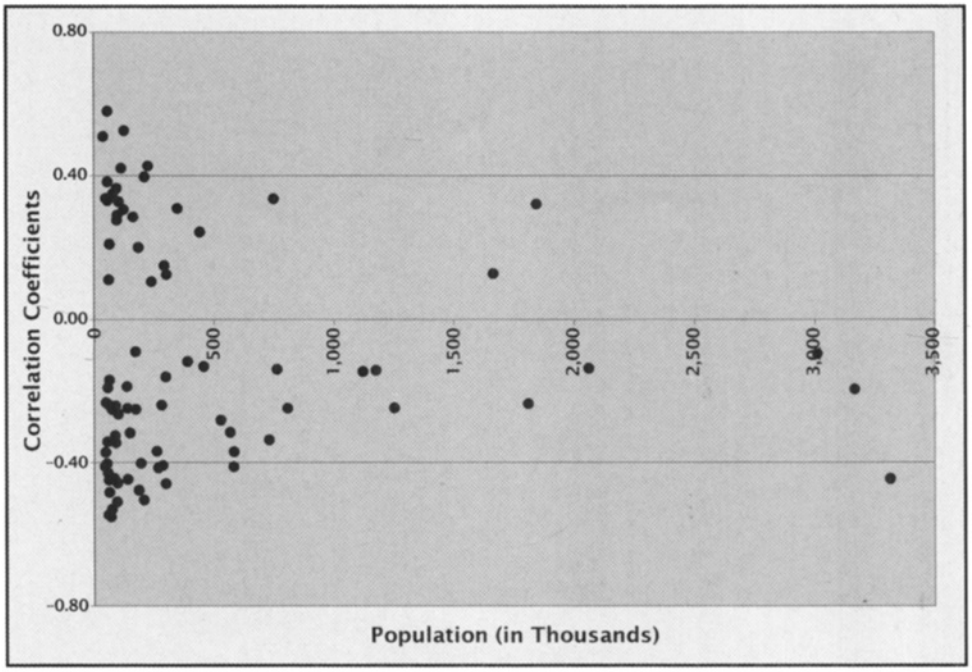

FIG. 2—Scattergram of statistically significant correlation coefficients between percent black and altitude against metropolitan-area population in the U.S. South in 2000. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors)

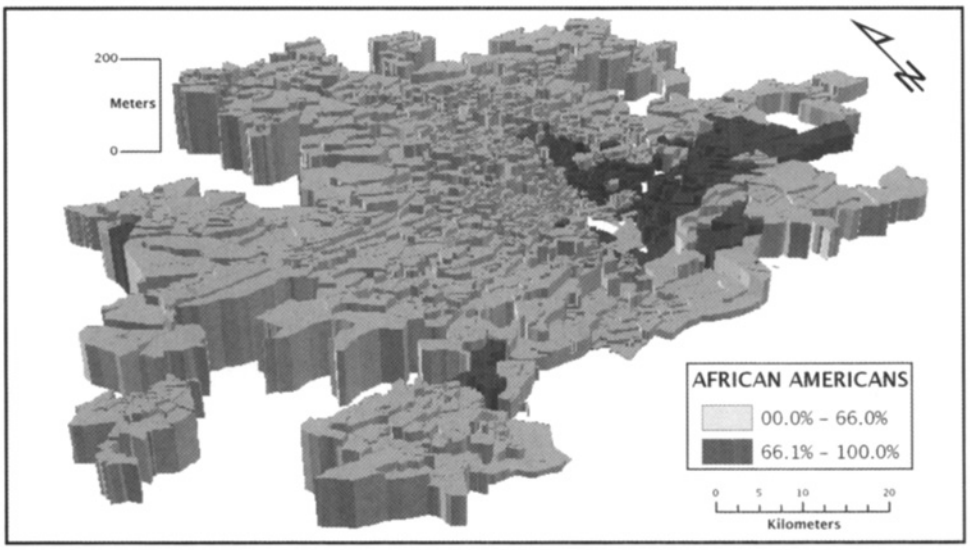

FIG. 3—Race and altitude in the Washington, D.C. Metropolitan Area in 2000 reflected an increasing proportion of white residents on suburban hillsides. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors)

space contexts. To assess the relationships between race and altitude in this light, our analysis turns to brief case studies of several selected cities: Washington, D.C.; Richmond, Virginia; Birmingham and Mobile, Alabama; Waco, Texas; and two communities that defy the observed pattern between race and altitude, Shreveport, Louisiana and Ft. Myers–Cape Coral, Florida. These vignettes illustrate how the generalized processes of racial segregation combine with the specifics of individual locales to offer insights into the constellations of factors and forces that shape each city's landscape over time.

WASHINGTON, D.C.

Washington, D.C., with 3,885,654 people in 2000 (of whom 29.3 percent were African American), was the largest metropolitan area among the cities examined (U.S. Census Bureau 2000). The correlations between percent black and mean block-group altitude were −0.45 in 1990 and −0.47 in 2000. Spatially, this relationship was manifested in the large concentration of African Americans in the city's southeast, whereas whites dominated higher-altitude locales in the city's northwest and those in the southwestern hills of suburban Alexandria, Virginia (Figure 3). Several factors, including discriminatory mortgage-lending practices, contributed to the modern segregated landscape of Washington, D.C. (Squires, Friedman, and Saidat 2002). Although legal segregation has not existed since the Civil Rights Act of 1965 put an end to Jim Crow regulations, Washington, D.C. has exhibited only modest desegregation over the last forty years (Massey and Denton 1993). Access to amenities, shopping, employment, and transportation still disproportionately favor whites over blacks, especially in the neighborhoods east of the Anacostia River (Sigelman and Henig 2001). Since the late nineteenth century, the dirty and polluted banks of the Anacostia River have been the primary location of a large black community in the metropolitan area. In the tradition of political ecology, Brett Williams (2001) examines how the river played a role in the exploitation of Washington, D.C.'s underclass by corporate interests as well as the state, agents whose behavior brought the city to its current state of racial division. After World War II, many public-housing projects were created for black residents near this area. These urban-renewal projects reinforced the racial topography of the nation's capital (Williams 2001). Hence, even in a context in which the state plays a much larger role than it does elsewhere, racial segregation worked to allocate the highest places to whites and the lowest to blacks.

RICHMOND, VIRGINIA

Richmond, Virginia, whose residents in 2000 numbered 818,836, of whom 32.4 percent were African American, exhibited a similar pattern of lower-lying, inner-city black areas and surrounding white-dominated hills (U.S. Census Bureau 2000) (Figure 4). The correlations between percent black and altitude were −0.41 in 1990 and −0.47 in 2000. Richmond has a long history of segregating races by elevation. In the 1880s African American communities formed in the Duval's Addition and

Madison Ward communities, located in a valley bottom and centered on a stream (Kellogg 1977, 318). Fulton Bottom was a white, working-class neighborhood that evolved into a black one as whites moved to nearby Fulton Hill, "above the smoke and dirt of the factories located on the James River" (Kellogg 1977, 318). Richmond was the first southern city to embrace racial zoning in 1910 in the wake of Jim Crow laws passed in the 1890s. Christopher Silver and John Moeser noted that Richmond's local elites used the state to control the expansion of black communities, including annexation of dispersed, low-density areas dominated by rural whites (Moeser and Dennis 1982; Silver and Moeser 1995), a strategy largely uncontested by the city's black leadership (Gavins 1980). African Americans were crowded into the dilapidated houses in the Jackson Ward area, including the Second Street commercial district (Bowen 2003), although the East End and Church Hill absorbed the largest influx of blacks after World War II. Residential discrimination extended into the public arena, including systematic denial of equal opportunities for African Americans (Pratt 1992), and into public policy decisions in the placement of public housing, indicating that not only private housing markets but the state contribute to racial segregation. Sixty-four percent of these public-housing units, built prior to 1970, were placed in the Church Hill area and most of the rest in Jackson Ward. Not only did these decisions further galvanize the racial topography of Richmond, they created a polarization of class within black neighborhoods themselves, with poor black areas located in east Richmond and middle-class residences located in the northeast (Silver 1984). Although the black community is frequently viewed as a homogeneous whole, this spatial differentiation indicates an economic stratification within black communities. In the case of Richmond, rifts in the leadership of the black community from the 1920s forward contributed to the social and spatial stratification of blacks (Holton 1987). Some movement of blacks into the older white suburbs to the north also occurred, exacerbating a growing schism within the African American community between the middle-class and low-income segments. Thus, altitudinal zonation can work within as well as across ethnic and racial lines.

BIRMINGHAM, ALABAMA

With a 2000 population of 913,681, of whom 44.7 percent were black (U.S. Census Bureau 2000), Birmingham, Alabama offers another example that clearly demonstrates racial zonation by altitude. The correlations between mean block altitude and percent black were −0.40 in 1990 and −0.37 in 2000. Henry McKiven (1995) noted that the steel industry that defined the city's economy generated significant upward mobility for both white and black workers, the former trying to preserve their entrenched position of advantage and the latter struggling against a class and racialized system that denied them full equality. Bobby Wilson (1992, 2000) explored in detail the racial dimensions of economic transformation in Birmingham, noting the unique historical trajectory of the South. Slavery retarded the region's industrialization, while social development was inhibited by a lack of liberal notions of

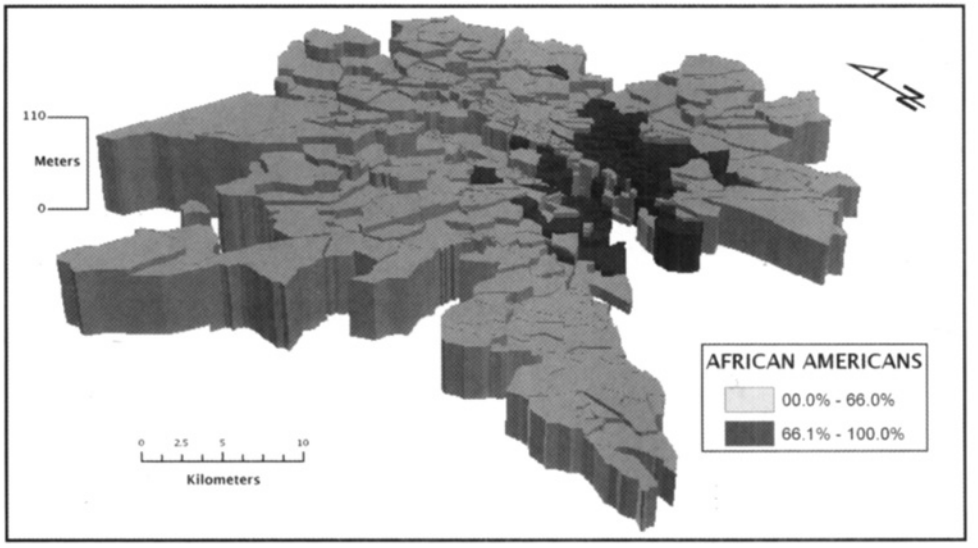

FIG. 4—Relationships between race and altitude in Richmond, Virginia in 2000 point to white suburbs surrounding the low-lying, predominantly minority-inhabited central city. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors)

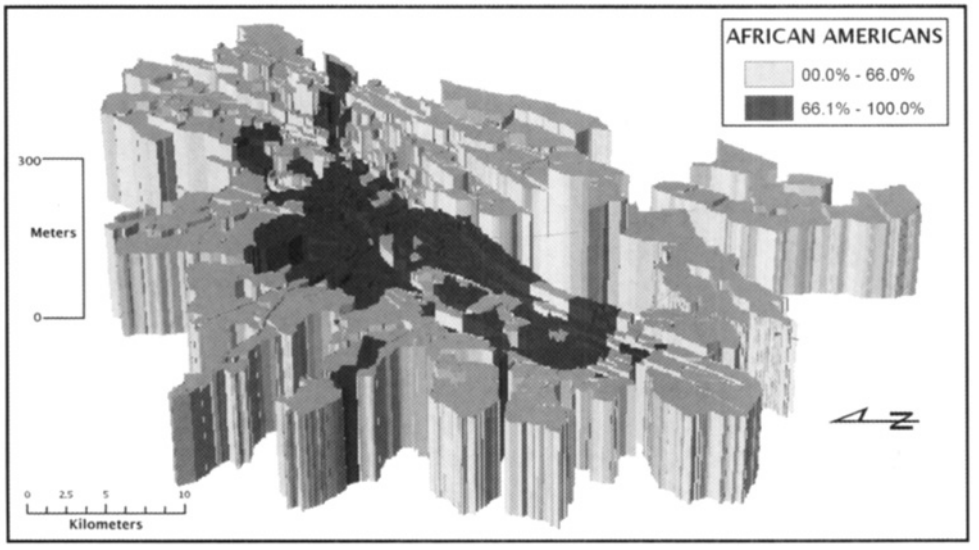

FIG. 5—Race and altitude in Birmingham, Alabama in 2000 show a concentration of blacks in the inner city and the dispersal of whites in the surrounding highlands. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors).

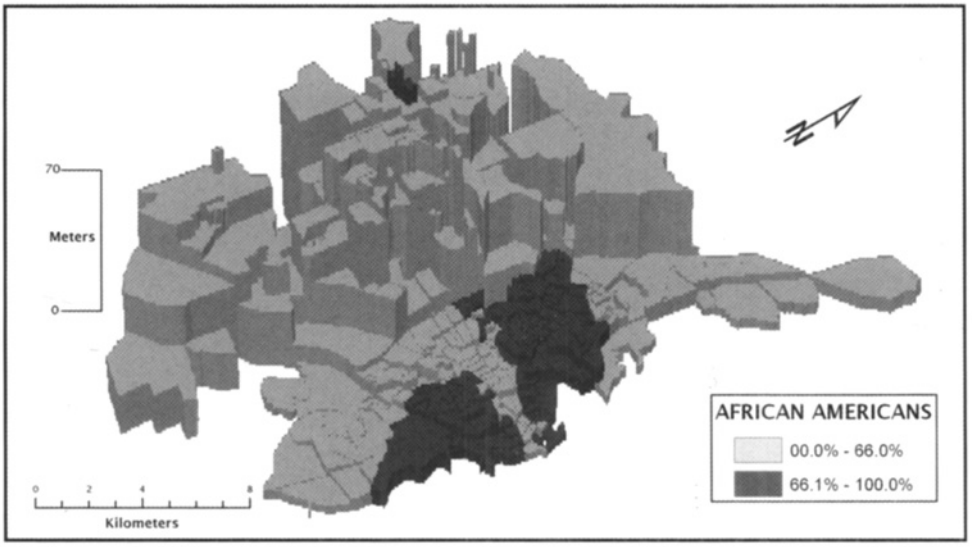

FIG. 6—In Mobile, Alabama in 2000, black neighborhoods, with one exception, are located in the lower-elevation urban core. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors)

equality tied to markets and democratic governance, the impacts of the rise of mass consumption and the collapse of class consciousness under Fordism and the Keynesian state. Wilson also commented on the changing sources and expressions of black ethnic and political awareness, white resistance to this empowerment, and the emergence of a racialized post-Fordist urban system that renewed the basis for local place-based identity politics (1992, 2000). The racial differences in Birmingham's labor market were translated into distinct geographies of black and white housing, with African Americans concentrated in the Jones Valley near the city center and whites living disproportionately in the hillier regions of the city's eastern edge (Figure 5). Charles Connerly observes that, in Birmingham, "the most segregated city in America," racialized geographies, urban planning, and the civil rights movement shaped each other in complex and intimate ways: "Birmingham was planned not only as an industrial city but also as a city that relied heavily on black labor. But by forcing black labor to live in the city's 'vacant spaces,' near creeks and railroads where whites did not wish to live, Birmingham's leaders set the stage for the black community's mid-twentieth-century struggle to escape these inferior spaces and move into the better neighborhoods enjoyed by whites" (2005, 10).

The city's officials also used federal interstate-highway funds to relocate blacks to less desirable locales. Interstate 59, for example, became a racial boundary between the black neighborhood of Ensley and the white one of Ensley Highlands, whose very name suggests its elevated status. Thus, given its relief and dramatic history of racial strife, Birmingham serves as a prime model to illustrate how race, labor markets, power and politics, and topography are deeply interconnected.

MOBILE, ALABAMA

In Mobile, Alabama, with a total population in 2000 of 317,605 (of which 38.9 percent were African American) (U.S. Census Bureau 2000), the correlation between percent black and altitude was –0.46 in 1990 and –0.47 in 2000. This pattern played out unevenly across the city's hilly western sections, which are predominantly white, and the lower-elevation eastern edge, which is populated mostly by African Americans (Figure 6). The spatial distribution of the black population in Mobile confirms the pattern examined here; that is, the black population is relegated to lower elevations along the coast. Unlike Florida, however, where coastal property is expensive and overwhelmingly owned by whites, in Mobile the coast is the site of heavy industries, such as shipbuilding and oil refineries, which are located in the industrial docklands on the other side of Mobile Bay, across the bridge from the high ground of "Mobile proper." The negative externalities generated by noxious land uses thus lower neighboring residential property values, and the area has been inhabited primarily by lower-income minorities.

Although Mobile has a long history of racial oppression, contemporary racial segregation is grounded historically in racist labor practices during World War II, when severe shortages of skilled labor plagued the city, home to several large defense contractors and shipbuilders at the Alabama Dry Dock, which employed 12,000 black workers (Nelson 1993). Despite this fact, less than 1 percent of these laborers were employed as skilled workers, and none was employed as a welder, one of the occupations most in demand. In contrast, northern areas, like the Hampton Road area of Virginia, during the same time employed more than 50 percent of the black workforce of 17,000 in skilled or semiskilled positions (Fusfeld and Bates 1984). Mobile thus hints at labor and housing markets as simultaneously determinant phenomena, twin sides of a network of social relationships shot through with racism and racial segregation.

WACO, TEXAS

The history and geography of Waco, Texas (population 153,198 in 2000, of whom 18.9 percent were African American; U.S. Census Bureau 2000) illuminate other facets of the relationship between race, housing, and urban topography. Historically, Waco had its economic base in agriculture: It was one of the largest cotton exchanges in the South (Conger 1975). Steven Reich (1996) noted that World War I had significant effects on Waco's labor market, creating shortages that propelled blacks into the lumber industry. After the turn of the twentieth century, its forefathers dubbed Waco the "Wonder City" as part of an effort to attract white-collar businesses, including the up-and-coming insurance industry, and to overcome the city's reputation as "Six Shooter Junction," an appellation that referred to the lawlessness of the late 1800s (Bernstein 2005). Robison, a small black community outside Waco, was the focus of the city's black population during the early 1900s.

Today the concentration of African Americans is still high in Robison, which is now part of the greater Waco urban area. The highest concentration is in the low-

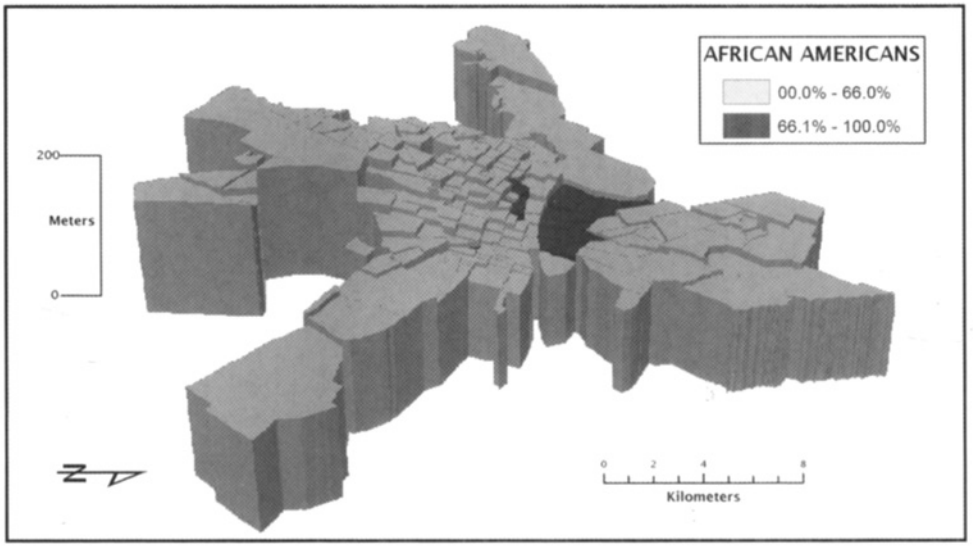

FIG. 7—Waco, Texas in 2000 offers another example of a predominantly white-inhabited, higher-elevation periphery surrounding a largely black-populated central city located at a lower elevation. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors)

est-lying area of downtown Waco. The city's residential geography is thus characterized by white-dominated suburban hills surrounding the low-lying inner city (1990 −0.45; 2000 −0.43) (Figure 7). Race and racism in Waco were also debated through the lens of standardized testing in the school district in 1995; 75 percent of black students and 66 percent of Hispanic students failed the Texas basic skills test in the Waco school district, in contrast to 37 percent of white students. Race was important as well in light of the differing vulnerability of blacks and whites to tornado hazards. Harry Moore (1958), who analyzed the 1953 tornado in Waco, found that black residents and neighborhoods were markedly more vulnerable than were those of whites to tornadoes, in terms of housing damage, bodily injury, and resultant lost employment. Waco reveals racial relationships as multifaceted, permeating diverse spheres of social life in addition to the geography of its residences.

SHREVEPORT, LOUISIANA

The case study analysis also included two cities in which the expected relationship between race and altitude was reversed; that is, Shreveport, Louisiana, on the Red River and Ft. Myers–Cape Coral, Florida, on the Gulf coast. In cases of reverse altitudinal zonation, where blacks live above whites, the explanation typically lies in the ability of whites to command relatively expensive waterfront properties. However, while the exceptions to the general hypothesis explored here demonstrate that simple, all-encompassing generalizations rarely hold merit under all circumstances,

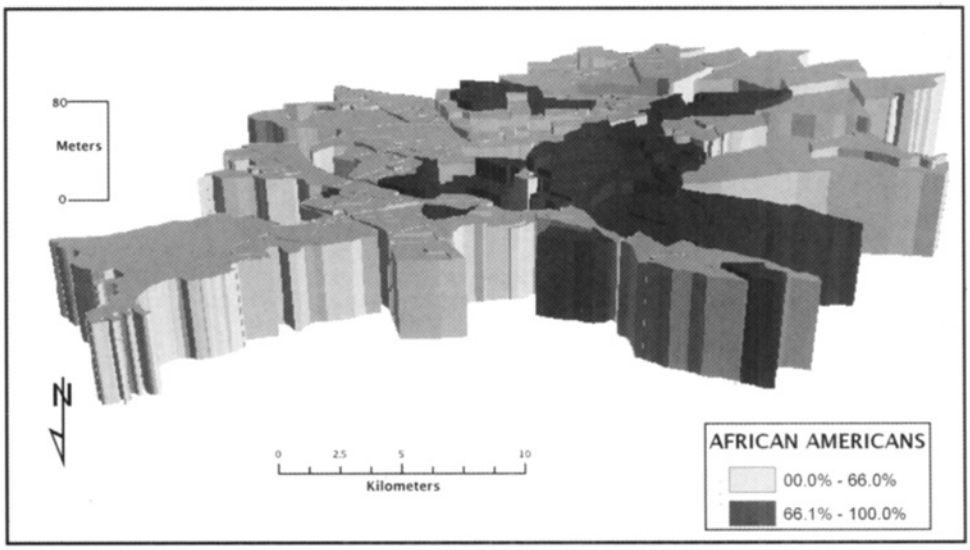

FIG. 8—The relationship between race and altitude in Shreveport, Louisiana in 2000 differs from that found in most southern cities, in that blacks largely live in the hills distant from expensive waterfront property along the Red River. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors)

they also indicate that similar processes of racial segregation are at work with somewhat different outcomes than those observed previously.

In Shreveport, Louisiana (population 275,213 in 2000, of whom 42.4 percent were African American; U.S. Census Bureau 2000), the black populace resides mostly in the hills on the city's western side (Figure 8). The correlations between percent black and block-group altitude were 0.43 and 0.54 in 1990 and 2000, respectively. Shreveport has a long history of racial discrimination, including health care (Brierre 1986); in 1960, the city's index of housing segregation (proportion of minorities that would need to be moved to reach perfect segregation) was 95.9, the second highest in the nation (Taeuber and Taeuber 1965). Many of the areas with the highest concentrations of black population have roots as historic black neighborhoods. The area of St. Paul's Bottom in Shreveport, now known as "Ledbetter Heights," still has a high concentration of African Americans. Starting in 1983, a joint private-public–financed venture was undertaken to revitalize the dilapidated housing stock in the Ledbetter Heights and Allendale neighborhoods. Some 200 housing units were rehabilitated and classified as low income (N. Johnson 1995), both adding to the institutionalized stigma of this neighborhood and offering a relatively optimistic future for this urban landscape. Kenneth Vines (1959) used Shreveport as an example to demonstrate how the earliest local strands of the Republican Party in the South were formed on the segregationist platform that emerged on the heels of Eisenhower's electoral success in the region during the 1956 presidential election. In the 1960s and 1970s this strategy materialized into a full-blown appeal to white vot-

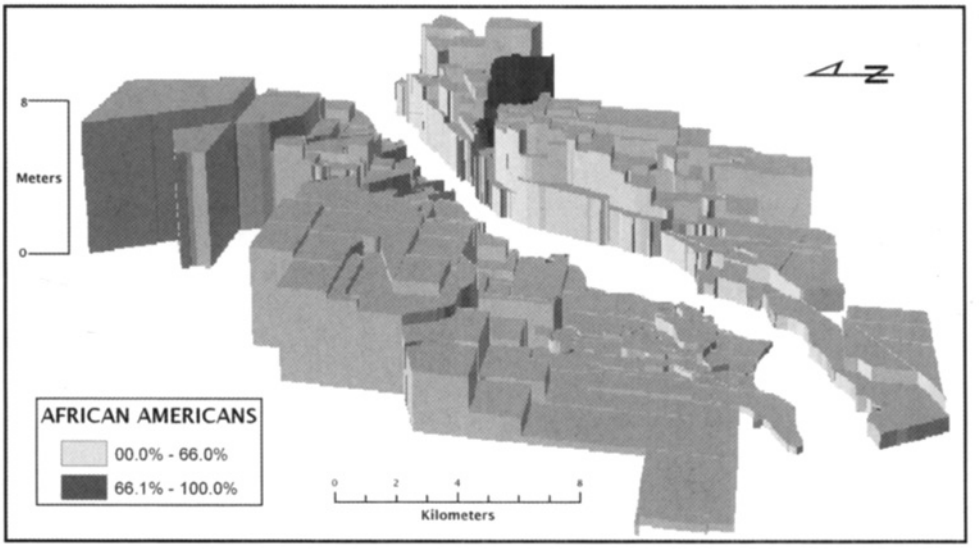

FIG. 9—Race and altitude in Ft. Myers–Cape Coral, Florida reveal an exception to the general tendency of whites to live in higher altitudes: In coastal cities, high-priced oceanfront property is overwhelmingly inhabited by whites. *Sources:* Calculated by the authors from data in U.S. Census Bureau 2000. (Cartography by the authors)

ers. This points to the complex linkages between residential racial segregation and institutionalized party politics as mutually reinforcing tendencies.

FT. MYERS–CAPE CORAL, FLORIDA

Florida offers interesting examples that defy the association between race and elevation observed elsewhere in the South. Its urban areas, including Miami, Ft. Lauderdale, and West Palm Beach, have been some of the nation's most segregated cities since the 1940s (W. Johnson 1975; Winsberg 1999). The topography of Florida changes by only a few meters in the south and east and only becomes a prominent feature in Tallahassee and other cities in the northern part of the state. Even so, higher-elevation areas, such as they are, are farther from the coast and are less prized and command lower property values. The geography of race in Floridian cities reveals that the black population lives farther inland and, therefore, in relatively lower-value properties.

In Ft. Myers–Cape Coral, two cities divided by a river inlet, 7.5 percent of the 2000 population of 329,703 was black (U.S. Census Bureau 2000). The African American population is largely clustered in the Ft. Myers neighborhood of Clemente Park, where the Williams Academy, the first government-funded school for black students, was opened on Henderson Avenue in 1913; the predominantly white population lives in the coastal areas and in the newer city of Cape Coral. The correlations between elevation and percent black were 0.40 and 0.46 in 1990 and 2000, respectively. Topographically, the spatial separation of blacks and whites was reflected in the dense concentration of African Americans in a hilly zone near downtown, whereas

whites dominate the low-lying waterfront areas (Figure 9); in this case, the maximum relief is only 5 meters. However, both median rent and property values were also significantly negatively related to altitude, with correlations in 2000 of –0.41 and –0.32, respectively. Thus, although the outer appearances of this case study seem to defy the general tendency identified in other southern cities, the underlying processes of segregation are virtually identical.

Concluding Thoughts

Like race, altitude has long conjured up a set of meanings in U.S. society often associated with health, cleanliness, aesthetic amenities, and safety. Across the American urban South, race has been a significant factor in relegating blacks and whites to different altitudinal zones. Our study has sought to inject this concern into the understanding of how residential segregation elevates—literally and figuratively—housing values out of the reach of lower-income groups, typically minorities, and consign them to the lowest altitudinal zones of cities. The discriminatory dynamics of housing and labor markets, including the lower average incomes of blacks and prejudicial access to mortgage lending and exclusionary zoning, have operated formally and informally for decades to generate geographies in which African Americans find themselves disproportionately concentrated in low-lying areas. Although to a large extent this pattern is a proxy for class and income—poor whites may find themselves in similar altitudinal concentrations—it nonetheless remains painfully evident that black urbanites tend to inhabit the most swampy and flood-prone parts of their cities, whereas whites are ensconced in the surrounding suburban hillsides. The statistical evidence indicates a strong pattern in which whites tend to occupy higher-altitude, more expensive locations in 146 cities across the South in both 1990 and 2000. The only exceptions to this trend were low-lying coastal or riverine cities in which property values were inversely related to altitude.

Geographers have long been concerned with matters of social justice (for example, Harvey 1973, 1996; D. Smith 1994). Altitudinal discrimination, as documented here, is frequently naturalized, made invisible, and taken for granted as "normal" and thus constitutes a form of environmental injustice. Making such a pattern visible is one step toward its rectification.

More broadly, urban social geography has been rather loath to incorporate the physical landscape into its frame of analysis. Although urban climatologists have examined urban heat islands, for example, social geographers have rarely taken the topography of cities into consideration. Yet cities are not simply two-dimensional surfaces upon which class, gender, and racial relationships operate. They are inescapably three-dimensional landscapes in which social structures and processes are entwined with local biophysical conditions in complex, contingent, and sometimes contradictory manners. GIS, particularly DEM models, offers an ideal technique to address this issue empirically. Future geographical work may move forward by denaturalizing both race and environment in a manner that does justice to the complexity of both.

Notes

1. "Redlining" is a discriminatory practice engaged in by financial institutions in which home loans and insurance are withheld from neighborhoods that are considered to be poor economic risks.

2. "Jim Crow" refers to the institutionalized racial segregation common across the U.S. South that persisted from the late nineteenth century until the civil rights movement of the 1950s and 1960s.

3. "Block groups," the smallest geographical units for which data are available, are subdivisions of census tracts.

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