Classifying and mapping the urban transition in Vietnam

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ABSTRACT

The urban transition almost always involves wrenching social adjustment as small agricultural communities are forced to adjust rapidly to industrial ways of life. Large-scale in-migration of young people, usually from poor regions, creates enormous demand and expectations for community and social services. One immediate problem planners face in approaching this challenge is how to define, differentiate, and map what is rural, urban, and transitional (i.e., peri-urban). This project established an urban classification for Vietnam by using national census and remote sensing data to identify and map the smallest administrative units for which data are collected as rural, peri-urban, urban, or urban core. We used both natural and human factors in the quantitative model: income from agriculture, land under agriculture and forests, houses with modern sanitation, and the Normalized Difference Vegetation Index. Model results suggest that in 2006, 71% of Vietnam's 10,891 communes were rural, 18% peri-urban, 3% urban, and 4% urban core. Of the communes our model classified as peri-urban, 61% were classified by the Vietnamese government as rural. More than 7% of Vietnam's land area can be classified as peri-urban and approximately 13% of its population (more than 11 million people) lives in peri-urban areas. We identified and mapped three types of peri-urban places: communes in the periphery of large towns and cities; communes along highways; and communes associated with provincial administration or home to industrial, energy, or natural resources projects (e.g., mining). We validated this classification based on ground observations, analyses of multi-temporal night-time lights data, and an examination of road networks. The model provides a method for rapidly assessing the rural–urban nature of places to assist planners in identifying rural areas undergoing rapid change with accompanying needs for investments in building, sanitation, road infrastructure, and government institutions.

Introduction

Simon Kuznets summarized the structural transition that accompanies economic development, emphasizing "the shift away from agriculture to non-agricultural pursuits and…away from industry to services" (Kuznets, 1992, p. 89). Less obvious but no less important are the transformations of the landscape needed for these structural shifts. As economies become industrialized and more people are employed in services, the nature of urban and rural areas changes. The transition from predominantly rural to increasingly urban economies is one of the great development challenges of the times (Aoyama & Horner, 2010). Urbanization spurs growth and reduces poverty but can also exacerbate inequalities, increase exposure to certain health risks, degrade environmental quality, lead to food insecurity, and have other deleterious effects. Managing the rural-to-urban transition in a way that safeguards equitable and sustainable growth is therefore a major concern of the development community. Policy makers around the world are looking for ways to manage the urban transition that ensure beneficial outcomes and minimize risk (Dudwick, Hull, Katayama, Shilpi, & Simler, 2011).

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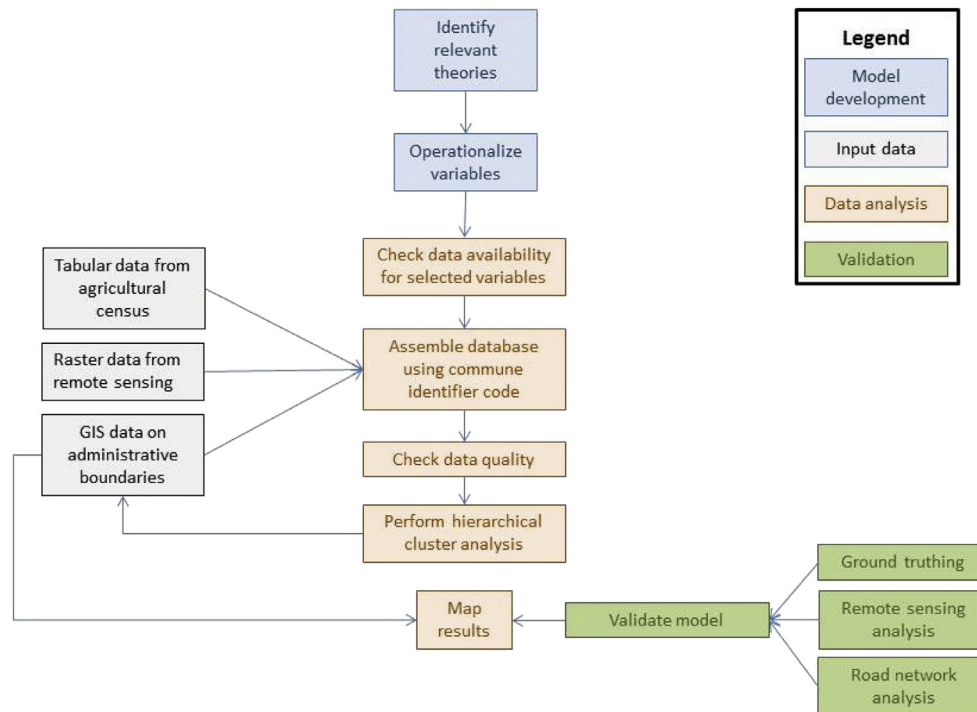
Fig. 1. Methodological workflow.

One immediate problem planners face in approaching this challenge is how to define, differentiate, and map what is rural, urban, and transitional (i.e., peri-urban). Statistical definitions of "rural" and "urban" vary from country to country (or even within countries) and can be based on administrative boundaries, size, level of services, or population density (Aoyama & Horner, 2010). In reality there is a rural-to-urban continuum, ranging from sparsely populated, isolated settlements to small towns to secondary cities to megacities; and in any given country there is heterogeneity within areas that are classified as rural or urban. Whether an administrative unit is classified as rural or urban, however, affects how it is governed and the financial resources allotted for governance. Of particular concern is the fact that the governance and management of places that are neither rural nor urban are frequently neglected by both rural and urban administrators because such places either lie beyond urban administrative boundaries and thus lack access to urban resources, or they fall under the administration of cities that lack the financial resources to upgrade the planning and infrastructure of transitional areas.

The urban transition almost always involves wrenching social adjustment as small agricultural communities are forced to adjust rapidly to industrial ways of life. Large-scale in-migration of young people, usually from poor regions, creates enormous demand and expectations for community and social services. Environmental stresses in peri-urban areas are also significant due to the patchy nature of newer settlements, pollution from a variety of industrial and residential sources, as well as motorization; and inadequate public-sector financial resources to cope with the rapid development (Webster, 2002). Planners and development agencies badly need methods for collecting and analyzing data that enable them to assess variables along the rural-to-urban continuum and to classify and map areas as rural, urban, and peri-urban. Without such methods they cannot estimate how much of the landscape is affected by peri-urbanization;

they do not know how many peoples' lives are affected; they do not know the extent of the environmental and human-health problems; and they cannot address issues of governance and responsibility.

Numerous studies have used remotely sensed data to map the extent and rate of urban expansion at local (Li & Yeh, 1998; Schneider, Seto, & Webster, 2005), national (APN, 2009), and global scales (Schneider, Friedl, & Potere, 2009, 2010; Seto et al., 2012). These studies, however, tell us little or nothing about the socioeconomic characteristics of places undergoing the rural-to-urban transition or the interaction of rural and urban activities. Other studies have used household and community data to map local-scale administrative units according to characteristics such as population size and density, communication and transportation networks, educational facilities, and access to health services and markets. These studies map the relative urban nature of a place, a broad concept that is often referred to as "urbanicity" (Dahly & Adair, 2007; Jones-Smith & Popkin, 2010; McDade & Adair, 2001; Van de Poel, O'Donnell, & Van Doorslaer, 2009). While these studies show differences in the rural/urban nature of communities across space and time, they have been limited to small- to medium-scale observational studies.

Novak, Allender, Scarborough, and West (2012) report a multi-country urbanicity scale for Ethiopia, India, and Peru, but their work does not map changes in urbanicity across national space. More significantly, the variables used in these studies largely measured "urban" features and failed to distinguish between different levels of "ruralness." While some studies have used statistical construct validation (Dahly & Adair, 2007; Novak et al., 2012), none have validated the results of their models through ground truthing.

The objectives of this study are twofold. First, we seek to establish an urban classification by using Vietnamese national census and remote sensing data to identify and map communes, the smallest administrative unit for which data are collected, as