

IMPACT ANALYSIS OF LAND-COVER (GREENBELTS) CHANGE DUE TO CHANGES IN LAND-USE PLANNING

Misha Mittal

Urban Planner at Urban Planning Council, Abu Dhabi, UAE.

ar.misha.0227@gmail.com

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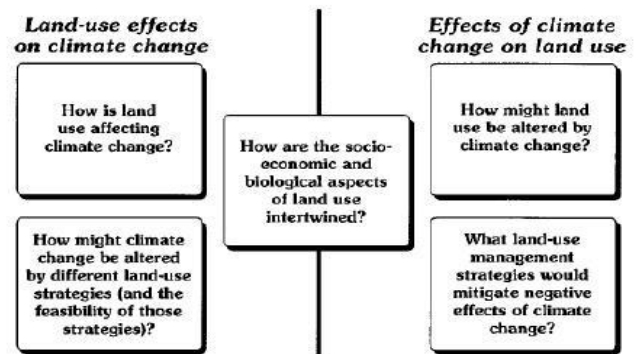
Abstract—The city and regions, which rely on their ecosystems, depends upon their health and availability. Changes to the usage pattern of these, as a process of urbanization, may bring economically positive impact but can be devastating for the ecology and social well-being of many groups of society. It is thus becoming increasingly important to measure these city resources in order to manage them effectively. The challenge is of appropriate land-use planning giving special consideration to natural systems which combines with the urban edges. This paper briefly analyses the green belt as a component of natural system and its role played in National Capital Region of a developing country (India) as an example. The attempt is made to identify the impacts due to changes in land-use planning on the green belt between two cities. Simultaneously, attention is drawn to the ways and situations, in which other functions can be incorporated within the green belts. These have helped to bring out potentials which can be considered for effective planning of green belt. The study is based on the evidence, case studies and it is suggested that appropriate planning may make green belts (GB) an effective planning tool but monitoring plays the most important role in their performance.

I. BACKGROUND

It has been stated in various urban studies that there is a relationship between land-use and sustainability of a city which has an overall effect on global sustainability ((Dale, V.H., 1997), (Wrbka, T., et al., 2004), (Kächele, H., & Zander, P., 1999)). Consequently, the physical forms of urban planning are now being characterized to achieve a sustainable urban form. The rising issues of sprawling population are posing issues on the natural forms, which if continues will hamper the global sustainable development. In consideration to this aspect, the research is based on natural form, the green belt (GB), focusing on its usability and credibility with the increasing globalization and researching the issues to make it an ideal planning tool.

A. Why consider green belts-The Problem Context

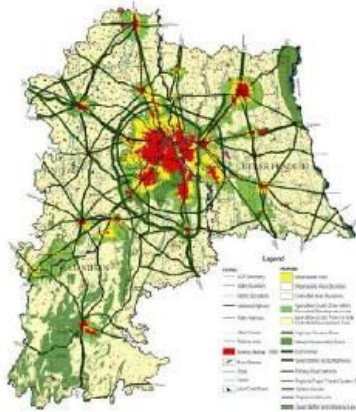
The effect of globalization is evident from the out-of-city increasing developments which are increasing the problems of diminishing land-cover (LC) and increasing CO2 emissions excessively, thereby posing threat to sustainability.



The surrounding green edges of the city structure are shrinking progressively in an attempt to cater the growing demands of the population for accommodation, recreation, and supporting facilities as a process of urban sprawl. If the relationship between land-use and land-cover is disrupted or altered, to accommodate urban demands, an imbalance is generated in the climate patterns and hence their efficiency in counteracting the CO2 levels falls down. While considering the socio-economic perspective, GBs acts as a displacement factor by diverting the populations from that region/ country to elsewhere, henceforth pressurizing natural ecosystem elsewhere due to the migrating populations. (Lambin, E.F., Meyfroidt, P., 2011,p.3467). In order to balance this loss of natural land forms outside the city and to decrease the increasing CO2 levels, planners are adopting alternative approaches like provision of agricultural lands, artificial urban open spaces, adapting green technologies and space planning in building construction, etc. But the issues arise when these micro level approaches associate at a global level.

II. LOCATION CONTEXT

New Delhi, the capital of India, is characterized as a complex structure evolving from interaction of physical, social, economic, cultural and behavioral factors some of which are not regulated by strict land-uses and governmental norms.



The urban fringe of the city does not have a distinct classification between the urban and rural due to these inherent characteristics and thus continue outgrowth of the population towards the rural parts of the neighboring towns. In order to counteract this situation, Delhi Metropolitan region, also known as National Capital Region (NCR), was proposed to reduce the migrating population pressure as an effect of economic centralization on Delhi. From 1998 – 2006, the built-up areas have been increasing rapidly due to the increasing urban population, resulting into an alarming consequence of increasing traffic volumes which are estimated to be 255% by 2021 with high levels of congestion and air pollution. (Khanna P. et al., 1999). Several studies on transportation relating to socio-economic diversity, relationship of green spaces with bio-diversity, agricultural productivity, and issues of urbanization have been documented but there is little evidence of the role being played in the selected region by the green belts, hence a need for this study to cater to both social and environmental issues.

III. METHODOLOGY

The method of research investigated the issues broadly for the selected topic in three sectors of sustainability through case studies, literature based analysis and interviews. These methods were helpful in finding out the facts about the issues arising from changing role of green and open land. This paper estimates the value of green belt land by assessing its output: agricultural; amenity; recreational; and savings in costs, by restricting the size of urban areas. These outputs are valued in social terms by the application of welfare economics.

IV. URBAN RELATIONSHIP AND SUSTAINABILITY

The aim of the GBs is to limit the physical growth and to prevent the over spilling of a city and to form huge conurbation and provide spaces for recreation. (Frey, H.W., 2000, pp.16) The green belt offers a range of ecological benefits for both the city and the biological diversity. On the social front, the provision of green belts allow equal rights to the both the city as well as rural users. These are free access lands and allow diversified groups to enjoy the beauty and other benefits from them. Economic benefits as seen by the provision of GBs are not direct. They are weighed more in terms of impacts they have due to their provision. The agricultural output as a by-product of GBs

establishment also plays a role in adding to economic benefits. (Whitby, M.C., & Willis, K.G., 1985, pp.148-149). Urban growth has been seen as proportional to the demand of individual houses with front and back gardens which in today's context are developing in city outskirts (the green belt land). GBs replaced such demands efficiently by providing brown field sites as alternative developments and thereby keeping the size of the city intact.

V. REVIEW OF PERFORMANCE OF GREEN BELTS IN NCR

The economy of the urban area is the major driver of economic growth of the city in terms of productivity and developments, and thus, it has been seen as the major factor of diffusion of activities from the center to the periphery of the cities. (Mohan, 2005) The green belt now has almost vanished owing to this sprawl which is engulfing the original established ring towns to form a metropolitan. "The population of NCR, as per 2001 census, was 11.5 million with an average decadal rate of growth of about 29 % in the last three decades. UP accounts for 31.2% of the total NCR population." Due to the availability of cheap land prices as compared to Delhi the population was dispersed from Delhi to these areas. The pressure of the fringe areas has since then rising increasingly resulting into higher number of unauthorized development of land-uses on the city outskirts. The rapid urbanization has led to the development of new settlement colonies in Delhi both formal and informal. Such unauthorized and informal settlements led to the slum growth in Delhi, from 12,749 in 1951 to over 500,000 in 2005 and approximately 0.6 million at present. Out of these the population residing on the banks of Yamuna accounts 3 million (Rahman, et al., 2009). 25% of Delhi's total population have critical conditions of housing with every 3 persons/ room. Thus shortage of housing coupled with the large influx of migrant population leads to un-planned city expansion and change in land use/ land cover over period of time (Rahman, et al., 2009).

With more profound prospects of employment opportunities growing in these areas and the vicinity to Delhi, there has been an increasing percentage of migrant population from across the country which has directly put pressure on the land of the region with indirect impacts on air and water. The regional plan of 2001 showed that only 1.2% of the area was under forests, important as a source of fuel and fodder, as most of it was lost due to population pressures and extensive urbanization. A study conducted in 2007 on employment and accessibility shows the relationship of land-uses and accessibility patterns. With respect to the concept of "Compact City" development the case as demonstrated in the city of Delhi shows the impacts of making a decongested city. The study states that commuting behaviors and employment dynamics contribute to the growth of the metropolis which can be restricted by providing appropriate job housing policies that restrict the expansion of city beyond its boundaries. Thus, unguided and unsustainable choices for commuting to these might impact the preservation of green belt land with increased levels of emissions. (Alpkokin, et al., 2007) To support such facilities within green belts infrastructural services are required to assist the consumers.

VI. CONCLUSION

An important aspect evident from this is the importance of socio-spatial dialectic which requires to be integrated in the detailed process of urbanization. It validates the usage of such regulatory measures by one to one interaction and helps in developing an understanding for the need of such measures. Planning of GBs at regional levels, if limited to institutional and technological innovations may give a negative outputs resulting into the change of these landcovers and at worse changing their trends. The GB if perceived as a component of political boundary can lead the city to a growing disease in which humanity strives to survive. If this regional measure is perceived in a broader political interest, it can solve issues of climate change and reduction of biotic diversity. This regional governance further directs to the other agriculture function of green belt and its sustenance. The changing of land-use happen due to costs of cultivation where output productivity is low, the supply of labour is limited/less, price fluctuation and inappropriate fertilizer availability pushes the farmers to sell these lands and progress to find opportunities in urban centers.

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