Chapter 1
Geospatial Technology in Urban Sprawl Assessment: A Review

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ABSTRACT

The emergence of alienated patch in the periphery of the city or fragmentation of the main city are the results of irresponsible and poor planning. This global problem of sprawl is strengthening even more with the hasty pace of urbanization. Despite the existing policies and regulations, it is a huge failure to control the sprawl. Hence, city planners and policy makers need to be more efficient in designing the cities to achieve sustainable development goals. For that purpose, adequate and informative data of the urban morphology, growth pattern, sprawl characteristics are required. Geospatial technology is a cost-effective measure and best among currently available techniques for collecting real-time/near real-time geographical data of the entire globe. The geographic information system (GIS) provides numerous tools for assessment of multidimensionality of urban sprawl. This chapter discusses various urban models, different forms of urban expansion, and a few existing methods to quantify sprawl.

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INTRODUCTION

Urbanization can be defined as the migration or shifting of rural populations towards the urban areas. The major driving factors for rural to urban transition are industrialization, employment, better standard of living, and social security benefits (Aithal & Ramachandra, 2016; Bhatta, 2009). In the 21st century, urbanization blooms as one of the biggest problems for many developing as well as developed countries all over the world (Jaeger et al., 2010; Muñoz, 2003). It is taking place at an unprecedented scale by creating profound impacts on the environment, economy, as well as the society (Sun et al., 2013). The foreseeable consequences of this process are the unplanned and uncontrolled spatial expansion of urban cores beyond their administrative boundaries in order to accommodate the growing population, which results in scattered patches or fringes (Marshall & Dolley, 2019). The sprawled cities are facing serious issues with respect to basic amenities, such as electricity, water, sewerage channels, transportation, and communication, along with a dramatic increase in pollution, poor health facilities, deteriorating educational standards, unemployment, and poverty. To overcome such issues, urban planners have to understand the dynamics of a particular urban area and the current urbanization process, which will solidify the basis of future predictions and guide in preparedness for urban sustainability (Anas et al., 1998).

There are three popular models for urban development, such as the concentric zone model (Burgess Model), the sector model (Hoyt Model), and the multiple nuclei model (Ullman Harris model). In the concentric zone model-based cities (e.g. Chicago, United State), multiple zones, such as industrial corridors, working-class housing, middle-class housing, and commuter zones with suburbs of higher-income-class housing are usually designed around a central business district (CBD). Whereas, the sector model-based cities (e.g. Sunderland, United Kingdom) are divided into multiple wedge-shaped (not ring shaped) sectors of transportation, industries, and low-medium-high-class residential areas designed around a central circular CBD. In both of these models, the CBD plays a vital role, however, in contrast, a less significant CBD is presented for the multiple nuclei model (e.g. Los Angeles and Houston). Multiple centres attract a particular kind of population, which is imitated by neighbourhood land use. Apart from these conceptual models, different countries develop their own theories and policies for urban development (Figure 1).