Urban Sprawl and its Smart Management

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Abstract

Aristotle once wrote that men come together in cities to live, but stay in them to live the good life. "Cities are now junctions in the flows of people, information, finance and freight....They're less and less places where people live and work" says Nigel Harris, a professor of development planning (Ellis and Harris, 2004). However, the urban dynamics and growth has led to the spatial problem of urban sprawl. For developing countries like India, where pace of economic growth is going higher, an idea of smart growth or planned growth can provide benefits in long term planning.

The article explains briefly about how and why the idea of urban sprawl initiated and developed all across the globe. In order to understand this phenomenon, its causes and effects are being explained with few probable solutions through which a smart management strategy can be foreseen by the urban planners and professionals. Concentrating growth is what many planners recommend as a measure against sprawl for a sustainable city. The idea of "Smart Growth" involves controlled or managed sprawl where balance is the watchword for developing communities. Sensitive policies and directional economic growth and management are the possible solutions.

Keywords:

Urban Sprawl, Spatial Patterns, Smart Growth, Public Transport System, Government Policies

Introduction

Contemporary urban growth consists of following two interrelated problems of spatial dynamics:

1. The decline of central or core cities which usually mark the historical origins of growth
2. The emergence of edge cities which both compete with and complement the functions of the core. The rapid suburbanization of the periphery of cities - core and edge represents the most extensive indicator of spatial growth.

Our abilities to "control and manage" such growth or "sprawl" is virtually non-existent despite occasional but short lived successes through planning instruments such as green belts. The suburbanization of cities and methods for the control of such growth go back to the origins of cities themselves.

Early uses of the term suggest that it consumes excessive space in an uncontrolled, disorderly manner leading to poor distribution, loss of open spaces, high demand for transportation, and social segregation. This definition has not changed much through time. Modern usage of the term ‘sprawl‘ was coined by Earle Draper, one of the first city planners in the United States in 1937 (Black, 1996). Since then, the issue became popular and concerns continue to grow with different measures introduced to combat it in one way or another. In the report, “Revisiting Sprawl: Lessons from the Past”, Burgess (1998) defined sprawl as "...expanding physical development, at decreasing densities, in metropolitan regions, where the spatial growth exceeds population growth". On the other hand, The Oxford English Dictionary (2001) defines the word as "the straggling expansion of an indeterminate urban or industrial environment into an adjoining countryside; the area of this advancement."

In the 1990s the phenomenon of sprawl was adopted by other sciences as well as the general public in the US. At this time the Anti-sprawl-movement arose and first measures of urban sprawl were conducted. As the concept of sprawl was ―invented‖ in the US, it was anchored in the US context and discussion for a long time.

Thus generally speaking, as a noun, sprawl implies a condition characterizing an urban area or part of it at a particular time. Based on descriptions of conditions characterizing sprawl in literature and amplified by observation and experience, the following conceptual definition is suggested (Galster, Hanson, R.Ratcliffe, Wolman, Coleman and Freihage, 2001).

Sprawl (n.) is a pattern of land use in an urbanized area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, compactness, centrality, nuclearity, diversity and proximity.

Methodology

In order to understand the phenomenon of Urban Sprawl, various literature studies have been undertaken. In most cases, urban sprawl is regarded as one of the major effects of urban growth. As a land-use phenomenon, it is typically characterized in following ways in American literatures:

i. Excessive land consumption
ii. Low densities at peripheries in comparison with older centers
iii. Lack of choice in ways to travel
iv. Fragmented open space, wide gaps between development and scattered appearance
v. Lack of choice in housing types and prices
vi. Separation of uses into distinct areas

vii. Repetitive one story development
viii. Commercial buildings surrounded by acres of parking
ix. Lack of public spaces and community centers

The study on urban sprawl (The Regionalist, 1997; Sierra Club, 1998) was attempted in the developed countries and recently in developing countries such as China (Yeh and Li, 2001; Cheng and Masser, 2003) and India (Jothimani, 1997 and Lata et al., 2001). The spatial patterns of urban sprawl over different time periods, can be systematically mapped, monitored and accurately assessed from satellite data along with conventional ground data. The physical expressions and patterns of sprawl on landscapes can be detected, mapped, and analyzed using remote sensing and geographical information system (GIS) technologies. The patterns of sprawl are being described using a variety of metrics, through visual interpretation techniques, all with the aid of software and other application programs. The earth scientists with the Northeast Applications of Useable Technology in Land Use Planning for Urban Sprawl (NAUTILUS) program are using techniques of statistical software to characterize urbanizing landscapes over time and to calculate spatial indices that measure dimensions such as contagion, the patchiness of landscapes, fractal dimension, and patch shape complexity. The built-up is generally considered as the parameter of quantifying urban sprawl. It is quantified by considering the impervious or the built-up as the key feature of sprawl, which is delineated using toposheets or through the data acquired remotely.

Table 1

Cause	Reason	Objection
Affluence	Periods of rapid land development coincide with prosperity. Sprawl is an inevitable sign of good times	Developers and home buyers do not shoulder the entire cost of sprawl
Government Subsidy	Sprawl is encouraged by government spending and subsidized strategies to decongest the city core	Over the years, public subsidies have been scaled back. Yet sprawl has not been diminished
Population Growth	Birth and immigration rates drive sprawl	Sprawl has occurred in every metropolitan area whose population has stagnated or shrunk
Technological change	Sprawl is the result of innovation of automobiles and peoples capacity to spend on private transport	Countries with abundant land also went through similar changes without producing much sprawl
Government shortsightedness	It is because of government's inability to plan for the future with long term planning goals	Poor executions is less a cause than an effect. Had there a will, government would have found a way
Source (Chen 2000)		

The impacts of urban patterns on ecosystem dynamics should focus on how patterns of urban development alter ecological conditions

(e.g. species composition) through physical changes (e.g. patch structure) on an urban to rural gradient. The use of gradient analysis for studying urban-to-rural gradient of land-use intensity to explain the continuum of forest change from city centre to non-urban areas might help to explore ecosystem effects of different urban configurations, but current applications do not differentiate among alternative urban patterns (Alberti et al., 1999). Most studies of the impacts of urbanization do not differentiate among various urban patterns. Planners need this ecological knowledge, so that their decisions can minimize impacts of inevitable urban growth. Decisions by urban dwellers, businesses, developers, and governments all influence patterns. Spatial pattern is one (of very few) such environmental variable, which can be controlled to some extent by land-use planning. Design strategies for reducing urban ecological impacts will remain poorly understood and ineffectual if spatial pattern issues are not addressed in ecological studies of urban areas.

Normally, when rural pockets are connected to a city by a road, in the initial stages, development in the form of service centers such as shops, cafeteria, etc. is seen on the roadside, which eventually become the hub of economic activities leading to sprawl. Eventually a significant amount of upsurge could be observed along these roads. This type of upsurge caused by a road network between urban / semi-urban / rural centers is very much prevalent and persistent in most places in India. These regions are devoid of any infrastructure, since planners are unable to visualize this type of growth patterns. This growth is normally left out in all government surveys (even in national population census), as this cannot be grouped under either urban or rural centre. The investigation of patterns of this kind of growth is very crucial from regional planning point of view to provide basic amenities in these regions. Further, with the Prime Minister of India's pet project, "Golden Quadrilateral of National Highways Development Project" initiative of linking villages, towns and cities and building 4-lane roads, this investigation gains importance and significance. Prior visualizing of the trends and patterns of growth enable the planning machineries to plan for appropriate basic infrastructure facilities (water, electricity, sanitation, etc.). The study of this kind reveals the type, extent and nature of sprawl taking place in a region and the drivers responsible for the growth. This would help developers and town planners to project growth patterns and facilitate various infrastructure facilities. In this direction, an attempt is made to identify the sprawl pattern, quantify sprawl across roads in terms of Shannon's entropy, and estimate the rate of change in built-up area over a period with the help of spatial and statistical data of nearly three decades using GIS.

Some major consequences of urban sprawl in order to understand the extent of issue can be summarized as follows.

i. Loss of open space
ii. Increased cost of infrastructure
iii. Loss of rural character
iv. Loss of farms and forestland
v. Loss of community character
vi. Air pollution
vii. Water pollution
viii. Increased time in traffic/increased vehicle miles traveled (VMT)
ix. Increased energy consumption
x. Loss of urban population to non-urban areas
xi. Urban decay
xii. Increases in housing starts and building permits
xiii. Housing location trends in once rural areas

Results and Discussions

Those who criticize sprawl, in general, dream about densely populated urban communities with plenty of green spaces, sharp distinctions between city and countryside, few cars, and lots of public transportation. In spite of the fact that the patterns of sprawl in developed and developing countries are very different, the solutions proposed are similar with a little bit of modification to fit into the context of the

developing world since there are more prior needs to be addressed. For developing countries, the people living on the periphery of the city are mainly rural migrants who have come to the city in search of employment. In rural areas, where agriculture is most common, the activity often tends to be seasonal and therefore unreliable. The problem that needs to be addressed is, therefore, the creation of employment opportunities away from the major metropolitan areas. A number of small towns and cities that are closer to the hinterland could be developed as potential sources of employment for rural people. This would reduce the burden on larger cities and create an alternative source of work, thereby addressing the problems of both unemployment and sprawl.

Brownfield redevelopment or the reuse of existing land within the city and concentrating growth: Abandoned building sites such as old schools, industrial land and parking space may be reused providing alternatives to using virgin land outside of city limits. This attacks the problem of city sprawl encroaching on new land outside the city. The problem is that in most cases there are zoning policies that do not permit such redevelopment. Policies therefore have to be adjusted by providing incentives for developers to re-use land. Concentrating growth may be achieved through a variety of methods such as moving the concentration of population back towards the city centre and not pushing it outward, away from the core and by promoting the reuse of land within the cities. This is the same as increasing density in already existing developments and building upwards rather than spreading horizontally.

Use of improved mass public transport systems: Lack of well-developed mass transit system increases dependence on private means of transport. The advantages that are provided by private means of transport are highlighted by the fact that the mass transit system in most cities is non-existent or very poorly developed. While it is true that the automobile has led to the sub-urbanization of the wealthy, it is not clear what the solution to this problem should be. One approach might be to tax car or charge higher parking fees and push the rich back into cities. Municipalities and concerned bodies can also act on the problem by giving a lot of attention and allocating the necessary fund for developing mass public transport modes. Good transportation planning relies less on new highway construction - which encourages sprawl - and more on mass transit solutions, such as light rail and commuter trains. In addition, awareness should be increased among people on the benefits of using mass transport and through time make it a culture. Some European countries such as Stockholm are good examples of mass transport culture.

Development and use of better and most efficient land use policies: Communities can grow in an efficient manner by using existing infrastructure, or by building away from natural wildlife resources. For these development policies can be targeted more towards an already urbanized area

Implement means to decrease or stop migration: In addition to the push factors, the pull factors that attract migrants to cities other than job opportunities need to be addressed. Improving efficiency of land use or other proposed solutions would not be effective in the long run

Idea of Smart Growth: Concentrating growth is what many planners recommend as a measure against sprawl for a sustainable city. The term ‘Smart Growth’ was coined to describe the response to the unchecked urban expansion in America during the past half century. Taking the seriousness of the situation, Smart Growth idea was to suggest an alternative to the problem of growth describing the application of sustainable development concept to land-use issues. The idea channels development to areas with existing infrastructure and consumes less land for roads, houses and commercial buildings. Smart Growth could mean smart management of resources in both growing and declining communities.

The ultimate goals of Smart Growth to counteract sprawl are not that different from general solutions forwarded by planners and usually include following ten principles:

i. Mix land uses
ii. Take advantage of compact building design
iii. Create a range of housing opportunities and choices
iv. Create walkable neighborhoods
v. Foster distinctive, attractive communities with a strong sense of place
vi. Preserve open space, farmland, natural beauty, and critical environmental areas
vii. Strengthen and direct development towards existing communities
viii. Provide a variety of transportation choices
ix. Make development decisions predictable, fair, and cost effective
x. Encourage community and stakeholder collaboration in development decisions

Conclusion

Most of the focus of physical planning in western countries during the 20th century has been on ways of controlling urban growth but the recent wave of economic and related forms of institutional deregulation have given the problem a new urgency. Traditional solutions such as reducing our ability to locate in suburban locations through selective taxation of travel, combined with incentives to develop residential and other activities nearer the core of old cities are being suggested once again. But such policies are doomed in that they ignore completely the structure of the modern spatial economy where the central city is now just one of many nodes within a complex sea of urbanization. More sensitive policies, particularly those being canvassed in North America, admit that such growth is going to take place and that it will be suburban, but more selective ways of letting it take place are being proposed. This is the idea of "Smart Growth" which basically involves controlled or managed sprawl where balance is the watchword for developing communities in which there is much the same variety of opportunity in travel and recreation as there is in less controlled growth. Such policies needs to be tested real-time in developing countries also so that the problem gets uprooted from its base only and a guided urban smart growth takes place.

More modern Smart Growth principles need to address housing opportunities for middle-class and low-income families in cities and close-in suburbs while creating more affordable housing near job centers. ‘The denser the better is one of the chief ideas behind the initiative. The success of Smart Growth will ultimately depend on its adaptation to the unique political cultures, market realities and developmental trends. The great differences in regional growth patterns should be accounted for. Smart Growth can be an effective anti-sprawl measure in only one-way: by confining more and more people into existing urbanized areas.

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