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Micropolitan areas: Exploring the linkages between demography and land-cover change in the United States cities

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ABSTRACT

Micropolitan statistical areas in the United States are important transitionary regions that may provide insights into the economic, demographic, and social forces driving urbanization. Land cover change may provide significant insights into the dynamics of these important transitionary units. Our work investigates three questions: (1) How is the national landscape changing within micropolitan statistical areas with regards to land cover? (2) Are land-cover conditions in micropolitan areas closer to rural or metropolitan areas or are they unique? (3) How closely are demographic patterns linked to land conversion for development within micropolitan areas?

When compared to metropolitan and rural areas within the US, our results demonstrate that micropolitan areas are unique with regards to the total amount of developed land, as well as land conversion to development. Within the micropolitan areas, we show that demographic categories such as population, population density, or population growth are not adequate predictors of land-cover change and that the geographic patterns of land conversion for development may provide valuable insights into the impact of micropolitan areas on the US national landscape.

Introduction

In a posthumous article published in *Cities* in January 2012, Alexander Vias (2012) outlines the necessity of investigating the new micropolitan statistical areas that were created by the Office of Management and Budget (OMB) in 2003. The significance of this new designation is slowly being recognized as researchers begin to investigate how micropolitan areas reflect and respond to shifting socio-economic and demographic pressures (Vias, 2012). In his work, Vias (2012) highlights a series of basic empirical research issues that should be addressed for micropolitan areas, ranging from an understanding of the basic demographic patterns and how they differ from or are similar to metropolitan areas, to more complex multivariate statistical analysis that characterize micropolitan areas using economic, demographic, and geographic variables. The present work responds to Vias' challenge but emphasizes the utility of beginning with an investigation of land-use/land-cover change in micropolitan areas. In particular, this research investigates three questions: (1) How is the national landscape changing within micropolitan statistical areas with regards to land cover? (2) Are land-cover conditions in micropolitan areas closer to rural or metropolitan areas or are they intermediate? (3) How closely are demographic patterns linked to land conversion for development within micropolitan areas?

Our aim is to reinforce Vias' assertion that micropolitan statistical areas in America are important transitionary regions that may provide insights into the economic, demographic, and social forces driving urbanization. We hypothesize that when compared to metropolitan and rural areas within the US, micropolitan areas are unique with regards to the total amount of developed land, as well as land conversion to development. In addition, we argue that within micropolitan areas, demographic categories such as population, population density, or population growth are not adequate predictors of land-cover change.

Background

Urbanization in the United States has historically been driven by two critical forces: immigration and rural-to-urban migration. These forces combined with natural population increase helped make the United States an urban nation (50% of the population residing in urban areas) in 1920. The nation is now approximately 80% urban. While it is easy to conclude that the United States is just a massive "daily urban system" and that non-metropolitan or rural areas lack economic or social autonomy (Berry, 1967) it is still important to think about how smaller urban centers that are spatially and functionally removed from major urban centers may

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adopt development policies that reveal distinct land-use patterns. At the same time, it is also important to note that providing concise definitions for words like rural, urban and metropolitan are extremely challenging propositions (Deavers, 1992; Fitzsimmons & Ratcliffe, 2004; Isserman, 2005; Slifkin, Randolph, & Ricketts, 2004). Part of the problem lies in trying to apply a formal definition to a functional region that might be best described as a "space of flows" (information, people, and goods). For example, the Census Bureau defines urban areas, which reflect a physical/formal (rather than functional) distinction where urban or urbanized areas are required to pass population size and density thresholds. In contrast, the Office and Management and Budget (OMB) examines metropolitan areas and seeks to capture the functional nature of our metropolitan regions by emphasizing their high degree of social and economic integration and clearly developed commuting patterns. From this perspective, the OMB classification was not designed to delineate urban and rural populations, although it often tempting to think of metropolitan regions simply as urban.

While official metropolitan statistical areas were established in the U.S. in the 1910 census (Bureau, 1913), it was not until 2000 when the OMB (the federal government agency responsible for establishing the nation's official statistical geography) established a new core-based statistical system which introduced the category *micropolitan*. Of interest for this research are three core-based statistical area (CBSA) designations: metropolitan, micropolitan, and non-designated areas (often referred to as rural).

Why the micropolitan designation?

The OMB's reclassification effort in 2000 sought to distinguish between large core settlement clusters of more than 50,000 (metropolitan) and smaller clusters of 10,000–49,999 (micropolitan) and to account for commuting patterns between core and outlying counties. In addition, non-core-based counties were retained. Under the previous system, non-metropolitan areas referred to counties with populations less than 50,000 and metropolitan areas were counties with 50,000 or more. In lay terms, the micropolitan designation was created to serve as an intermediate level of urbanization between larger, more extended metropolitan systems, and smaller, more localized rural places. The OMB continued to use the county as the basic geographic building block of metropolitan areas in the new system because: (1) economic data is more readily available at the county level in comparison to the census tract level; (2) census tracts tend to change more frequently; and (3) counties remain the primary unit of local governance for most regions in the United States. It should be noted that the county-level spatial unit does impose artificial boundaries on the US landscape. The effect of neighboring areas outside the county may not be fully accounted for in the classification. Also, the size of the counties vary widely on east–west gradient across the US, which has implications when assessing land-cover change. It is important to examine the response from the landscape data on both an area and a percentage data to more fully capture the underlying story.

One of the most obvious effects of the new classification system is the amount of territory that has been redefined. Comprising hundreds of counties, micropolitan counties now account for a sizable land area (i.e., almost 25% of the contiguous US) and therefore have important geographic and demographic implications. One in ten Americans (approximately 30 million people) lives in micropolitan areas, creating what Lang and Dhavale (2004) refer to as, "a brand new Geography."

Micropolitan areas, migration, and population change

Investigations concerning the dynamics of migration and population change have been aided by the inclusion of micropolitan areas (Brown, Cromartie, & Kulcsar, 2004). Researchers have used the OMB's new census category to demonstrate how this new intermediate settlement type can offer clarity to demographic, social and economic trends.

Research is just beginning to highlight the types of services and functions (bus services, housing, hospitals, museums, newspapers, national or regional hotel franchise, employment opportunities, etc.) available to citizens living in these areas (Goe, 2002; Vias, Mulligan, & Molin, 2002). The strength of this research is that it illustrates that even small places removed from metropolitan areas serve as economic hubs for workers and shoppers across large areas. The point of this research is to demonstrate that micropolitan areas are important because they can anchor regional growth for a variety of reasons (Davidsson & Rickman, 2012). For example, fast growing micropolitan areas include: (a) oil boom communities like Williston, Dickinson and Minot, North Dakota; (b) retirement or leisure communities like The Villages, Florida, Boone, North Carolina and Heber, Utah; and (c) places like Dunn, North Carolina whose location in Harnett County, North Carolina places it between two growing metropolitan areas of the research triangle and influenced by the growth of Fort Bragg.

A wealth of literature now exists on trying to measure and explain the causes and consequences of sprawl, particularly metropolitan sprawl (Benfield, Raimi, & Chen, 1999; Bhatta, Saraswati, & Bandyopadhyay, 2010; Carruthers & Ulfarsson, 2002; Daniels, 1999; Ewing, 2008; Fulton, Pendall, Nguyen, & Harrison, 2001; Gordon & Richardson, 1997; Hasse & Lathrop, 2003; Li & Yeh, 2004; Sudhira, Ramachandra, & Jagadish, 2004). Other researchers have been keen to share the benefits of investigating smaller cities that are often ignored in urban analysis (Brennan, Hackler, & Hoene, 2005; Clancey, 2004; Heubusch, 1997; Miles, 2006). For example, Bell and Jayne (2009) note that the wealth of literature discussing the epochal city, the urban hierarchy, the global city and the global city-region tends to discount the status and performance of smaller urban centers, often concluding that such places are irrelevant or unimportant because of their failure to have the same influence or reach of larger urban centers. Of course, defining smallness may be determined by a number of different measurements, but Bell and Jayne (2009), following Brennan and Hoene (2003), note that in the United States a city population of less than 50,000 is often a benchmark. More important that city size, though is the functional characteristics of these urban places. It is clear, as Vias (2012) argues, that much more work needs to be done to understand the basic demography and characteristics (age, race, ethnicity, education, housing conditions, etc.) of micropolitan areas as well as more complex investigations that seek to characterize migratory behavior and economic structure. Since micropolitan areas occupy the middle ground of the urban hierarchy, reflecting and responding to processes from below (i.e. rural migration) and above (i.e. amentity/leisure migration, economic specialization, competitive advantage, etc.), they offer potential to reveal the dynamisms of the urban hierarchy. What makes micropolitan areas fascinating is that they can be places of very rapid change, and similar to metropolitan areas can be rich with diversity (Lang & Danielsen, 2008). A county can shift from being a non-core based statistical area to a metropolitan area in the course of decade.

We concur with the above authors (Bell & Jayne, 2009; Vias, 2012) that we have a somewhat limited picture of micropolitan areas and smaller urban centers with regards to the broader economic, demographic, and social changes taking place in the US. At the same time, we argue that the creation of the new micropolitan statistical category provides a prime opportunity to investigate the link between micropolitan processes and land-use and land-cover change (LULC) patterns. Ultimately, the long term research goal is to determine if this new designation has altered the dynamics of the broader urban system. For example, has the