

Survey paper on Effect of Urban Sprawling on Deforestation and Encroachment of Land using RS and GIS- A Case Study of Gangtok City

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ABSTRACT

Urban sprawl has become a universal problem, and is being faced by many cities. When cities grow, the surrounding land and the natural green areas are engulfed to build houses, roads, pathways, to match the needs and desires of the inhabitant population. This spread of urban areas into rural area, farmlands and forests on outer edges of a city is referred as Urban Sprawl. A proper assessment of urban sprawling is imperative for monitoring the development and future planning of the city in terms of limitation, extension, bifurcation etc. The inevitable physically expanding urban areas in a Gangtok City located in Eastern Himalayan range, at an elevation of 1,650m (5,410ft) are increasing. The complexity of urban development, especially in a hilly town like Gangtok is so rapid that it demands quick response and perspective physical planning of the city. This case study of Gangtok city is to detect and predict the possible sites for deforestation, encroachment of land and to identify the area cause by the sprawling in the city and use the relevant methods for future assessment for sprawling.

Keywords

Urban sprawl, Encroachment, Inhabitant Population, Deforestation.

1. INTRODUCTION

Urban Sprawling or suburban sprawl describes the expansion of human populations away from central urban areas into low-density, monofunctional and usually car dependent communities. The spread of urban areas into rural area, farmlands and forests on outer edges of a city is referred as Urban Sprawl as shown in Fig. 1 below. It has become an inevitable problem and is being faced by many cities.

Gangtok is the capital of the northern Indian state of Sikkim and also the largest city of the Indian state of Sikkim. The city is located at 27.3325°N 88.61°E. The inevitable physically expanding urban areas in a Gangtok City located in Eastern Himalayan range, at an elevation of 1,650m (5,410ft) are increasing. The complexity of urban development, especially in a hilly city like Gangtok is so rapid that it demands quick response and perspective physical planning of the city. The increasing population day by day in Gangtok city leads to the demand for urban land. The state population according to census 1951 was 137,725 out of which 2,744 lived in city. By 2011 census data the population had grown up to 610,577 out of which 100,286 lived in the city area. Thus, calculating the increase in population in the state was 343.33% and in the city area was 3554.73%. Thus the increased population has been

accommodated in the new suburbs by deforestation and encroachment on land.

2. REASONS FOR URBAN SPRAWL

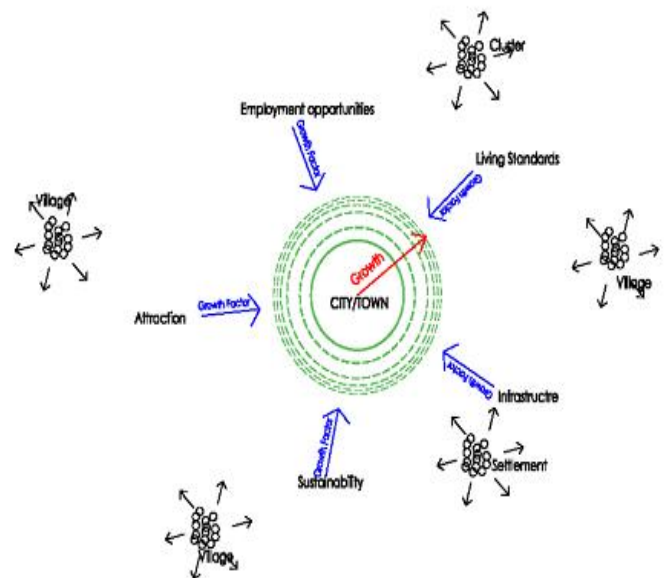


Fig 1. Reasons for Sprawling

The urban sprawling is also often criticized for causing environment degradation like deforestation, and intensifying segregation and undermining the vitality of existing urban areas and attacked on aesthetic grounds which we generally called as encroachment of land. Some possible reasons for urban sprawl can be summarized as below.

1. Population Growth

Population Growth is the important reason for urban expansion or city expansion. The Sprawling of a particular city, town or a region depends upon natural, physical and socio-economic factors. Among these factors the population assumes significance in the determining the future pattern in urban sprawling. Sikkim underwent many changes in its economy and demography after it joined the National mainstream. There was a considerable increase in development activities which caused growth in urbanization or urban sprawling. The population of Sikkim was slightly

higher than 540,000 in 2001 as against 406,000 in 1991. Sex ratio of Sikkim was much lower (875) females than the national average (933 females). The population changes from 1891 to 2001 shows a growth of 24.4 times in Sikkim, with population density increasing from 8 in 1901 to 76 in 2001.

2. Rising incomes

In need of high income people migrate to urban and suburbs areas which cause expansion of urban areas and the areas may include forest, farmlands etc. Housing affordability in areas close to the city centre can also be a big issue.

3. Government regulation promoting low density land use (zoning plans sometimes allow for low density developments in the heart of the cities)

The zoning plans sometimes allow for low density developments in the heart of the cities. The government strategies defining land sub divisions allow for large lots which results in low density developments.

4. Individual preference towards low density developments

People often prefer quite silence places than crowded and noisy places. Which in turns developments or increasing the lower density areas.

5. Affordability and desire for big houses

Everyone has a desire to stay in a big house due to several reasons like to stay in more space, portraying their financial stability to friends and family, having more space for kids to play within the house, having the liberty to do what they want to do at their convenience of the item and money.

6. Competition for land (between real estate developers and owners of the land in the outskirts)

The competition for land between real estate developers and owners of land in the outskirts (farmers & others) helps to determine the spatial size of cities. A success bid by developers to bid away additional land from agricultural users indicates that the land is worth more in urban use than in agriculture, reflecting a greater economic contribution in its developed state.

7. Urbanization (population inflow from rural areas and small towns).

More people from rural areas and small towns are moving into the cities for opportunities of increased income and lifestyle, increasing the demand for housing.

With the expansion of urban land day by day, engulfing the neighboring land, there is a major threat to sustainability and quality of life. As a result, many problems in the society and environment have appeared in city, such as population expansion, encroachment of land, deforestation, etc. Migration and urban sprawl isn't something that is just now becoming popular, as it has been around for quite some time. Cities and suburbs are now becoming overcrowded because of this.

3. PROBLEMS FACED DUE TO URBAN SPRAWLING

1. Loss of open space, forests, valuable farmlands

Most of the open space, forests, and valuable farmlands are vanished by the replacement of buildings and sterile urban landscape. Roads, commercial buildings, residential areas are made by replacing those above lands.

2. Loss of small towns

The small towns having good land, affordable buildings and many more which attracts an individual is the reason for

changing the small towns into city. Urban sprawl causes the loss of small towns.

3. Overcrowding of services and infrastructure

The main reason for overcrowding is the developments of city in an unplanned way. The town that was planned for a small group of people is often forced to cater to the sprawled communities resulting in overcrowding of services and infrastructure leading to traffic congestions, intermittent water supply, pressure on sewage system etc. Developing cities have more pressure of development of slums & squatters, sub standard living conditions, lack of hygiene and sanitation. As the public of a big investments for low density population. This often results in problem to attract government funding for amenities as such the residents are often deprived of the essential services.

4. Greater dependence on private vehicles, cars.

The Residents of sprawling neighbourhoods rely largely on private vehicles. As such, they tend to emit more pollution per person and suffer from more fatalities. Every new suburb is based on the estimate that households will use cars two or three times as much as older suburbs. The greater dependence on car also leads to loss of exercise. Recent studies have concluded that the people in sprawls are more at risk of obesity as walking and bicycling are no longer viable options.

5. Increased personal transportation costs

The residents of sprawls spend higher proportion of their income on transportation that the residents living close to the city centre.

6. Increased urban pollution

In Sikkim the increasing industries and factories are increasing the pollution in various ways like in wate, air and land as well. The increased use of motor vehicles releases chemical and particulates like hydrocarbons, carbon monoxide, nitrogen oxides leading to air pollution and smog. Construction site erosion, fuel spills, oil leaks, paint spills, lawn chemical, pet wastes contribute to water pollution.

7. Environmental degradation

The suburbs on new urban lands add to deterioration of the environment through depletion of resources (air, water and soil). Excessive use of motor vehicles and long distances traveled by private transport release enormous amount of pollution in the atmosphere; clearing of the forest cover and farmlands creates a threat to water quantity and quality. There are impacts on vegetation and habitation. Several species of animals and plants are becoming extinct impacting on the precious environmental resources.

8. Social Fragmentation

It has been observed that people living in sprawls or outskirts spend a lot of time commuting longer distances to get to their jobs, schools, shopping facilities. There is hardly any time or opportunity to meet their neighbors. Very often, people do not even know their neighbors. There is no community feeling. Dating back in the history & from the experience of our grandparents, we come across stories wherein if one did not happen to see their neighbor for a day or two, they would be concerned about health and safety as a part of social bonding and responsibility.

9. Increased crime.

As the social interaction reduces, the surveillance over the neighboring properties reduces. This results an increase in crime rate. The criminals find themselves at lesser chance of being caught as the extruders can very often be mistaken as a

part of the resident's family. We often hear news of robbery/murder next door couple of days after the incident when the police or investigating agencies knock our door for information.

4. RELATED WORK

Chunnu Khawas *et. al.* [2011] proposed a statistical approach to urban sprawling in the east district of Sikkim with the objective of identifying the pattern of sprawling along the low lying area of the east Sikkim, identifying demographic changes and to forecast the direction of sprawl. The study was based on IRS LISS III satellite images for the year 2004, 2006, 2008 and thematic maps of National Atlas and Thematic Mapping Organization. Using satellite images of 2004, 2006, 2008 3 classes of land were taken under consideration settlement, vegetation, barren land and observed the changes from 2004 to 2008. Taking the census data into consideration the growth rate of population from 1951 to 2001 was also calculated. By the pattern radial and linear identification of type and direction of sprawling was observed

5. CONCLUSION

Urban Sprawling has been main issues these days in each and every city of any countries. So does in the capital city Gangtok in Sikkim where the urban expansion is in a rapid rate which may cause the city to face many problems. Since the city population is increasing which results the deforestation and encroachment of a land.

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