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Regional Development and Land Use Change in the Rocky Mountain West, 1982-1997

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ABSTRACT Economic and demographic restructuring, along with the increasing desirability of environmental amenities, have driven growth in the eight-state region of the Rocky Mountain West to extraordinary levels in recent decades. While social scientists have developed a solid conceptual understanding of the processes driving growth and change in the region, the broad nature of the land use outcomes associated with in-migration has not received nearly as much scholarly attention. This article initiates an in-depth empirical investigation on the magnitude, nature, and spatial variation of land use change in the Rocky Mountain West over the 1982-1997 time period. Data from the USDA's National Resources Inventory reveals that the conversion of landscapes from rural to urban types of land uses varies significantly from place to place, not only in terms of total land developed, but also with respect to how population pressures and a number of other local characteristics of counties manifest themselves in the spatial pattern of growth.

Introduction

Over the last several decades, the Rocky Mountain West—composed of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming—has evolved to be the fastest growing region in the United States (Shumway and Davis 1996; Booth 1999; Smith and Krannich 2000; Shumway and Otterstrom 2001). Driving the growth is in-migration, as people move to the region for its abundant scenic areas and its temperate climate. The influence of environmental amenities on migration and regional growth has been an active area of research for scholars, especially with respect to their relationship to population deconcentration, economic restructuring, and other forces that work to shape the outcome of regional development. At the onset of the 21st century, the growth pattern that has marked previous decades in the Rocky Mountain West remains strong, even as an economic downturn slows the pace of change in many other parts of the United States.

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Throughout this expansion, scholars and journalists alike have chronicled an ongoing political struggle that pits long-time residents of the region against newcomers (Whaley 2000; Smith and Krannich 2000). Perhaps the most volatile of all the issues dividing these groups is the impact that the ongoing change has on the landscape. That there is an impact is not in doubt: to see this, all one has to do is explore the many small mountain towns spread throughout the region, or drive through the outskirts of its major urban centers. Although much of the region is undeveloped federal land, sprawl—in the form of uncontrolled, unplanned, and/or uncoordinated development of new homes and commercial and industrial areas (Nelson et al. 1995)—is an obvious byproduct of growth, especially in and around major metropolitan areas. But despite the publicity associated with this contentious issue, there is surprisingly little in the way of academic literature documenting the various aspects of land use change in the region, including the following specific questions that are the focus of this article. Are all parts of the Rocky Mountain West experiencing similar far-reaching transformations of the landscape? Are population pressures inducing the same levels of land development throughout the region? What other factors besides population growth are associated with more/less developed land in Rocky Mountain West? And, finally, what does this imply for the long-term sustainability of growth in the Rocky Mountain West?

The research presented here reports the results of an exploration of the nature of land use change in the region. This topic is an important one because many of the complaints associated with recent growth patterns emerge from their visual impact on the surrounding landscape, as more homes, roads, stores, malls, and other developments are built to accommodate newcomers (Theobald, Gosnell, and Riebsame 1996; McCormick 1998). For a region that derives much of its allure from its landscape, the issue is all the more critical. The first section of the article explores the process of regional change in the Rocky Mountain West, focusing on the links between population growth and land use outcomes. This is followed by a brief discussion of recent research on the development of land, measures for investigating the links between population growth and land use change, and the variety of data commonly used for this type of analysis. Then, in the first empirical section, the USDA's National Resources Inventory is used to examine the amount and types of rural land—including farmland, rangeland, and forest—consumed by growth and the resulting spatial pattern of development between 1982 and 1997. Finally, in the last two empirical sections, several county-level classifications, based on absolute and relative geography, and socioeconomic structure, along with a regression analysis, are used to explore factors associated with land use change in the region. The classification analyses reveal a very diverse pattern of land use change in the Rocky Mountain West, where the intensity of outcomes varies significantly and systematically from place to place. The multivariate analysis reinforces many of the findings from the classifications, but also shows a number of other factors that help differentiate patterns of land development in the region. Together, these findings raise a number of questions about growth and change in the Rocky Mountain West that require further investigation, a topic addressed in the conclusion.

A Changing Region

The patterns and processes of regional growth in much of the Rocky Mountain West over the past three decades—particularly in rural areas—represent a significant departure from trends of the past. For more than 100 years, the region has relied heavily on its substantial natural resource base to drive economic growth, more so than other parts of the United States (Lorah 1996; Power 1996). These significant resources have usually served the sparsely populated region well, especially since the manufacturing base is the lowest of any region in the US (11% of all employment compared to 18% for US as a whole, based on 1990 census data). Over the past few decades, however, the Rocky Mountain West has moved away from its reliance on natural resources. Today, researchers argue that the "quality-of-life model" model provides the best explanation of the nature of growth and change in the region (Rasker 1995). A significant aspect of this model, which relies on the concept of "compensating differentials," is the changing nature of residential consumer preferences (Knapp and Graves, 1989). More leisure time and higher incomes have led to increased demand for living in so-called "New West" counties, known for their scenic landscapes and abundant recreational opportunities (Rudzitis and Johansen 1989, 1991; Rudzitis and Streatfeild 1994). As a result, there is now strong demand for natural environments that is *not* related to extracting resources from the ground—a demand that is able to take advantage of these resources without necessarily damaging them at the same time (Rasker 1995; Power 1996; Power and Barrett 2001).

While a majority of the research on the appeal of environmental amenities has centered on remote, nonmetropolitan areas, it is worth noting that these processes are also at work in metropolitan counties that contain large amounts of high-amenity, undeveloped land that lie within metropolitan county boundaries (such as Jefferson, Boulder and Larimer counties in Colorado, or Pima County in Arizona). Combined with the attraction of these scenic areas close to major cities, many parts of the Rocky Mountain West have developed dynamic economies based on new high-tech industries like telecommunications and software development (Lyons 1995). Hence, growth and change is observed to manifest itself from multiple sources in this booming region.

Previous research on the topic offers a great deal of information on the nature of growth of high-amenity regions like the Rocky Mountain West. Nonetheless, the broad geographic views of many of these studies provide few specific insights on the link between population growth and land use change at the local level, or on the role of other factors in the land development process. For this reason, it is useful to divide the processes of change into two parts—both of which emphasize the role of migration and population growth, and residential preferences at two geographic scales—as driving forces behind land use outcomes.

Figure 1 illustrates the connections between population change and land use change at two scales, including enabling factors, residential preferences, and outcomes. Running across the top, interregional population deconcentration has led to the growth of the Rocky Mountain West, and the Sunbelt in general, at the expense of more built-up areas in the Northeast and Midwest. This shift has been enabled by improved transportation and com-

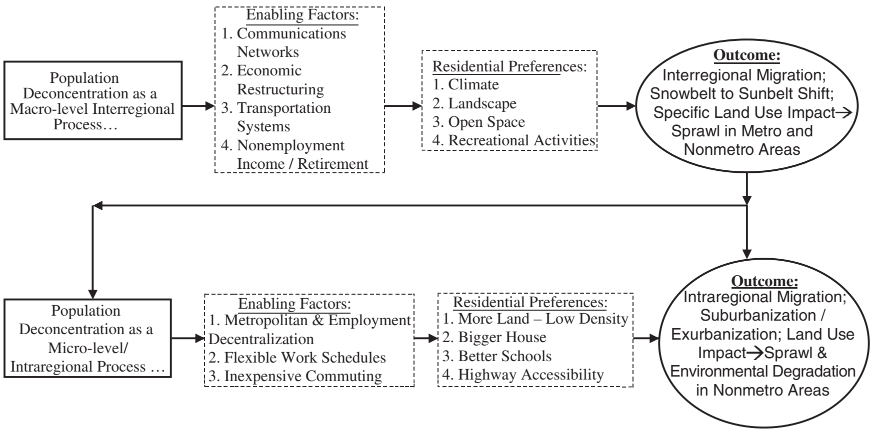

FIGURE 1. MACRO AND MICRO-LEVEL POPULATION CHANGE, LAND USE CHANGE, AND THE ROLE OF AMENITIES.

munications technology, economic restructuring, increased nonemployment income, and numerous other socioeconomic factors (Vias 1999). At the same time, it has been perpetuated by people's preferences for mild climates, scenic landscapes, abundant open space, and other attractions.

A great deal of research has focused on this process, and there is clear evidence that amenities have a substantial influence on migration flows (Clark and Murphy 1996), even though the specific preferences of migrants and how their arrival eventually affects land use outcomes remains unclear. This lack of information on the local land use impacts that result from interregional migration is understandable considering the large geographic units commonly used to model migration flows (usually the county, metropolitan statistical area, or state level). Certainly some of this interregional migration directly induces land use changes both at the fringe of cities, and in the more remote nonmetropolitan areas across the Rocky Mountain West. This is especially true of the major recreational centers located in the mountains of the region, such as Vail, Colorado and Jackson Hole, Wyoming. Similarly, the bottom half of the figure suggests that counterurbanization has made suburbanization and, more recently, exurbanization the dominant modes of land development nationwide. Compared to interregional migration, counterurbanization is a micro-level process that is generally described in terms of household mobility (Cadwallader 1992). Even so, the concept is very similar to population deconcentration because it involves a shift from more- to less-developed areas, is enabled by localized versions of the same factors, and is likewise perpetuated by residential consumer preferences.

The conceptual model just described cites a number of factors associated with land use change in the Rocky Mountain West, but, most importantly, the role of migration. However, this paper only begins this complex research agenda by examining broad

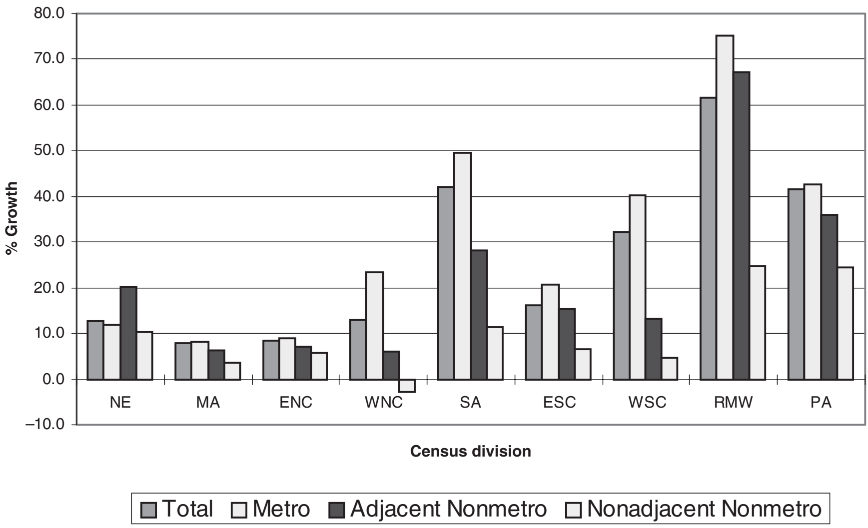

FIGURE 2. DISTRIBUTION OF POPULATION GROWTH BY CENSUS DIVISION, 1980-2000.

patterns of land use change, and through an investigation of a few of the links between population growth, residential preferences, regional characteristics, and the development of land, using a combination of complementary research methodologies.

The notion that the region is experiencing rapid development in all types of areas—within and on the fringe of metropolitan areas, in adjacent nonmetropolitan counties, or in more remote locations as a result of population pressures—seems beyond doubt. The overall pace of growth in the Rocky Mountain West is illustrated in Figure 2, which shows that its population increased by over 60 percent between 1980 and 2000, by far the most rapid rate of increase in the nation. Figure 2 also shows that, within the region, growth is almost equally drawn to metropolitan and their adjacent nonmetropolitan areas, often in the form of exurban sprawl, as people move to the periphery of the region's major urban centers (Olinger 1999; Carruthers and Vias 2005). Again, the overall rate of growth for these types of counties is the highest of any region in the United States. Finally, the Rocky Mountain West has also experienced significant growth in the more remote nonadjacent nonmetropolitan counties, induced by the desire for the kind of low-density development and environmental amenities available in more rural areas (Vias 1999).

Several aspects of land use change in the Rocky Mountain West have received significant attention from researchers, especially locally-focused studies on growth in environmentally scenic areas (Theobald, Gosnell, and Riebsame 1996; Riebsame et al. 1996), and the associated loss of natural open space, wildlife habitats, and farmland (Maestas, Knight, and Gilbert 2001; Hansen et al. 2002). Although these studies provide excellent information on the land use impacts of growth at the local scale, and in several geographic contexts, there has been no systematic examination of land use change in the Rocky Mountain West, as has been done for other regions of the United States (e.g., Reynolds 2001, for the South) and the nation as a whole (Vesterby and Krupa 2001). Furthermore, the relationship between population growth and the land development process has not been examined in all parts of the Rocky Mountain West. For a region with such a great diversity of physical, cultural, and economic landscapes, it is reasonable to expect that considerable spatial heterogeneity exists in the intensity of local land development and overall outcome of land use change.

Analyzing Land Use Change

Researchers have used a number of databases to examine land use change in the Rocky Mountain West and elsewhere in the United States (see Hart 2002 and Theobald 2002 for detailed discussions of these). Recently, Hart (2002) used data from the Census of Agriculture to measure the loss of farmland, focusing on the development of sold or abandoned properties at the urban fringe. In contrast, Theobald (2002) relied on Decennial Census data to develop a methodology using housing density as a way of estimating land use change and development over a 50-year time period. Other researchers have utilized a completely different database, the USDA's National Resources Inventory (NRI), which is derived from a national sample of land uses through aerial photography and ground surveys (Nusser and Gobel 1997). The continued development of remote sensing techniques has also produced land use databases that can provide finer spatial resolutions (Vogelmann, Sohl, and Howard 1998) but these are generally used for place-specific analyses (Alberti 1999).

The present analysis makes use of the NRI to analyze land use change in the Rocky Mountain West. As Theobald (2002) explains in some detail, the NRI, like all the other data sets, has its limitations, so care needs to be taken when using it for inferential purposes. For example, a major shortcoming of the NRI is the presence of low-density development—an important component of exurban development in the Rocky Mountain West—that does not meet the criteria associated with developed urban land. However, the NRI is still useful for measuring broad changes in land use, and for comparing land use change across different types of regions, particularly if very local spatial patterns of development are not a concern of the research. For example, after each appearance of the new NRI data, researchers have examined broad trends in land use change, and linked these changes to important social processes underway in the United States (Greene and Stager 2001; Vesterby and Krupa 2001).

Since 1982, the NRI county-level land use data have been released at 5-year intervals, up to and including 1997. For this study, several measures of change between 1982 and 1997 for population and developed land are estimated at the county level. One measure often employed is the average land use coefficient, which is simply population density, or people per acre of developed land, at a single point in time. Another particularly useful measure for examining the pace of development is the land use change coefficient (Pendall 1999; Reynolds 2001). This measure is written as:

$$\Delta = \frac{(U_t - U_{t-1})}{(P_t - P_{t-1})}, \tag{1}$$

where U stands for acres of urban land between time t and time $t - 1$, and P stands for population for the same times. This straightforward measure represents the marginal change in land use, or the number of acres developed per new person over the time period. In other words, the land use change coefficient is a good measure for examining how population growth affects the *intensity* of land development—that is, does high- or low-density development result from population growth in a given county?

The total number of acres of developed land in a county is used for both measures of density. More often utilized by researchers, is a density measure with the total land area of a county—which captures growth, but not land use change—because the spatial unit remains constant through time. This can be very misleading, especially in many states of the Rocky Mountain West where large tracts of land have virtually no population, and where population is highly concentrated in and around the major urban centers. While the use of developed land for density levels and density change is not perfect because a percentage of the population lives outside these developed areas, the measure still provides a much more accurate picture of the population pressures leading to, and the ultimate outcome of, the land development process (the focus of this paper), than a measure with a fixed county land area. Moreover, the same measure has been used successfully in numerous other studies, including analyses of land use change and the density of development (Pendall 1999; Reynolds 2001; Kline 2000; Carruthers and Ulfarsson 2002).

The next three sections comprise the empirical analysis. The first introduces the various types of land uses in the NRI and examines broad trends in land use change in the Rocky Mountain West. The second partitions the data using several county-level classifications to analyze systematic differences in population growth, the conversion of rural lands to urban uses, and the intensity of recent land development in the region. Finally, the last section presents a regression model that explores a number of other factors associated with differences in the levels of land developed at the county level, using a panel data set derived from NRI and US Census data. Together, the three sections provide substantive evidence on the nature of growth and change underway in the Rocky Mountain West and point the way towards several potential long-term implications of development in the region. Especially significant for policy makers should be the long-term impact as resources are depleted to support an increasingly large population (e.g., water resources), and as the potential for damage to scenic environments (sprawl, pollution, and congestion) increases.

Broad Patterns of Land Use Change in the Rocky Mountain West

The NRI divides land uses into several categories for each 5-year time period, with data gathered at the county level. Table 1 shows these general categories and provides descriptions of each, along with their distribution in the Rocky Mountain West and the United States as a whole (USDA 2001). In some cases, these categories represent aggregations of land uses. A good example is the developed land category, which brings together urban, large and small built-up land, along with rural transportation land. Other studies have shown that this aggregation provides the “best” estimate of total developed land when using the NRI database for statistical analyses (see Carruthers and Ulfarsson 2002; Carruthers and Vias 2005). While previous research has focused on the nature of land development, especially tracking the conversion of land from one use to another (Greene and Stager 2001), the present investigation focuses primarily on changes in developed land, and county-level differences in the factors associated with the levels of land developed over time.

Examining Table 1, the differences between the Rocky Mountain West and the United States in terms of land use are quite apparent. In the Rocky Mountain West, two land uses dominate, compared to a more even distribution of land uses in the rest of the nation. One category, federal land, takes up close to half the land in the region, with the federal government controlling up to 90 percent of the entire state of Nevada (USDA 2001). This compares to the United States as a whole, where federal ownership amounts to just less than 22 percent of total land area. The other primary land use category in the Rocky Mountain West is rangeland, which accounts for an additional 35 percent of all land. In contrast, less than 2 percent of all the land in the Rocky Mountain West had been developed as of 1997, a much lower percentage than other areas of the country (about 5 percent of all territory in the United States is developed).

Figure 3 shows that, between 1982 and 1997, there has been significant land conversion in the Rocky Mountain West. Over that time period, the developed land category registered a 30 percent increase, or an addition of almost 2 million acres, the largest percentage change of any category. Although developed land remains a small percentage of all the land in the region, this still represents a significant change in land use. Increases in acreage were also present with respect to pastureland, and other rural land. Both of these categories, like the developed land category, represent a small part of the Rocky Mountain West as a whole. The largest losses were in cropland, where 6 million acres were converted to other uses, along with a loss of 3.6 million acres of rangeland. Most of the land that has gone to development is likely to have come from the loss of cropland at the periphery of cities because rangeland is usually more remote. There has also been significant reallocation of land from one rural type to another within the region. For example, about 80 percent of the cropland that was lost was transferred to other rural uses, including acreage reclassified as conservation land, a category not listed in the NRI database.

The growth in developed land in the Rocky Mountain West represents a sizeable amount of acreage, but the spatial distribution of this conversion is far from uniform. In terms of total growth, the metropolitan counties with their large populations continue to dominate through inertia. But when *rates* of change are examined, a more diffuse pattern emerges. Figure 4 presents a map of these rates for the Rocky Mountain West over the 1982-1997 time period, illustrating that most growth took place in the southern parts of the region, namely Arizona and Nevada. Besides large amounts of land use change in and around the region’s major urban centers, also note the high percentages of land developed in some fairly remote areas, as expected given the increasing desirability of these scenic areas.

TABLE 1. LAND USE TYPES FROM NATIONAL RESOURCE INVENTORY, 1997.

Land Use Category	Description	percent of all land—RMW	percent of all land—US
Developed Land	Aggregated category including all large urban and built up areas, small built up areas, and rural transportation land	1.4	5.2
Cropland	Aggregated category of all land suitable for crops, included cultivated and uncultivated land	6.9	20.4
Pasture	Category of land which is managed primarily for the production of introduced forage plants for livestock grazing	1.5	6.4
Rangeland	Land use category where climax species consists of natural grasses and shrubs suitable for grazing and browsing	34.5	22.0
Forest	Land use category that is at least 10 percent stocked with single stemmed woody species at least 4 meters tall	4.8	21.7
Other rural	Land use categories that consist of farm structures, barren land, marshland, and other residual categories	2.2	2.7
Federal	Land owned and controlled by federal government.	48.7	21.6
Total		100	100

Source: NRI, 1997.

Systematic Patterns of Land Use Change in the Rocky Mountain West

The distribution of land uses in Table 1 shows that the Rocky Mountain West is significantly different from the rest of the United States. Moreover, the varied pattern of land use change illustrated in Figure 4 makes clear that development in the region is spatially heterogeneous. Despite the somewhat chaotic spatial pattern of growth, the literature sug-

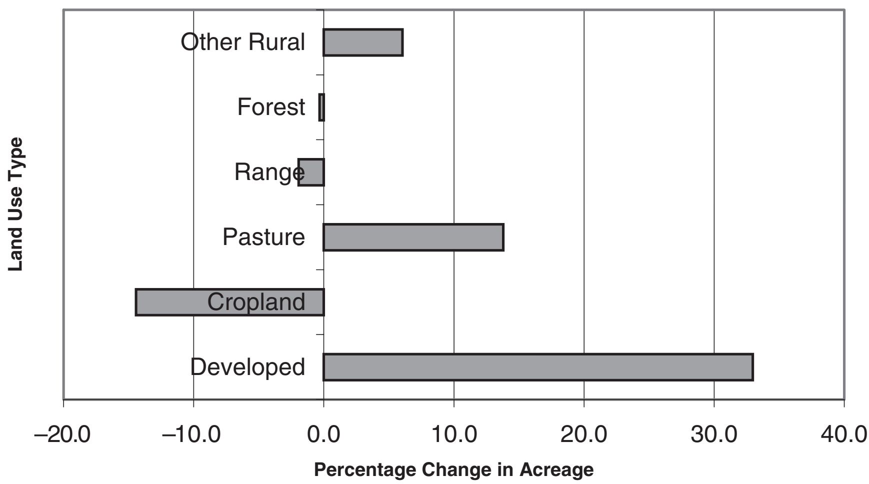

FIGURE 3. PERCENTAGE CHANGE IN LAND USE ACREAGE, 1982-1997.

gests that many of the socioeconomic changes associated with the development of land have some underlying order to them (Shumway and Davis 1996; Booth 1999; Vias 1999; Carruthers and Vias 2005). To investigate this possibility, several county-level classifications are used to enable observation of systematic differences in patterns of land use change. Specifically, for each county category within a classification, the data were aggregated, and then growth rates and density measures were calculated.

The first classification, shown in Table 2, divides counties according to their state and metropolitan/nonmetropolitan status. The state-level classification scheme is used for examining land use and population change due to significant differences in amenities, government regulation, and economic opportunities—all factors that can vary tremendously from state to state. Examining these data, there are a number of broad trends in land use change that shed light on the path of growth in the Rocky Mountain West. For instance, metropolitan and nonmetropolitan counties in most of the states experienced significant increases in developed land, ranging from a high of 86 percent in New Mexico's metropolitan counties, to a low of 10.3 percent in Montana's lone metropolitan county. However, the associated rates of population change for these counties exhibit much greater variation. In Nevada, for example, the metropolitan counties experienced a 95 percent increase in population, compared to a 48 percent growth in developed land. Even more surprising is the 15 percent increase in developed land in Wyoming's metropolitan counties that coincides with a *decline* in population of 4 percent.

The divergence in these rates of change is made even more apparent when density levels and land use change coefficients are calculated to assess the interaction of changes in population and developed land. As an expected outcome of exurbanization, the density of

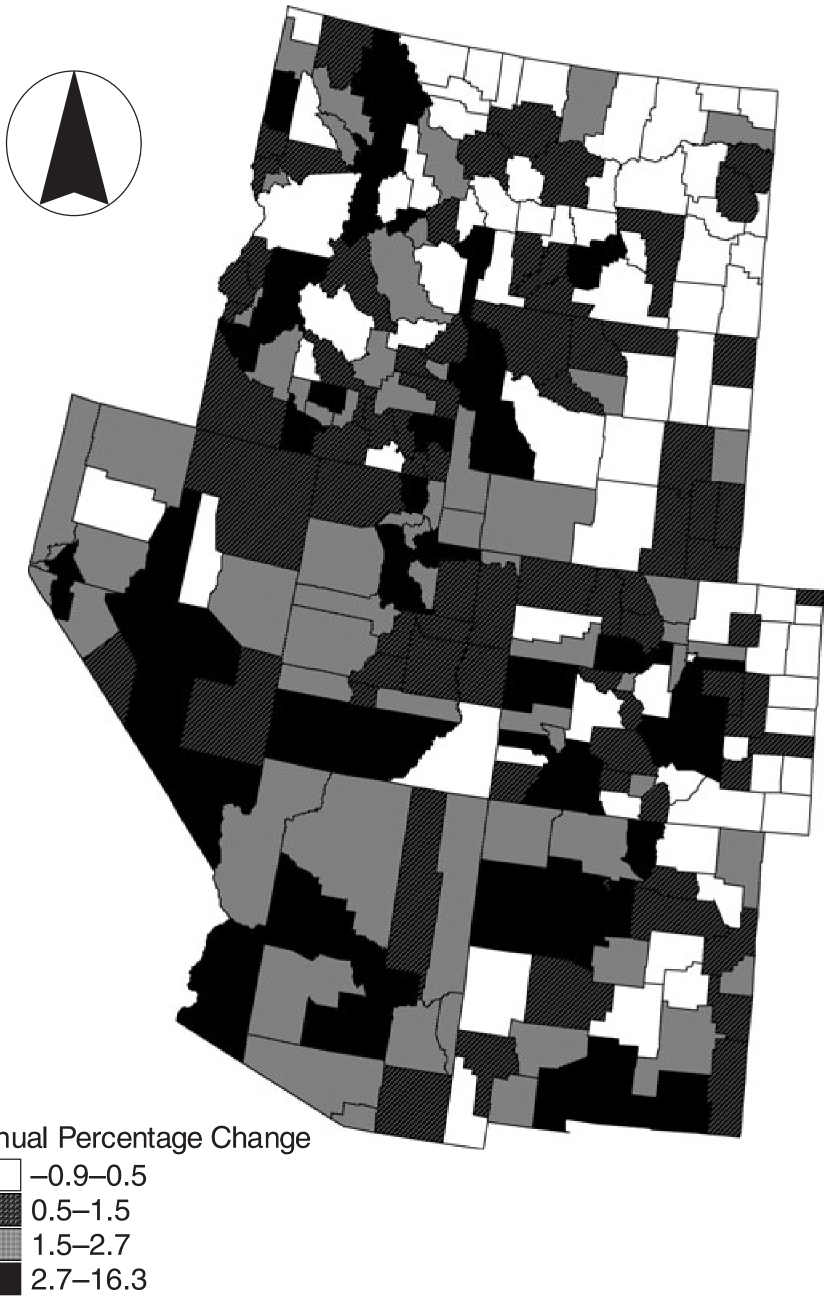

FIGURE 4. CHANGE IN DEVELOPED LAND IN THE ROCKY MOUNTAIN WEST, 1982-1997.

TABLE 2. STATE, METRO, AND NONMETROPOLITAN LEVEL CHANGES IN POPULATION AND DEVELOPED LAND*, 1982-1997.

Description	n	Developed Land 1982	Developed Land 1997	Percent Change 1982-97	Population 1982	Population 1997	Percent Change 1982-97	Population Density 1982	Population Density 1997	LUCC 1982-87	LUCC 1987-92	LUCC 1992-97	LUCC 1982-97
ARIZONA													
Metropolitan	5	677,000	971,300	43.5	2,433,070	3,892,237	60.0	3.59	4.01	0.27	0.22	0.13	0.20
Nonmetropolitan	9	411,600	520,100	26.4	456,790	659,970	44.5	1.11	1.27	0.88	0.41	0.40	0.53
COLORADO													
Metropolitan	10	694,240	963,140	38.7	2,459,064	3,155,942	28.3	3.54	3.28	0.43	0.63	0.24	0.39
Nonmetropolitan	53	613,300	759,600	23.9	602,498	735,351	22.1	0.98	0.97	–9.15	1.34	0.34	1.10
IDAHO													
Metropolitan	2	74,300	135,800	82.8	266,018	383,555	44.2	3.58	2.82	0.79	0.35	0.57	0.52
Nonmetropolitan	42	475,900	619,100	30.1	707,701	827,083	16.9	1.49	1.34	–15.17	0.92	0.69	1.20
MONTANA													
Metropolitan	1	35,900	39,600	10.3	79,791	78,977	–1.0	2.22	1.99	–0.44	0.93	–9.68	–4.55
Nonmetropolitan	54	776,900	906,800	16.7	611,122	673,770	10.3	0.79	0.74	–37.56	3.57	1.45	2.07
NEW MEXICO													
Metropolitan	6	240,600	447,800	86.1	732,858	1,005,549	37.2	3.05	2.25	0.45	0.55	1.23	0.76
Nonmetropolitan	26	540,400	704,900	30.4	630,964	717,390	13.7	1.17	1.02	1.73	1.47	2.16	1.90

TABLE 2. (CONTINUED)

NEVADA													
Metropolitan	3	167,900	249,300	48.5	735,375	1,438,273	95.6	4.38	5.77	0.32	0.12	0.03	0.12
Nonmetropolitan	14	104,300	132,100	26.7	146,163	237,308	62.4	1.40	1.80	0.46	0.09	0.48	0.31
UTAH													
Metropolitan	4	209,800	313,000	49.2	1,198,983	1,580,432	31.8	5.71	5.05	0.19	0.26	0.32	0.27
Nonmetropolitan	25	260,300	348,600	33.9	359,328	484,965	35.0	1.38	1.39	1.23	1.20	0.35	0.70
WYOMING													
Metropolitan	2	88,300	102,000	15.5	148,223	142,329	–4.0	1.68	1.40	–1.28	–0.20	0.49	–2.32
Nonmetropolitan	21	461,600	541,700	17.4	358,177	337,702	–5.7	0.78	0.62	–17.32	–1.04	2.71	–3.91
ALL STATES													
Metropolitan	33	2,188,040	3,221,940	47.3	8,053,385	11,677,294	45.0	3.68	3.62	0.34	0.30	0.24	0.29
Nonmetropolitan	244	3,644,300	4,532,900	24.4	3,872,743	4,673,539	20.7	1.06	1.03	3.27	1.04	0.76	1.11
ALL COUNTIES	277	5,832,340	7,754,840	33.0	11,926,128	16,350,833	37.1	2.04	2.11	0.57	0.43	0.36	0.43

LUCC—Land Use Change Coefficient.

* See Beale, 1993 for metro/nonmetropolitan classification.

growth is much lower in nonmetropolitan areas where housing may inexpensively occupy large tracts of land. However, there are also some sizeable differences among states as well. The most densely populated metropolitan areas in 1997 were in Utah and Nevada, with average densities of over 5 people per acre of developed land. This compares to Wyoming and Montana, where average densities measured below 2 people per acre of developed land in metropolitan areas. This variation is much less apparent than in the nonmetropolitan areas of each state.

Perhaps even more interesting, is the pattern of change in density, which is visible via the land use change coefficient described in equation (1). Over the entire time period, the lowest metropolitan and nonmetropolitan land use coefficients occurred in Arizona and Nevada. This means that, while population has generally grown most rapidly in these states, the rate at which land is developed to accommodate that population is significantly lower than other states—or, in other words, that development is of a higher density. In fact, the land use change coefficients are so low that the average density levels for developed land in these states have gone up in both metropolitan and nonmetropolitan areas. This shows that although a significant amount of land is being developed in Arizona and Nevada because of large population increases, the conversion of land is more efficient in these states. Although this finding may seem counterintuitive due to the perception of the sprawling metropolitan areas of Phoenix and Las Vegas, this finding is consistent with previous research (Kline 2000). The results for these two states stand in contrast to events in the rest of the Rocky Mountain West, where the spread of developed land is occurring at a much greater rate than population growth. This indicates that the land development process is less efficient, and is pushing the average density levels lower over time. Just how powerful are the forces behind the development of land in the Rocky Mountain West? So powerful that, in parts of Wyoming and Montana, the amount of developed land increased even in the face of population decline.

Although the primary focus of the research presented here is on the overall change during the 15 year time period of 1982-1997, a simple alternative view of the data shows that the typical boom and bust economic cycles that have characterized the region for a century were still present in the 1980s and 1990s (Power 1996). To examine some of the temporal dynamics of change within the Rocky Mountain West, the land use change coefficients were also calculated for the three separate time periods, and are also shown in Table 1. A primary characteristic apparent in these additional coefficients is the volatile nature of change in the region early in the 15 year time period. Between 1982, much of the northern part of the region suffered significant population losses that led to large negative land use change coefficients. While the volatility has diminished to some extent (as evidenced by some convergence in the coefficients), Montana still showed large negative land use coefficients in the 1992-1997. Overall, there are strong similarities in the coefficients for the latter time period, and for the entire time period, especially among the relative differences in the coefficients between states. An important exception to this is Wyoming, which experienced an abrupt return to growth between 1992-1997 that could not overcome the huge losses of the previous decade.

The second classification of counties relies on the urban-rural continuum code, often called the Beale code, for 1993 (Beale 1993), which is based on the population size and rurality of a county. It is reasonable to expect differences in growth and change in these different types of counties based on a large body of research that shows much of the success of nonmetro county growth has been associated with proximity to metro areas, or for counties having a minimum urban population size in order to sustain many important private and public sector activities (Johnson 1985; Shumway and Davis 1996; Booth 1999; Vias 1999). Categorizing and then aggregating data for this classification shows that the biggest increases in population and developed land were in metropolitan counties, and in nonmetropolitan counties adjacent to metropolitan counties (see Table 3). However, note that many remote rural areas also experienced significant increases. In terms of density and land use change, the pattern here is quite consistent and understandable. Metropolitan area counties are densely populated, with densities declining as one moves to smaller, more distant counties. Likewise, counties in the periphery experienced land use change that was much less efficient, with each additional person resulting in the development of five additional acres—more than ten times the rate found in metropolitan counties.

Additional insights derived from Table 3 show that densities are increasing for all metropolitan counties and adjacent nonmetropolitan counties, while nonadjacent nonmetropolitan counties, which are least likely to have any sort of regulation on the development of land, are moving to even lower densities over time. These findings are also consistent with other research revealing measurable density gradients falling away from major urban centers in the Rocky Mountain West (Booth 1999; Carruthers and Vias 2005). Finally, the wide swings in land use change coefficients that differentiated counties by state in the 1980s and early 1990s are not as apparent when the counties are grouped by relative geography. However, the trend toward some convergence in the coefficients over time is apparent in this classification as well.

There are systematic and significant differences in the pace of land development in the Rocky Mountain West based on the relative and absolute location of counties. This finding is interesting, but to link underlying socioeconomic processes with land use change, other methodologies are needed. One approach to establishing these links is to use a classification based on the varying socioeconomic and demographic changes found within each county. To do this, a slightly modified classification developed by Shumway and Otterstrom (2001), which itself was adapted from the USDA nonmetropolitan county classification based on economic structure (Cook and Mizer 1994), is used. Besides the USDA types, Shumway and Otterstrom identified a new county category based on amenities and recreation opportunities to create a 6-category classification system. Their classification is adapted here by aggregating certain categories to create 4 broader categories: *Metropolitan*; *Old West* (basic sectors of agriculture, mining and manufacturing); *New West* (high amenity/high growth counties), and *Diversified Service* (diversified and government). Statistics were generated for the same variables used in Tables 2 and 3, aggregating across each of these four categories.

TABLE 3. CHANGES IN POPULATION AND DEVELOPED LAND BY BEALE CODE, 1982-1997.

Beale Code* / Description	n	Develop. Land 1982	Develop. Land 1997	Percent Change 1982-97	Population 1982	Population 1997	Percent Change 1982-97	Population Density 1982	Population Density 1997	LUCC 1982-87	LUCC 1987-92	LUCC 1992-97	LUCC 1982-97
METROPOLITAN													
0 / Central County of Metropolitan Area; 1,000,000+ population	9	892,440	1,210,740	35.7	4,266,607	5,985,130	40.3	4.78	4.94	0.18	0.22	0.17	0.19
1 / Fringe County of Metropolitan Area; 1,000,000+ population	2	98,600	165,700	68.1	126,631	269,844	113.1	1.28	1.63	0.85	0.69	0.20	0.47
2 / County in Metropolitan Area; 250,000-1,000,000 population	12	828,000	1,283,500	55.0	2,728,452	4,237,526	55.3	3.30	3.30	0.40	0.27	0.27	0.30
3 / County in Metropolitan Area; less than 250,000 population	10	369,000	562,000	52.3	931,695	1,184,794	27.2	2.52	2.11	1.26	0.66	0.57	0.76
NONMETROPOLITAN													
4 / Urban Population > 20,000; adjacent to metropolitan area	8	239,400	352,200	47.1	435,591	672,241	54.3	1.82	1.91	0.64	0.41	0.43	0.48

TABLE 3. (CONTINUED)

5 / Urban Population > 20,000; nonadjacent to metropolitan area	22	738,400	971,900	31.6	1,222,352	1,454,369	19.0	1.66	1.50	1.51	0.68	1.09	1.01
6 / Urban Population < 20,000; adjacent to metropolitan area	23	383,600	485,500	26.6	408,320	543,197	33.0	1.06	1.12	1.51	0.68	0.58	0.76
7 / Urban Population < 20,000; nonadjacent to metropolitan area	95	1,396,300	1,676,300	20.1	1,413,076	1,552,060	9.8	1.01	0.93	–3.23	2.15	0.74	2.01
8 / Completely rural; adjacent to metropolitan area	24	242,200	302,200	24.8	114,314	153,288	34.1	0.47	0.51	4.39	2.13	0.94	1.54
9 / Completely rural; nonadjacent to metropolitan area	72	644,400	744,800	15.6	279,090	298,384	6.9	0.43	0.40	–4.63	–28.33	1.22	5.20
ALL COUNTIES	**277**	**5,832,340**	**7,754,840**	**33.0**	**11,926,128**	**16,350,833**	**37.1**	**2.04**	**2.11**	**0.57**	**0.43**	**0.36**	**0.43**

* see Beale, 1993.

The primary rationale for utilizing this classification system is to measure differences in population growth and land use change between Old and New West counties. A number of papers have explored the transition of western counties as they change socially, economically and demographically from areas once reliant on resources, to new high amenity areas that use resources in a very different way (Rasker 1995; Shumway and Davis 1996; Power and Barrett, 2001). Associated with the changes in the local economy and population has been research on the consequences of these broad structural changes, especially social conflicts on the nature and direction of growth and change in rural communities between newcomers and long-time residents (Smith and Krannich 2000).

The findings in Table 4 reveal some of the systematic differences between categories that were found using the other classifications, but now there is a set of socioeconomic characteristics linked to each category. Interestingly, the *Metropolitan* counties and *New West* counties are quite similar in many ways—both experienced comparably high rates of growth in population (45 percent and 36.3 percent respectively) and developed land (47.3 percent and 40.7 percent respectively). The rest of the region, which is represented by *Old West* and *Diversified Service* economies, experienced a much slower pace growth in population (6.7 percent and 11.8 percent respectively) and developed land (15.9 and 18.1 respectively). More significant than these differences in growth rates, are variations in the land use change coefficient. For each additional person, there was an increase of .79 acres of developed land in the *New West* counties, and .29 acres in *Metropolitan* counties. On the other hand, for each additional person, there was an increase of 2.77 acres of developed land in the *Old West* counties, and 1.60 acres in *Diversified Service* counties. Over time, the land use change coefficients for county types are not nearly as volatile as those found in the two previous classifications, and tend to converge over time. Additionally, the latter 5-year time period is quite similar to that found for the entire 15-year time period.

Overall, the results shown in Table 4 provide a number of interesting insights on land use change in the region, in light of the other evidence presented so far. For instance, the densities for each category, with high densities for *Metropolitan* counties and low densities with the nonmetropolitan *Old West* and *Diversified Service* counties, certainly make sense. The *New West* counties, though, occupy a hybrid space, with densities that are much higher than other nonmetropolitan counties. This is likely a result of the considerable growth experienced by the more remote *New West* counties—especially in counties with a high percentage of federal land, which may require higher density recreational and residential development than would be expected in most nonmetropolitan counties. The higher density may also be attributable to exurban development in nonmetropolitan counties adjacent to metropolitan areas, where commuting and interaction with major cities is high. A final plausible explanation is that it is the result of location-specific amenities, which drive land values and, in turn, the density of development, up. Even though these *New West* counties look more urban than the other two nonmetropolitan types of counties, their density levels are still less than half of those found in *Metropolitan* counties. Differences in absolute density aside, there is a similar downward trend in all types of

TABLE 4. CHANGES IN POPULATION AND DEVELOPED LAND BY FUNCTIONAL SPECIALIZATION*, 1982-1997

Description	n	Develop. Land 1982	Develop. Land 1997	Percent Change 1982-97	Population 1982	Population 1997	Percent Change 1982-97	Population Density 1982	Population Density 1997	LUCC 1982-87	LUCC 1987-92	LUCC 1992-97	LUCC 1982-97
New West	76	1,157,800	1,629,600	40.7	1,648,033	2,245,631	36.3	1.42	1.38	1.48	0.72	0.61	0.79
Diversified Service	65	1,005,700	1,187,500	18.1	964,101	1,082,480	12.3	0.96	0.91	5.20	1.57	0.96	1.54
Old West	103	1,480,800	1,715,800	15.9	1,260,609	1,345,428	6.7	0.85	0.78	–2.75	4.48	1.08	2.77
Metropolitan	33	2,188,040	3,221,940	47.3	8,053,385	11,677,294	45.0	3.68	3.62	0.34	0.30	0.24	0.29
ALL COUNTIES	**277**	**5,832,340**	**7,754,840**	**33.0**	**11,926,128**	**16,350,833**	**37.1**	**2.04**	**2.11**	**0.57**	**0.43**	**0.36**	**0.43**

* Classification developed from Shumway and Otterstrom, 2001.

counties, suggesting that the rate at which land is being developed cannot be differentiated based on the socioeconomic classification.

A Multivariate Model of Land Development in the Rocky Mountain West

This final section develops a regression model that highlights differences in a number of other factors associated with land development from county to county. Rather than focusing at change on change variables over the entire time period of 1982-1997, an approach that can produce unstable coefficients, and involves a 15-year time period with considerable short-term fluctuations, an alternative approach is utilized (Gujarati 1995). Specifically, a number of county-level variables were collected for the years 1982, 1987, 1992, and 1997, permitting an analysis of factors associated with differences in levels of land developed in each county over the 1982-1987, 1987-1992, and 1992-1997 time periods. The result is a panel data set based on five-year intervals. However, due to the empirical specification used—a log-log, or "constant elasticity" model—some observations were dropped because no variable can have a negative value ($n = 638$). This approach was used to take advantage of the ease of interpretation provided by these models (the coefficients are interpreted as elasticities), and the superior fit.

The general form of the model can be shown as the following:

$$\ln(d_{it}) = \alpha_0 + \alpha_1 \ln(x)_{1it\text{-}5} + \alpha_2 \ln(x)_{2it\text{-}5} + \alpha_k \ln(x)_{kit\text{-}5} + e_{it}$$

where $\ln(d_{it})$ is the natural log of land developed in county i at time t, and is a function of a constant and vector $\boldsymbol{x}_{t-5}$ consisting of variables in several categories at time $t - 5$, all assumed to play a role in distinguishing the levels of land developed in Rocky Mountain West counties. The categories of variables, which are explained in more detail with the interpretation of the results, include *land market characteristics*, measured by population density, average rent, and percentage of houses vacant; *demographic characteristics*, measured by per capita income, average household size, and percentage white; *government spending*, measured by per capita spending on roadways and per capita roadway spending on sewage; *economic structure*, measured by the percentage small business establishments, along with percentage employment in agriculture, manufacturing and services; and *geographic characteristics*, measured by the Economic Research Service's natural amenity scale, percentage county land developed, percentage county land national forest, and percentage of county land that is federal. The model also controls for relative geography using dummy variables based on the same rural/urban continuum code used in Table 3. However, in order to reduce the number of categories, 0-3 were labeled as "urban", the omitted category, 4 and 6 as "suburban", 5, 7, and 8 as "exurban", and 9 as "rural". Finally, dummy variables were also included to take into account state and temporal fixed effects (Wyoming and 1987 are the omitted categories). All variables except for the last three categories were in log form, and, as discussed, all are measured at time $t - 5$. Table 5 lists the definitions and sources of all variables involved in the regression. (Note: data for intercensal years were estimated through interpolation).

TABLE 5. DEFINITIONS AND SOURCES OF REGRESSION VARIABLES

Population Density, Developed Land Area, t	Population / Developed Land Area (acres), 87, 92, and 97	REIS, NRI
Population Density, Developed Land Area, t–5	Population / Developed Land Area (acres), 82, 87, and 92	REIS, NRI
$ Average Rent, t–5	Average rent, 82, 87, 92	Census
% Housing Vacant, t–5	Vacant Housing Units / Total Housing Units, 82, 87, 92	Census
% Housing Owner Occupied, t – 5	Owner Occupied Housing Units / Total Housing Units, 82, 87, 92	Census
Per Capita Income, t–5	Per Capita Income, 82, 87, 92	REIS
Average Household Size, t–5	Population / Total Households, 82, 87, 92	Census
% White, t–5	Population / Whites, 82, 87, 92	Census
Per Capita Spending on Roadways, t–5	$ Spent on Roadways / Population, 82, 87, 92	REIS, CG
Per Capita Spending on Sewerage, t–5	$ Spent on Sewerage / Population, 82, 87, 92	REIS, CG

% Establishments Small Businesses, t–5	Establishments with 10 or fewer Employees / Total Establishments, 82, 87, 92	CBP
% Employment in Agriculture, t–5	Employment / Employment In Agriculture, 82, 87, 92	Census
% Employment in Manufacturing, t–5	Employment / Employment In Manufacturing, 82, 87, 92	Census
% Employment in Services, t–5	Employment / Employment In Services, 82, 87, 92	Census
Natural Amenity Scale	Index based on climate, topography, and other features	ERS
% County Land Developed, t–5	Developed Land Areas / Land Area (acres), 82, 87, 92	NRI
% County Land Area Forested, t – 5	Federal Forest Land Areas / Land Area (acres), 82, 87, 92	NRI
% County Land Area Federal, t–5	Federal Land Areas / Land Area (acres), 82, 87, 92	NRI

[a] CG indicates Census of Governments; CBP indicates County Business Patterns; ERS indicates Economic Research Service; NRI indicates National Resources Inventory; REIS indicates Regional Economic Information System; Census data estimated from 1980, 1990, and 2000 U.S. Census.

Estimation results for the model are shown in Table 6, and indicate that the variables used explain a high percentage of the variability in land developed in each county: the adjusted $R^2 = 0.71$. In a model such as this, a baseline control variable is required to take into account different county sizes in terms of land. In this case, the amount of developed land in time t is held constant by the amount of land developed in time $t - 5$. As such, all other variables help to explain differences in why one county has more or less developed land than other counties for a five year time span. As expected, the proportion of county land area that was developed is highly significant, where for every 1% change from time $t - 5$, there was an increase of 0.27% of land developed in time t.

Moving onward, the discussion focuses on statistically significant variables. Also, the fixed effects variables in this model, which control for unobserved differences among states and years, simply reflect unknown spatial and temporal differences, so they and are not discussed. With respect to *land market characteristics*, higher densities and average rents are associated with lower and higher levels of developed land, respectively. This makes sense in that there has been more land developed outside of the high-density metropolitan areas. On the other hand, average rent acts as a proxy value for attractive counties that are more likely to experience land development. In the *demographic characteristics* category, larger household size is associated with more developed land, while a higher percentage of white population is associated with lowers levels of developed land. Clearly, the presence of larger households, especially in suburban counties, has led to larger lots being developed. The higher percentage of white population probably represents the large number of highly agricultural and rural counties that may not be as desirable as counties on the fringe of metro counties, or high amenity counties. In the *government spending* category, higher levels of per capita spending are associated with lower levels of developed land. This seems to be contrary to expectations that suggest more roadway construction makes it easier to expand and develop land on the urban periphery. However, it may also be that roadway construction helps to alleviate congestion, making it more appealing for people to remain in already built-up areas. One way or the other, the effect, as measured by the elasticities, is among the smallest of all the significant variables.

Economic structure plays a large role in differentiating levels of land developed from county to county. Estimates show that a high percentage of small businesses establishments (10 or fewer employees) is associated with lower levels of developed land, perhaps indicating that small stores are more likely to be part of counties with high-density central business districts, as opposed to counties with large numbers of big box stores that consume large amounts of land outside of the CBD. Additionally, high percentages of employment in manufacturing and services both lead to higher levels of land development. In both cases, these probably represent counties with booming economies, either in new high-tech industries, or metro counties experiencing large amounts of population growth, leading to the kind of sprawling development patterns commonly associated with the service sector.

In the *geographic characteristics* category, although just barely significant (at the .10 level) the amenity scale is associated with lower levels of land development. Also, a higher percentage of forest land is associated with higher levels of land development. It is

TABLE 6. FACTORS ASSOCIATED WITH DIFFERENCES IN DEVELOPED LAND

	ln Acres of Developed Land	
	α:	*t*-statistic:
Constant	8.92	4.54
Land Market		
ln Population Density, t – 5	**–0.47**	**–9.85**
ln Average Rent, *t* – 5	**0.36**	**1.96**
ln % Housing Vacant, *t* – 5	–0.07	–0.85
Demographic Characteristics		
ln Per Capita Income, *t* – 5	–0.03	–0.13
ln Average Household Size, *t – 5*	**0.41**	**2.63**
ln % White, *t* – 5	**–0.49**	**–3.56**
Government Spending		
ln Per Capita Spending on Roadways, *t* – 5	**–0.09**	**–2.66**
ln Per Capita Spending on Sewerage, *t* – 5	0.03	1.53
Economic Structure		
ln % Establishments Small Businesses, *t – 5*	**–2.32**	**–5.41**
ln % Employment in Agriculture, *t* – 5	–0.05	–1.18
ln % Employment in Manufacturing, *t* – 5	**0.08**	**2.33**
ln % Employment in Services, *t* – 5	**0.90**	**5.98**
Geographic Characteristics		
ln Natural Amenity Scale	–0.36	–1.79
ln % County Land Area Developed, *t* – 5	**0.27**	**7.62**
ln % County Land Area Forest, *t* – 5	**0.05**	**2.78**
ln % County Land Area Federal, *t* – 5	–0.02	–1.67
County Type		
Suburban	**–0.70**	**–7.70**
Exurban	**–0.91**	**–10.48**
Rural	**–1.24**	**–11.50**
Locational Fixed Effects		
Arizona	0.58	4.54
Colorado	–0.29	–3.23
Idaho	–0.37	–4.04
Montana	–0.16	–1.90
New Mexico	0.04	0.42
Nevada	–0.52	–4.60
Utah	–0.39	–4.41
Temporal Fixed Effects		
1992	0.04	0.75
1997	0.01	0.21
n		638
Adjusted R^2		0.71

Variables in **Bold** are significant at the .05 level.

possible that the most attractive high amenity counties have overheated land markets, and limited areas for development, making additional development untenable, and pushing people towards higher density development. In contrast, counties with large amounts of forest land alone may have more land available for development, particularly in the absence of the kind of timber industry found in the Pacific Northwest. The *county type* category, demonstrates the gradients in land development shown in Table 3, where the lower the density and population, and the further from metro areas, the less overall development that is taking place. Overall, the fastest changes in land development are taking place in metro counties, but probably not in the central city counties with very high densities, as demonstrated with the density variable above.

The significance and high elasticities of the county type variables show that much of the differentiation in the amounts of land developed in the region is based on the factors related to relative geography. Additionally, the role amenities play in explaining differences in land development is much murkier than suggested by previous analyses. Recent research by Clark et al. (2003) suggests that amenities may be uncompensated, highlighting the need for additional exploration of precisely how they affect regional growth and change.

Discussion and Conclusion

Data from the USDA's NRI database exposes significant differences in the pattern of growth and resulting land use outcomes in the Rocky Mountain West between 1982 and 1997. More specifically, Arizona and Nevada dominate the region in terms of population growth rates, while Idaho and New Mexico have experienced the highest growth rates in terms of developed land. By far, the slowest growing states between 1982 and 1997 were Montana and Wyoming, states where the nonmetropolitan counties developed land at a faster rate than their metropolitan counterparts. In addition, the analysis revealed that land development and population growth in the *New West* counties was similar to rates found in metropolitan counties. The interaction between population growth and land use change indicates that land developed in the metropolitan counties of the fast growing states is much more dense, and actually consuming much less land, given the number of people moving into the region. In contrast, the most inefficient use of land, at least in terms of the amount of land developed per new person in the region, is found in the more remote and nonmetropolitan areas of the Rocky Mountain West, especially *Old West* areas that have traditionally relied on extractive industries. Finally, the regression model shows a number of other variables that can help to differentiate the levels of land development from one county to another, especially the role of population density and local economic structure.

Several aspects of this research are particularly salient, and deserve further discussion. First, there is some evidence that the conceptual model presented in Figure 1 provides insights on differential land use change in the region. In particular, the results suggest that population processes working at two spatial scales may induce land use change. For instance, using the Beale urban/rural continuum classification, we can see the continued micro-level deconcentration process, with people leaving the large cities for the nearby nonmetropolitan counties. This movement is leading to significant land development in these nearby nonmetropolitan counties, but at density levels substantially lower than in metropolitan counties. Additionally, the macro-level processes outlined in the model, with substantial population growth and low-density development taking place in many remote, high-amenity areas (the New West counties), can be discerned from the results.

A simple follow-up examination of IRS migration data for 1995-1996 (other years in the 1990s show similar patterns) generally confirm the above statements, that migration at the inter- and intra-regional levels is a significant force in bringing about population change at the county level (IRS 1997). For example, by aggregating counties according to the four socioeconomic categories used in Table 4, the IRS data show that *Metropolitan* and *New West* counties have the highest percentages of out-of-state migrants when compared to the other types of counties. For *New West* counties, the high percentage of all in-migrants coming from outside the state (about 57% of all in-migrants) may be a result of the process defined in the top part of Figure 1, where population growth is driven by interregional migration as people are lured directly to high-amenity counties. In *Metropolitan* counties, this high percentage of out-of-state migrants (around 60% of all in-migrants) feeds the process of counterurbanization as major cities in the region expand into the outlying suburban and exurban counties, as shown in the bottom part of Figure 1. For example, Salt Lake County in Utah received 68% of it migrants from outside the state, while the outlying counties of Weber and Davis received less than 50% of their migrants from out of state. Additionally, of in-migrants to Weber and Davis counties, by far the largest amount of those migrants represent an outflow of people from the central city county of Salt Lake. Similar results are found with respect to the outlying metropolitan counties around the cities of Albuquerque, New Mexico and Boise, Idaho. While these results suggest that the mechanisms and processes outlined in Figure 1 may be valid, more rigorous modeling is needed to provide a more definitive test.

The second important finding of this research relates to the *New West* counties, which have truly differentiated themselves from *Old West* counties. Recent research (Rasker 1995; Power 1996; Booth 1999; Shumway and Davis 1996; Power and Barrent 2001; Shumway and Otterstrom 2001) has outlined the processes that have changed these counties in terms of economic structure, demographic characteristics, and the natural environment. That is, these counties are more service-oriented, have experienced greater population growth, and offer a more desirable set of natural amenities than *Old West* counties. While *New West* counties have changed significantly in recent decades, it is also apparent that they remain quite different from their metropolitan counterparts. The research presented here suggests that *New West* counties represent a transitional hybrid, with densities lower than *Metropolitan* counties, but noticeably higher than *Old West* counties. Unfortunately, this hybrid type of county also embodies the high growth rates of metropolitan areas combined with the more inefficient patterns of land use development found in the more rural areas—a likely path to urban sprawl. This trend probably spells long-term problems for the *New West* counties that rely on natural amenities for their economic health, attributes that are endangered with uncontrolled and rampant sprawl.

Finally, the third significant aspect of this research concerns the density of land development throughout the Rocky Mountain West as a whole. While specific density patterns for 1982 and 1997 are interesting in-and-of themselves, they represent the past, or the nature of development that has already taken place. However, the change in density is of much greater interest, and illustrates how the region is developing over time through processes that are probably still taking shape. For instance, the Beale code classification reveals that the most remote counties are developing land in a way that is pushing densities ever lower, unlike the larger counties located close to metropolitan areas. Given the lack of land use planning generally found in these very rural areas, this finding is understandable.

The most interesting results, however, emerge from the state-level classification, which reveals a startling dichotomy in terms of land use change in the Rocky Mountain West. Arizona and Nevada, both fast growing states, are the only two states that have experienced development that is becoming more efficient, with densities increasing between 1982 and 1997, for metropolitan and nonmetropolitan areas. The rest of the region also experienced population growth, but over time even more land was developed than population trends suggest, leading to long-term declines in density.

While further, more detailed, research is needed to uncover the specific residential consumer preferences of migrants, especially as they relate to local amenities, this article has taken a step in that direction by documenting the powerful growth trends at work in the Rocky Mountain West and linking them to substantive land use outcomes. Because natural amenities represent a primary draw for migrants, the long-term sustainability of growth in the Rocky Mountain West may depend on the preservation of these attributes (Power and Barrett 2001). Once these are eroded people, and the firms who employ them, will have much less motivation to locate in the region, especially given how remote most of it is.

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