



Urban sprawl and its Impact on Ecological Balance of Imphal City: Manipur

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Abstract : The concept of Urban sprawl has many different aspects, which includes the expansion of a city and its outskirts to low-density and auto-dependent development on rural land. Urban sprawl directly impacts traffic congestion, high oil consumption, and many other issues. It is evident that urban sprawl has negative impacts on both air quality and public health, which affects the human health condition. This results in health issues for inner-city residents, air pollution and many other ecological problems. Urban sprawl has gained popularity in academic discourse in recent times, but the majority of the research was conducted in developed countries. This research article is mainly for the character and nature of urban sprawl in Imphal City, although the city is experiencing one of the fastest rates of sprawl. Urbanisation in Imphal City is very rapid, and in addition to the emerging challenges of globalisation, climate and ecological change, Imphal City has an enormous task to manage urban sprawl. The purpose of this research paper is to determine the impact of urban sprawl on the ecological balance of Imphal city.

Index Terms - Urban sprawl, Imphal city, ecological balance, climate change.

I. INTRODUCTION

Various definitions can be made for urban sprawl from different perspectives. Galster et al. (2001) made specific definitions which can be alternative for or can be used at the same time with urban sprawl; (1) specific land utilization model, (2) land development process, (3) reasons of land utilization behaviours, (4) results of urban land utilization behaviours. Parallel to the rapid increase of population, urban growth which develops according to demands of dwelling, industry and business sectors is in the trend of expanding towards city boundaries and causes occupation of agricultural lands and forests. This uncontrolled and unplanned growth is defined as urban sprawl that is the result of urban growth (Zhang, 2004; Sudhira and Ramachandra, 2007:1). Urban sprawl which is asserted to be carried out for urban growth is in fact not suitable either for urban growth or rural environment in real sense. In this sense, since it is carried out in disorganized and uncontrolled way, it has effects which hinder regional sustainable development (Bhatta, 2010:8). These areas can be deprived of infrastructure services, basic facilities such as health, education (Sudhira and Ramachandra, 2007:1). After 1960's urban growth and urban sprawl are regarded as an important problem in many cities throughout the world and especially in metropolitan cities (Squires, 2002:41; Pengjun, 2011:1).

II. THE CONCEPT OF URBAN SPRAWL

The lands of urban sprawl which are defined as lands that have lost their rural characteristics and yet cannot be defined as urban include specific uncertainties results in various problems such as unplanned urban growth and use of non-agricultural purpose. Therefore, urban sprawl can be defined as a hinterland between rural and urban areas. While (Gordon and Richardson, 1997) define urban sprawl as leapfrog development¹, (DiLorenzo, 2000) defines it as growth with cancer or virus. In the confusion in definition of urban sprawl, (Wilson et al., 2003) and (Galster et al., 2001) state that describing would be more suitable rather than defining. In order to make general characteristics of urban sprawl throughout Europe, global socio-economic powers are rather in interaction with local environmental and spatial restrictions. These socio-economic powers include socio-economic trends at macro and micro level such as transportation, land prices, personal preference of dwelling, demographic trends, cultural traditions and restrictions, increasing attraction of the city, practices of local and regional land utilization policies. Despite this interaction, urban sprawl continues rapidly with developing transportation connections and increasing personal mobility (EEA, 2006:6). Urban sprawl characterizes to a large extent discontinuous and fragmented occupation together with random population density. Apart from having environmental and social impacts on urban and rural population, sprawl brings a great burden on the state as well (Polidoro et al., 2011:73). In spite of this, some studies defend that urban sprawl emerged due to people's desire to live in big houses and vast areas and their preferences such as tendency to comfort, and it has emerged within a regular market process between urban and agricultural utilization (Henderson and Mitra, 1996:614; Brueckner, 2000:161). Since the reasons of urban sprawl are similar with the reasons of urban growth, they are difficult to differ (Bhatta, 2010:10). For example, in Europe growth of cities was related with increasing population basically. However, urban sprawl is a new phenomenon and its reason cannot only be attributed to population growth (EEA, 2006:6). Therefore, determination of sprawl and taking measure against it is quite important for sustainable urban growth. In many studies, the most important reason of urban sprawl is indicated as the increase of demand for dwelling at low density areas. As a result of insufficient demand for dwelling in city centers, there is an increase in building houses at city boundaries (Chin, 2002; Slaev and Nikiforov, 2013:23). Areas emerging according to this demand are in two forms; expansion in the image of the continuance of city with connection to city center and expansion as defined as leapfrog development being separated and far from city (EEA, 2006:6; Irwin et al., 2007:495; Coisnon et al., 2014:38). Another reason of

urban sprawl which is as important as the increase of population and demand for dwelling is the role of market. Many researchers which carried out studies on this subject adopt the approach of open market, they defend that the effect of market can be formed since the process of urban sprawl should be directed and managed within specific limits (Slaev and Nikiforov, 2013:24).

III. REVIEW OF LITERATURE

Urban sprawl is one of the most noticeable effects of urbanisation on land use (Jagadeesh et al., 2015). The growing population was the main driving force of land use change. The study is based on secondary data and intends to identify the process of land use/land cover change over the different time period with the help of GIS imageries. The study found that the build-up area of the city had increased from 22.07 sq.km to 74.16 sq.km while agriculture areas shrank from 54.18 sq.km to 14.26 sq.km during the study. Without proper planning and management, the excessive population growth will result to unplanned physical expansion towards the fringe areas in all direction. The sprawling process of expansion is disordered, unplanned, often leading to inefficient and unsustainable urban expansion patterns (Travisi and Camagni, 2005). Today, rapid urban growth is a worldwide phenomenon, especially the developing countries experience an unprecedented growth of cities. The outward urban expansion is mostly experienced in Indian cities. However, as most of them are unplanned urbanisation, it affects the land-use pattern of the region. The impact is mostly felt in the form of changes in urban land-use pattern and loss of prime land of the areas. Urban sprawl had a negative impact on agriculture land where build-up area encroach agriculture land leading to the reduction of its size, density and productivity (Atu et al., 2012, Bhalli et al., 2012, Shalaby et al., 2012). Sprawl generally deduces to some type of expansion with brunt such as loss of agriculture land, open space and ecologically insightful habitats (Sankhala and Singh, 2014). This problem has led to gaining the attention of researchers in the different fields—urban geography, environmental studies, regional planning, agriculture (Bhalli et al., 2012). Land use and land cover are interrelated. Changes in land use affect the land cover of an area and vice-versa. However, a change in either land use or land cover is not necessarily a product of the other (Riebsame et al., 1994). Land use change is important for monitoring, management for sustainable use of natural resources. Indian cities, today, experience rapid urban expansion and outgrowth of its boundary to its fringe areas. The development of suburbs along the transportation nodes promotes some economic activities like establishment of shops and within no time, it further develops as a centre for business and industrial activity zone. Urban growth and development have changed the land use pattern resulting in loss of many prime lands particularly, agriculture, and wetland. As Imphal city is the only big city in the state, it attracts migrants from both within and outside the state for better socio-economic opportunities like employment, education, health care facilities, etc. (Singh and Devi, 2012). Notwithstanding, most parts of North East India including Manipur continues to be a disturbed area. Despite being a disturbed area, the migrants continue to arrive in Manipur. Nevertheless, they are mostly confined to Imphal city and are largely businesspersons, semi-skilled or unskilled labourers. (Meitei, 2013) argues that newly arrived migrants are engaged in several business pursuits such as retailers, dealers, running street or established vendors, hawkers, saloons, cobblers, repairing works etc. (Meitei, 2013).

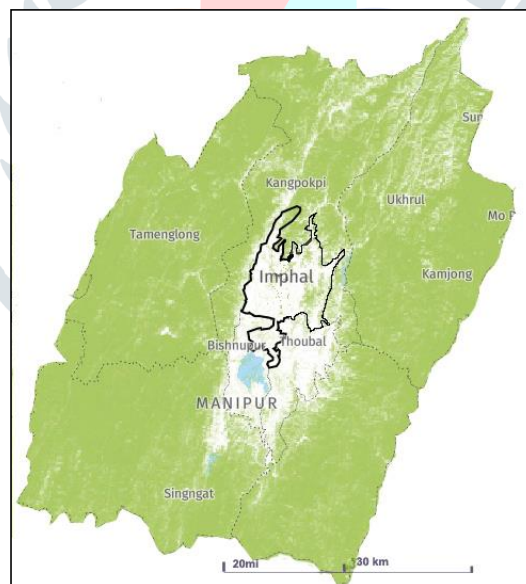


Fig. 1. Map of Manipur showing land and forest area

IV. AREA OF STUDY

Imphal city is located at 24.8074°N 93.9384°E in extreme eastern India, with an average elevation of 786 meters (2,579 ft). It has a humid subtropical climate with mild, dry winters and a hot monsoon season. Imphal is the capital city of the Indian state of Manipur. The metropolitan city spread over parts of the districts of Imphal West and Imphal East, Imphal is part of the Smart Cities Mission under the Ministry of Housing and Urban Affairs. Imphal city is divided between the two districts of Imphal West and Imphal East. Census collects the information for the two parts of the city separately, with the major portion of the city being in Imphal West and the minor portion in Imphal East. According to Census 2011, Imphal constitutes 42.13% of the total urban population in Manipur.

V. CAUSING FACTORS OF URBAN SPRAWL

Factors causing urban sprawl differ according to development level of countries or according to structure of society. For example, in America demand for having a large house detached with garden which is in touch with nature, introverted life styles (Bruegmann, 2005) and racism (Nechyba and Walsh, 2004:184) are the main reasons of urban sprawl. Reasons causing urban sprawl is given in table 2.

Table 1. Causing Factors of Urban Sprawl

<p>Macro-economic factors</p> <ul style="list-style-type: none"> • Economic growth • Globalisation • European integration 	<p>Housing preferences</p> <ul style="list-style-type: none"> • More space per person • Housing preferences
<p>Regulatory frameworks</p> <ul style="list-style-type: none"> • Weak land use planning • Poor enforcement of existing plans • Lack of horizontal and vertical coordination and collaboration 	<p>Transportation</p> <ul style="list-style-type: none"> • Private car ownership • Availability of roads • Low cost of fuel • Poor public transport
<p>Micro-economic factors</p> <ul style="list-style-type: none"> • Rising living standards • Price of land • Availability of cheap agricultural land • Competition between municipalities 	<p>Inner city problems</p> <ul style="list-style-type: none"> • Poor air quality • Noise • Small apartments • Unsafe environments • Social problems • Lack of green open space • Poor quality of school
<p>Demographic factors</p> <ul style="list-style-type: none"> • Population growth • Increase in household formation 	

VI. RESULT AND DISCUSSION

Here we are mainly discussing about the demographic, transport factors and tree cover loss causing urban sprawl of Imphal city. Proper Imphal is composed of two districts of Manipur ie. Imphal East and Imphal West. We will discuss about both the two districts. As per the Aadhaar Statistics the Manipur population in 2021/2022 is 3,008,546 (3.01 Millions) as compared to last census 2011 is 2,855,794. The population density of Imphal East and Imphal West is 992 and 638 per sq. Km according to year 2011 census in Manipur. It is known that numerous fertile agricultural land and forest land disappear due to speculations. That the price of agricultural land is quite lower than plot is an important factor causing urban sprawl (EEA, 2006:20). Low land prices cause heavy demand of sectors such as industry, trade and construction. Preference of these sectors in agricultural land instead of plots as the establishment place both causes urban sprawl and inefficient use of resources due to non-agricultural use of agricultural land. There is a competition between agricultural land which are close to city and other uses and due to intense speculative developments, agricultural land are allocated for housing, business and transportation uses rather than agricultural uses.

Table 2. Distribution of Population, Decadal Growth Rate, Population Density of districts in Manipur As per 2011 census record

State/District	Persons (per Ten Thousand)	Decadal growth (2001-11)	Population density (Per sq. km 2011)
Senapati	35.50	25.16	109
Tamenglong	14.01	25.69	32
Churachandpur	27.13	19.03	59
Bishnupur	24.04	15.36	485
Thoubal	42.05	15.48	818
Imphal West	51.47	25.82	992
Imphal East	45.27	25.63	638
Ukhrul	18.31	30.07	40
Chandel	14.40	21.72	43

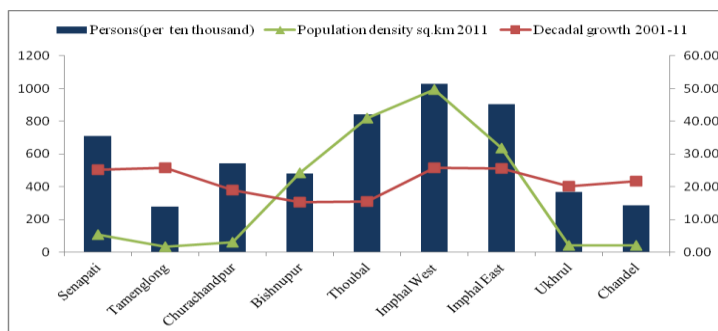


Fig 2. Statistics of population in districts of Manipur As per 2011 census record

Table 3. Record on vehicular population in Manipur (2001-2010)

Categories of vehicles	2001	2002	2003	2005	2006	2007	2008	2009	2010
Truck	6,203	6,422	6,113	7,804	8,586	9,063	9,436	9,800	12530
Buses	1,562	1,641	1,643	1,827	1,913	1,969	2,062	2,085	2677
Mini Bus	595	601	506	653	657	665	665	666	1104
Jeep	6,746	7,132	7,009	8,269	8,568	8,967	9,146	10,193	13443
Car	5,848	6,574	7,400	9,632	12,034	12,439	13,327	15,649	22962
Taxi	323	356	423	369	377	407	412	526	2477
Tempos	37	37	38	38	38	2,263	146	173	2298
Tractors	946	1,047	858	1,348	1,446	1,460	1,540	1,586	12615
Auto Rickshaws	2,315	2,352	2,344	2,592	2,697	76,219	4,096	4,297	150854
2 Wheelers	58,328	63,189	68,771	80,557	86,931	93,595	105,465	107,919	755
Others	190	208	213	251	270	423	435	635	12530
Total	83,600	90,091	95,860	113,921	124,129	208,066	147,394	154,203	234245

Table 4. Record on vehicular population for district wise in Manipur (2010)

Categories of vehicles	Imphal West	Imphal East	Thoubal	Bishnupur	Chandel	Senapati	Ukhrul	Chura chanpur	Total
Truck	7866	677	849	1138	578	367	164	891	12530
Bus	1646	194	179	198	174	114	-	172	2677
Mini Bus	542	1	147	160	115	1	-	138	1104
Jeep	10223	660	1170	281	369	234	219	287	13443
Car	18375	2115	334	380	252	407	247	852	22962
Taxi	1975	323	9	49	-	18	15	88	2477
Tractor	962	587	594	18	-	8	2	127	2298
Auto rickshaw	7754	1831	956	402	274	425	45	928	12615
2 wheelers	114977	12791	12801	1461	175	905	353	7391	150854
Others	405	24	251	-	-	-	2	73	755

Table 5. Tree covered loss in Imphal City per hectare (East and West) during 2001-2011

Year	Imphal West	Imphal East
2001	4.05	32.48
2002	7.06	11.20
2003	1.40	21.84
2004	7.34	22.04
2005	9.23	43.74
2006	8.95	54.67
2007	16.14	37.03
2008	7.90	59.51
2009	16.99	60.98
2010	8.94	44.11
2011	28.85	47.61

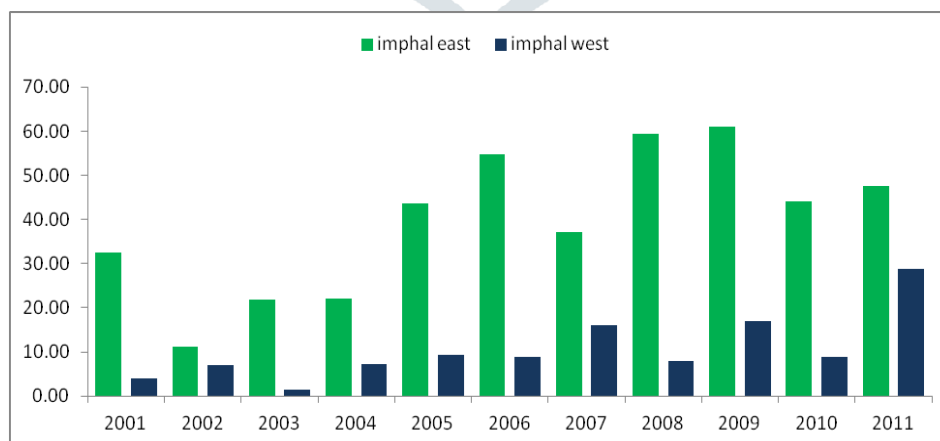


Fig 3. Tree covered loss in Imphal City per hectare (East and West) during 2001-2011

VII. CONCLUSION

Therefore, the value of land in which urbanization is expected are more valuable compared to agricultural land in rural areas. Emergence of urban sprawl as a result of this process is regarded as one of the probable outcomes (Sinclair, 1967:78). Rapidly increasing population lies in the basis of various factors causing urban sprawl. Apart from the effect of increase in birth rate, migration from rural to urban place also has great impact on rapid population increase in urban area. As a result of this

uncontrolled growth, problems arising from city becoming crowded direct people to live out of city center which causes urban sprawl. Apart from increasing population, increase in household income is among the factors which cause urban sprawl. Inter-linkages between dwelling and industry/business/transportation area are also important for the promotion of urban sprawl. Apart from this, new transportation linkages most of the time enable development of commercial and industrial fields, development of new settlement areas in its environment (EEA, 2006:18). This interaction between sectors causes increase of urban sprawl.

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