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Spatial analysis of land suitability, hot-tub cabins and forest tourism in Appalachian Ohio

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A B S T R A C T

After decades of falling real commodity prices in agriculture, forestry and mining, natural amenities have become central components of regional growth strategies. While the prospects for amenity-led growth are perceptible, there are still many open questions regarding how natural resources become valuable amenity assets. In this manuscript, we investigate spatial patterns of natural amenity-based tourism; i.e., tourist lodging in so-called hot tub cabins (HTCs) in Hocking County, Ohio. A rare events logistic regression (RELR) is used to examine which spatial factors are most strongly associated with the observed patterns of HTCs. We evaluate how apparent spatial conflicts (water availability and exurbanization), tourist and natural amenities (forest cover, topography, state parks and federal forestland) and legacy effects (past mining areas and an urban density instrumental variable) influence the suitability for HTCs. Prior literature on natural amenity tourism has largely focused on regional or continental scales in order to have a large sample size for analysis. In so doing, finer-scale variation in land suitability is difficult to represent. We use RELR to control for the rarity of tourism lodging at the county scale. Our findings suggest that accessibility combined with tree cover and topography explains much of the variation in HTC locations. While protected areas are likewise important, past activities like mining impact current recreation possibilities, appearing to be incompatible with the natural experiences sought by HTC visitors. HTCs are also more likely to be located in remaining "remote areas", or inversely related to the patterns of urban density. Policymakers wishing to enhance regional competitiveness in amenity-led growth should consider fine scale characteristics and environmental legacies in their development planning.

Introduction

Overview

After decades of falling real commodity prices in agriculture, forestry and mining, natural amenities have become central components of regional growth strategies as the countryside itself has become an object of consumption (Bowe & Marcouiller, 2007; Urquhart, Courtney, & Slee, 2012). Amenities can be defined as location-specific characteristics that increase willingness to move to or visit a particular area (Marcouiller & Clendenning, 2005; Waltert & Schläpfer, 2010). Location-specific amenities are increasingly attracting urban visitors to spend time in and money on rural areas (Gartner, 2004). Rural actors including foresters and farmers have developed new livelihood strategies in response to this demand that have had varying success (Van Berkel, Carvalho-Ribeiro, Verburg, & Lovett, 2011; Saxena, Clark, Oliver, & Ilbery, 2007). While the prospects for amenity-led growth are perceptible, there are still many open questions regarding how physical features become valuable amenity assets, and how local and regional communities can foster long-term amenity transitions.

Recent work in geography has enhanced understanding of amenity-led growth through analyses of postproductivism and multifunctionality (Duesberg, O'Connor, & Dhubháin, 2013; Lovellet al., 2010; Urquhart et al., 2012; Wilson, 2010). This research has emphasized the spatiality of such transitions, recognizing the diverse social, political, economic and environmental contexts within which they occur (Wilson, 2009). Specifically, this literature has stressed the importance of local institutional support (Holmes, 2006; Wilson, 2010), the provision of recreational opportunities most demanded by visitors (Jongeneel, Polman, & Slangen, 2008; Urquhart et al., 2012; Van Huylenbroeck,

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Vandermeulen, Mettepenningen, & Verspecht, 2007) and the role of the surrounding landscape in complementing tourist and recreational activities (Willemen, Verburg, Hein, & van Mensvoort, 2008). At local scales, landscape configuration has been especially emphasized as an important component of amenity growth (Marsden, 1999; Wilson, 2009). Spatial quantitative analysis can add insight into how and where amenity development occurs by investigating attributes including proximity to environmental features, cultural amenities, or incompatible land uses that shape where natural amenity tourism is possible (Mather, Hill, & Nijnik, 2006).

Opportunities for amenity-led growth may rise from environmental features like topography, climate, proximity to lakes and rivers, and attractive biomes (e.g. autumn colors of temperate deciduous forests) due to their inherent aesthetic value (Van Berkel & Verburg, 2012). Critically, physical attributes can become tourist amenities through the establishment of protected areas, the agency of local institutions, and the construction of tourist facilities, among other features that increase local demand for recreation and leisure activities (Brown, 2006; Claver-Cortés, Molina-Azorńn, & Pereira-Moliner, 2007). Transportation networks that increase accessibility to these amenities are also important.

In addition to these key factors, current tourism opportunities may be affected by competing uses that conflict with aesthetic values. Such conflicts may be a result of land-use history, for example the contamination of soil and water or aesthetic damage resulting from mining (Hunt, Boxall, Englin, & Haider, 2005). Rural growth that includes substantial exurbanization may also impede tourism. This paper examines how such processes are associated with the locations of tourist lodging.

We analyze patterns of tourist lodging in the Appalachian foothills of Hocking County, Ohio (39.50°N 82.48°W), a landscape experiencing an amenity transition (Fig. 1a). The county was at one time the site of heavy resource extraction and has transitioned toward increasing recreation and leisure. The decline of mining and lumber industries and subsequent reforestation has given rise to a tourist lodging industry with an estimated $14 million in rental returns annually. So-called hot-tub cabins (HTCs) vary from rustic to extremely luxurious and almost universally offer a hot tub as an accommodation amenity. They are advertised as romantic retreats, locations for group getaways, and secluded escapes.

Spatial suitability analysis of amenity landscapes

Previous studies of amenity landscapes have provided insight into how location-specific characteristics increase tourist demand. One of the earliest spatial evaluations of the role of environmental features in tourism dates to Christaller (1964). Subsequent studies have utilized advances in GIS to develop multicriteria suitability maps of landscape characteristics using expert input (Kliskey, 2000). Recent participatory empirical methods have linked stated preferences to actual landscape structure (Alessa, Kliskey, & Brown, 2008; Kienast, Degenhardt, Weilenmann, Wäger, & Buchecker, 2012; Plieninger, Dijks, Oteros-Rozas, & Bieling, 2013; Sherrouse, Semmens, & Clement, 2014) allowing for more sophisticated representations of trade-offs among different landscape configurations. Hedonic techniques can shed light on how environmental amenities are associated with variations in market value (e.g. lodging returns) (Kaidou, Moore, & Charles-Soverall, 2012; Parmeter & Pope, 2009; Santana-Jiménez, Suárez-Vega, & Hernández, 2011; White & Mulligan, 2002).

A major challenge of understanding suitability for natural amenity tourism is finding the most appropriate spatial scale for analysis, as tourists seek locations that offer proximate amenities, which satisfy their leisure and recreational demands (Alessa et al., 2008; Howley, 2011). Most studies focus on a relatively large region because amenity activities, e.g., tourist lodging, are often a comparatively small part of a local landscape, which confounds adequate spatial representativeness (Hunt et al., 2005; White & Mulligan, 2002). Analysis at larger aggregate scales, however, may obscure the diversity of land uses and covers and therefore may not account for spatial conflicts that can exist at sub-regional scales. In this paper, we take steps to capture these sub-regional interactions by using a rare events logistic regression model (King & Zeng, 2001), which ameliorates the challenge of rarity at this fine scale. The statistical model enables stable results despite the low occurrence of indicators of amenity demand (i.e., HTCs) that has previously hindered sub-regional analysis.

Hocking County as an amenity landscape: hot-tub cabins

Hocking County, Ohio, has experienced dramatic growth in tourism in recent decades, and hot-tub cabins are a key component of that growth. The county's proximity to the Columbus metropolitan area as well as the region's natural beauty, characterized by the dramatic topography of the Hocking Valley, and lush temperate forests, is a draw for visitors. The county is also home to several state parks and federal forests with well-known caves and waterfalls, hiking, All Terrain Vehicle (ATV) trails, and hunting opportunities. All these amenities attract tourists, and an estimated 3 million people visit Hocking Hills State Park annually (Hocking Hills Tourism Association, 2012). This high amenity demand has occurred despite seemingly incompatible land uses. The mining industry, for example, left lasting scars, including acid mine drainage and the outflow of acidic water from coal mines (Wan, Liu, Munroe, & Cai, 2013), damaging the attractiveness and viability of surface water bodies. A more complicated issue is the relationship between exurbanization and hot tub cabins. At the same time that tourism has been increasing in the region, there has been growth in residential development, possibly decreasing the perceived naturalness of the region and leading to potential conflicts between tourists and residents (Smith & Krannich, 2000).

A spatial analysis of HTCs can shed light on which features enhance or attenuate transitions to amenity landscapes. In this study we investigate which spatial factors are most strongly associated with the observed patterns of hot-tub cabins in the county. In so doing, we can evaluate spatial conflicts or complementarities in the observed pattern of hot tub cabins, and assess the influence of other land uses on current HTC locations. Specifically, we seek to understand what role the land use, physical environment, transportation infrastructure and services, and more recent trends in exurbanization play in shaping the development of amenity demand at a local scale.

Materials and methods

Overview

In this research, we investigate the association between various spatial factors and the locations of HTCs using a Rare Events Logistic Regression (RELR) (King & Zeng, 2001), which helps correct for the relatively low occurrences of HTCs in the county. In the following section we discuss data collection, variables that were included in the investigation as factors that might influence the locations of HTCs, and the methodology used to investigate why they are located where they are.

Dependent variable

A database of HTCs in Hocking County was created through a search of local tourist websites that advertise and take bookings for