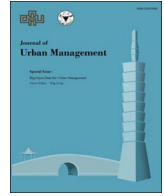


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Research Article

Measuring urban sprawl of Srinagar city, Jammu and Kashmir, India

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ABSTRACT

Urbanization, as such, is not perceived as a threat to the environment and development but it is unplanned urban sprawl that affects the accessibility to amenities and land-use of any region. It is thus imperative to study and bring out the intricacies and implications associated with the problem of unplanned urban growth ensuing into sprawl. The methods used to measure the sprawl of Srinagar City are modified versions of SCATTER (*The Sprawling Cities And Transport: from Evaluation to Recommendations*) and Cost of Sprawl: 2000 TRB (Transport Research Bureau, US). The analysis reveals that the largest urban center in the fragile ecology of Himalayas has haphazardly grown during the last forty years which has resulted in disproportionate distribution of various civic amenities, socio economic and environmental variables. This phenomenon of urban sprawl in Srinagar City has been observed as a threat to achieving sustainable urbanization.

Introduction

The study of urbanisation has evinced interest from a wide range of experts. The multidisciplinary gamut of the subject invokes the interest from ecologists to urban planners and civil engineers to sociologists to geographers to administrators and policy makers and finally the common man. This is because of the multitude of activities and processes that take place in the urban ecosystems every day. Urban ecosystems are the consequence of the intrinsic nature of humans as social beings to live together (Torrens and Alberti, 2000).

The unprecedented population growth and migration, an increased urban population and urbanisation is inadvertent in developing countries (Reddy, 2004). More and more towns and cities are blooming with a change in the land use along the highways and in the immediate vicinity of the city. This dispersed development outside of the compact urban and village centres along highways and in rural countryside is defined as sprawl (Theobald, 2001). Urbanisation is a form of metropolitan growth that is a response to often bewildering sets of economic, social, and political forces and to the physical geography of an area (Sudhira, Ramachandra & Jagadish, 2003; Ramachandra & Kumar 2009). Some of the causes of the sprawl include - population growth, economy, patterns of infrastructure initiatives like the construction of roads and the provision of infrastructure using public money encouraging development (Kulkarni & Ramachandra, 2009). The direct implication of such urban sprawl is the change in land use and land cover of the region.

Urbanisation, as such, is not seen as a threat to the environment and development but it is the urban sprawl that affects the land-use of any region that becomes a matter of concern through its affectation in the loss of prime agricultural lands (World commission on development, 1987). It is thus imperative to study and bring out the intricacies and implications associated with the problem of

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unplanned urban growth ensuing into sprawl. Also, sometimes sprawl is equated with growth of town or city (radial spread) (Barnes, Morgan, Roberge & Lowe, 2001, Sudhira, Ramachandra & Bala Subramanya, 2004). In simpler words, as urban population increases, the boundary of the city expands to accommodate the growth; this expansion is considered as sprawl. Usually sprawls take place on the urban fringe, at the edge of an urban area or along the highways. It results in the engulfing of villages into peri-urban areas, peri-urban areas into towns and towns into cities. However, in such a phenomenon of urban development, regional planning requires an understanding of the sprawl dynamics in order to provide basic infrastructure. Nevertheless, in a majority of the cases there are inadequacies to ascertain the nature of uncontrolled growth (UN-Habitat, 2002). Due to lack of prior planning, coordinated decision-making and visualization of the outgrowths, the regions remain devoid of basic amenities like water, electricity, sanitation, etc. and result in inefficient and drastic changes in land-use, affecting the ecosystem and thus threatening the sustainable development of the region.

Urban Sprawl coupled with economic development has transformed societies and cultures apart from the landscapes, and the natural environment. In the recent years, ‘development’ and ‘urbanisation’ have almost become synonymous especially in developing countries. Further ‘development’ *per se* is mostly associated with economic development, which most nation states promise to deliver to its citizens. A key challenge faced by most of the nations today is to ‘sustain’ the economic growth rate along with minimal impact on the environment. Urbanisation is also a common phenomenon, which most of the developing nations are experiencing that has led to the rise of large metros along with its slums and squatters. At the same time, an alarming concern is also about the depleting natural resources (Mitsova, et al., 2010) increasing pollution levels and associated environmental hazards (Kamat and Mahasur, 1997), apart from the rising urban-rural and rich-poor divisions; a host of environmental and socio-economic factors that have become important challenges of the recent times. In this regard, it is essential for concerned authorities to adopt integrated approaches in regional planning while addressing the needs of its stakeholders and managing the resources sustainably. This also necessitates proper planning along with effective governance to manage the urban growth and to mitigate the pressures on natural resources and environment while catering to the needs of the economy that sustains these urban areas. It is this philosophy that drives sustainable development essentially to balance both economic development and environment, not only for the present but also for the future generations.

Urban growth patterns resulting in sprawl are ‘unsustainable’, with the current consumption surging ahead of regions’ carrying capacity and leading to depletion of natural resources for future generations (Asian Development Bank, 2003). The need for managing urban sprawl also arises out of the global concerns of achieving sustainable urbanisation. Sustainable urbanisation is a dynamic, multi-dimensional process covering environmental as well as social, economic and political institutional sustainability (United Nations, 2004). Besides this, the adoption of the Millennium Declaration and the Millennium Development Goals by all the member states of the United Nations to promote equitable and sustainable development across nations, in pursuit of shared future for all, poses significant challenges. This has also set a universal framework for development by targeting the achievement of eight significant goals. Specifically, the seventh goal on ensuring environmental sustainability addresses the concern of improving the lives of millions of slum dwellers living in rapidly expanding cities (United Nations, 2007).

Urban sprawl was initially investigated in relation to demographic and the spatial extent of urban areas. Subsequent studies dealt the problem of sprawl in relation to economics, energy, land use, vehicular emissions, transportation, demography, climate and safety. The problem of sprawl needs to be addressed considering all disciplines with an integrative approach (TRB, 1998 and 2002; Gayda et al., 2003 and 2005). The problem has been acknowledged for nearly sixty years and sprawl was ascribed as low-density development beyond the edge of service and employment (Sierra Club, 1998; Batty, Chin & Besussi, 2002; Batty, Besussi & Chin, 2004; Bensen & Torrens, 2004; and TRB, 2002). Urban sprawl has been accompanied with three interrelated problems of spatial dynamics: densification of central or core cities which usually mark the historical origins of growth; the emergence of edge cities which compete with and complement the functions of the core; and the rapid suburbanization of the periphery of cities - core and edge - which represent the spatially most extensive indicator of such growth. This uncoordinated and unplanned incremental urban growth along the fringes of the metropolitan areas invading prime agricultural and resource land is unsustainable as such areas are over reliant on the automobile for access to resource and community facilities. There have been number of studies done on urban sprawl in India but this is the first such attempt to study to analyze the underlying causes for the measurement of urban sprawl in a highly fragile Himalayan city of Srinagar. This study will serve as a reference work for any future study in Himalayan cities’.

Materials and methods

Sprawl indicators for Srinagar

The sprawl indicators used for the present study are taken from; Costs of Sprawl:2000 Transport Research Bureau (TRB) and SCATTER (EU). The set of indicators used were modified as per the suitability of the area. It is with this motivation that the sprawl indicators for the Srinagar city are grouped under four themes:

1. **Demography and Economy;**
2. **Environment and Resources;**
3. **Mobility;**
4. **Planning and Governance.**

Among the first set of indicators that were enumerated based on the samples was the nativity of respondents in different areas of

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