



Post facto, trends, pattern of Urbanity in Sikkim

Kalosona Paul¹ and Deepak Sharma²

¹Doctoral Fellow, Tata Institute of Social Sciences, Govandi station road, Deonar, Mumbai, ²Doctoral Fellow, Sikkim Manipal University, Sikkim,

Correspondence: Kalosona Paul¹ (email: kalosonapaul@gmail.com)

Abstract

Urbanity is the rapid continues concentration of structuralism, modernism and socio-cultural dynamic changes through urbanization process. Urbanization has been viewed as an important factor in the areas of economic transformation, orchestrating the breakdown of the feudal order and taking societies to higher levels of social transformation. The paper analyses the spatial pattern, process and trend of urbanization in the state of Sikkim on the basis of conceptualization theory & secondary data for the last seven decades. Thus, till 1970, the process of urbanization was very invisible. Sikkim has also witnessed rapid urbanization process in the post-merger years and trend is rather increasing. A town attracts people for a better opportunity, employment, urban facility, better lifestyle and easy access to the places of human activities and also for better human status. The number of urban towns has grown from 1 in 1981 to 8 in 2001. The number of the population residing in urban areas has increased from 2% in 1951 to 11 in 2011. Even in Sikkim, the rural-urban migration is the pouring potency for growing the urban population. There is also an urgent need to strengthen the carrying capacity of smaller town to brace up to the challenges ahead by checking in the migration of population and through appropriate urban planning, monitoring & government intervention policies for effect in future on natural beauties as well as environmental resources.

Keywords: Definitional & classification Issues, urbanization, Urbanity, Degree of urbanization, City Size Classification, Tempo of urbanization.

Introduction

Urbanization is a process of population concentration, structural change and socio-cultural change affecting both people and place. The term urbanization has been used to outline the processes of alteration from a primarily rural to principally toward urban centers. The key dimensions of urbanization are a progressive concentration of people and activities towards towns and cities. Urbanization has also been stated as synonymous with urban expansion particularly the type of urban growth known as urban sprawl. Urbanization in the demographic sense is an increase in the proportion of the urban population to the total population over a period of one year. (Bose, 1974). It does not permanently yield the same form, nor does it progress at an equivalent proportion ubiquitously. The degree of urbanization varies from place to place. The spatial discrepancies on urbanization are concomitant with demographic phenomenon, structural change in society and urbanization as a behavioral process. Riesman, 1964 described, Urbanization as the whole process of change and its consequences, when a society gets transformed from an agrarian economy to an industrial economy and from a small homogenous society to a large

heterogeneous mass. Consequently, many developmental exertions have largely been focused in urban areas which have witnessed a high degree of migration from the villages to the town.

The spatial configuration and the dynamics of urban growth are important topics of analysis in the contemporary urban studies. Several studies have addressed these issues which have dealt with diverse range of themes (Acioly & Davidson, 1996; Wang et al., 2003; Paez & Scott, 2004; Zhu et al. 2006; Hedblom & Soderstrom, 2008; Geymen & Baz, 2008). This transition initially includes development in the open space in interstices between the central urban core and peripheral centers (Herold et al., 2005). Remote sensing challenged by the spatial and spectral heterogeneity of urban environments as well as developed satellite imagery and aerial photographs (Jensen & Cowen, 1999; Lavalle 2002; Donnay et al., 2001; Herold et al., 2004). The process of mapping urban growth results in the creation of abstracted and highly simplified change maps of the study area. Urban growth can be quantified by measuring the built-up change between two dates (Singh 1989; Jensen 2005). Cities in developing countries are becoming significantly more compact in spite of decelerating population growth and with the beginning of decentralization (Acioly and Davidson 1996; Richardson et al., 2000)

Till 1961, there was only one town – Gangtok, but the number of town have up surged to 8 in 1981. The swift increase in population density 57 persons / sq.km in 1991 as against 45 persons / sq.km in 1981 indicates huge burden on the existing land resources. Urbanization has become a common feature of anywhere. Its indicate development in terms of social-economic & awareness of life. Expansion of Industries & transportation has contributed to the growth of cities. Urbanization denotes a diffusion of the influence of urban growth poles to a rural hinterland. According to Mitchell urbanization is a process of becoming urban, moving to cities, changing their primary activity to secondary/ tertiary/quaternary activity pursuit in the cities or towns (Mitchell 1987).

Study Observation

Sikkim, with a total area of 7,096 sq. km, constitutes 0.22 per cent of the total geographical area of India. It is situated in the North-Eastern part of the country and lies between 27° 46' to 28° 7' N latitude and 88° 0' to 88° 55' E longitude (Fig 1). The State is divided into four districts—South, North, East and West (Registrar General of India, 1989). According to the census 2001, Sikkim state has a population of 540,493. North district is the largest district having an area of 4226 sq. km i.e. 59.55 % of the total area the state. It has only one town and 53 revenue blocks which share 8.3 % of the state population. West district is the second largest district in terms of geographical area, which comprises 2 town (Nayabazar and Gayzying) and 145 revenue blocks. It is followed by east district with the area of 954sq.km. It represents 13.44 % of the state population having largest number of town (Gangtok, Rangpo, and Singtam). The south district is the smallest with an area of 750 sq. km comprising 2 towns (Jorhang and Namchi). Sikkim is also one of the least densely populated Indian states, with only 86 persons per square kilometer. The [sex ratio](#) is 889 females per 1,000 males, with a total of 321,661 males and 286,027 females recorded in 2011. With 50,000 inhabitants, the capital [Gangtok](#) is the only significant urban area in the mostly rural state; the urban population in Sikkim constitutes around 25 per cent of the total (Census of India, 2001, 2011).

Objectives

This paper endeavors to illuminate on the process of urbanization in Sikkim over 4 decades with emphasis on level, tempo of urbanization and urban problems using Indian Census data during 1971-2011. The study has been carried out to examine the fashion of urbanization because Sikkim has been enduring noteworthy transformation in its demographic and settlement array since 1975.

- The basic purpose of this paper is to analyze the spatio-temporal pattern of urbanization in Sikkim since 1971.

- To assess and identify the trend of urbanization in major towns of Sikkim from period 1971 to 2011

Data Sources

The choice of an appropriate methodology is a crucial part of study design as it supports in the scrutiny of the data in correct form which in turn helps either endorse or discard.

Data and Maps:-Data for the purpose of spatio-temporal behavior of urbanization, growth trend of individual urban centers have been collected mainly through census publications, i.e. Town Directory, District census Handbooks, State Socio Economic Census 2006, Several statistical publications of the government, including City Development Plan-Gangtok from Urban Development and Housing Department, Government of Sikkim, Gangtok, Report of Directorate of Statistics and Evaluation, and published articles and journals from government and other organizations have also taken into consideration.

The descriptive and cartographic techniques would be applied in the present study to examine the trend of urbanization in Sikkim. The study is based on the secondary sources of data. Decadal variations in urban population of 8 major towns have been collected for the spatio-temporal trend and pattern analysis. Information data about the independent variables would be obtained from the related agencies and topographical sheet.

Significance of Study

One of the major challenges of Sikkim is its ruggedness. However, over 24% of the total population is inherent in urban areas of Sikkim (Census of India, 2011). The upsurge in economic activities in all sectors and rise in the literacy rate play imperative role in the urbanization of the State. Even in the non-existence of industries in the State, towns and bazaars are the leading places for the economic activities of the State. The rural products are brought to the towns, bazaars and the rural marketing centers for which the basic infrastructure has to be matched. There are eight notified towns and 46 rural marketing centers. The eight notified towns are Gangtok, Singtam and Rangpo in the East, Mangan in the North, Jorethang and Namchi in the South and Gyalshing and Naya bazaar in West.

Besides that, subsequent influx of permanent as well as floating population has been amplified principally in towns. The negative impacts associated with rapid urbanization, particularly the environmental consequences within the city and peri-urban areas, are some of the most documented issues in urban environmental research (Bernstein *et al.*, 1994; World Bank 1997). Whether the studies are focusing on mega-cities or medium and small sized urban places (Van den Berg *et al.*, 2003; UNDP, 2000; Jenkins, 2003). Due to urbanization there is problem of employment, environmental pollution, congestion, and transportation, shortage of housing and solid waste disposal especially in Gangtok town. Thus, till 1970 the process of urbanization was very invisible. But now, the state has witnessed much unplanned urbanization with little attention to building laws. There is also an urgent need to improvise the living quality of smaller town to check in the migration of population to the capital in seek of better living standards.

Methods of urban Area Demarcation

Usually, urban settlements are concomitant to towns and cities. Most of the countries delineate their urban settlement on the basis of a least qualifying size of population. Thus, towns are of many different size ranging from small country towns, sometimes smaller than village elsewhere, to enormous sprawling cities with several millions inhabitants.

The Census of India has its own criteria for identifying urban areas. Nevertheless, in India these criteria are not fixed rather they have changed from time to time since 1901. In 1991, the Census of India defines urban areas, which satisfy the following criteria.

1. All places which have a municipality, corporation, and cantonment board or notified town area committee.
2. All other places which fulfill the following criteria's
 - a) They should have 5000 minimum population
 - b) At least 75 percent of male workers are engaged in non- agricultural activities, and
 - c) They have a minimum population density of 400 persons per square kilometer (Fig 2).

Thus, the definition of an urban Centre is highly variable from countries to countries. In order to make the International data comparable, the United Nation (1958) suggested that the data on urban population should also be presented according to a standardized scale: accordance with the recommendation of the United Nation. Similarly, census of India has also classified the urban places into the following six categories (Fig 3 & Fig 4).

Methodology

A. Degree of Urbanization

The degree of urbanization is defined as the relative number of people who live in the urban areas. Few indices of measuring of level of urbanization. These are as described below:

1. Percent of Urban

It is the most common & simple index for using of measuring the level of urbanization at particular district or state or country.

$$PU = \frac{U}{P} * 100$$

Where,

PU= Percent of Urban

U = Urban Population of an area and

P = Total Population of an area

2. Urban/Rural ratio

This is also a simple index and measures the relative number of urbanities for each rural person in area unit and is calculated as follows:

$$UR = \frac{U}{R} * 100$$

Where,

UR= Urban-Rural Ratio

U = Urban Population of the unit and

R = Rural Population of the unit

3. Mean City Population Size

This index takes into account the size of cities, unlike percent urban and urban/rural ratio, and consequently give different results when applied to countries or area where the percent urban is the same but the size of cities is different. This index tells the size of the city in which the average person lives. This index has the same underlying concept as the mean age and its calculation is similar. The calculation

of this index would require information on every urban settlement in the state or country. This can be applied or considered an individually all types of class cities.

$$MC = \frac{\sum_{i=1}^n C_i}{P}$$

$$MC = \frac{\sum_{i=1}^n C_i^2}{\sum_{i=1}^n C_i} * \frac{\sum_{i=1}^n C_i}{P}$$

$$MC_{class II-VI} = \frac{\sum C_i}{P}$$

$$MC_s = \frac{\sum C_i^2}{\sum C_i}$$

$$MC_I = \frac{\sum C_i^2}{P}$$

Where,

$MC_{class II-VI}$ is Proportion of population in class II-VI class
 MC_s is Mean city Population Size
 MC_I is Index of Mean city Population Size
 C_i is the population of the city i,
 n is the total number of the cities and
 P is the total population of the State,

B. Tempo of Urbanization

1. Linear Model

$$TR_a = \frac{1}{n} \left(\frac{PU^{t+1}}{PU_t} - 1 \right) * 100$$

Where,

TR_a = Tempo of Urbanization
 n = number of years
 PU = percent urban at the year t & t+1

2. Exponential Model

$$TR_e = \frac{1}{n} \left(\frac{PU^{t+1}}{PU_t} \right) * 100$$

Where,

TR_e = Tempo of Urbanization
 n = number of years
 PU = percent urban at the year t & t+1

3. Index of City Distribution

A number of studies have shown that there exists a regularly between the size of the city and rank this relationship between the sizes of the cities and their ranks is known as *Rank Size Rule*. According to this rule, it is possible to adjust the distribution of cities with a function, which relates the population size of any city to its rank and to the population size of the largest city. This relationship can be described as below:

$$C_k = C_1 k^{-z}$$

Where,

C_k represents the population of the city ranked in place k from the largest city to the smallest city in the population size;

C_1 is the population of the largest city;

K is the rank order;

Z is a constant=the index of city distribution;

$$Z = \frac{\sum \ln \left(\frac{C_1}{C_k} \right) \ln(k)}{\sum [\ln(k)]^2}$$

C. Change in Index

$$CI = \frac{Dt}{Do}$$

Where,

CI: Change in Index

Dt: Disable population at time t ,

Do: Disable population at base time o ,

Methods of urban Area Demarcation

Usually, urban settlements are concomitant to towns and cities. Most of the countries delineate their urban settlement on the basis of a least qualifying size of population. Thus, towns are of many different size ranging from small country towns, sometimes smaller than village elsewhere, to enormous sprawling cities with several millions inhabitants. Hence, an urban area demarcation criterion has been different in different countries. In Canada, with settlement more than 1000 population are called town; In Colombia, the dividing line between rural and urban is 1500, in Argentina, the settlement above 2000 persons are urban and in USA urban settlement having more than 2000 persons. While in Pakistan, all area having Town Committee area treated as urban. In UK a settlement is proposed as urban on the basis of local government such as borough, municipal borough and urban district.

In India, on the basis of population a new criterion has been formulated by the Census of India in 1991 for classifying urban area.

Urbanity

The Urbanity word is related to the Latin '*urbanitas*', which means "the quality being from urbane and courtesies or civilities". People who can be described as having urbanity are also referred to as citified. Another way as described urbanity is continues concentration of structuralism, modernism and socio-cultural dynamic changes through urbanization process.

Degree of Urbanization

The degree of urbanization in Sikkim has moved up from 2% in 1951 to over 24% in 2011 which recorded an increase of 114% percent per decades. An annual increase of 1.90 percent has been recorded. However during the decade of 1951-61 the average annual rate of increase in the level of urbanization was about 14.95% and it has further stretch to 5% in the year 1961-71. Demographically, the speed of growth known as 'tempo of urbanization' which has noticeablyplunge down from 16.15% in 1981 to 9.10% in 1991 resulting from the reduction of urban area.

At the moment, Sikkim is among the state of low level of urbanization. Number of urban town has grown from 1 in 1981 to 8 in 2001. Number of population residing in urban areas has increased from

2744 in 1951 to 151726 in 2011 (fig 5). At this instant, as per 2011 census there are 4 VI Class towns in Sikkim those having less than 5000 population they have accommodate only 4.44 percent of urban population. Small towns with population less than 20 thousand each account for 50% of the total urban center but they accommodate about 25% of urban population of Sikkim. As per 2001 census, Gangtok emerged as II class town having population more than 50000, which support 65 percent of the total urban population of Sikkim.

Sikkim is one of those states of India, which is traditionally rural in character with agriculture and allied activities being the primary occupation of its population. Sikkim is one of the least urbanized states of the country. While the share of urban population to total population of Sikkim in 1951 was only 2%, it increased to 24.84% in 2011, which is still lower than the national average of 27.78% (fig 6).

The tempo of urbanization in Sikkim is comparatively low when equated to many other Indian states. India as a whole had a level of 27.78 percent in 2001; the highest level being over 49 percent in Goa and Mizoram followed by Maharashtra and Tamil Nadu. However, Sikkim will not take much time to beat national average of 34%. In the last decade (2001-2011), 12.36 percent growth has been registered in Sikkim. However, the rural population has tumbled by 5.20%, while the urban population of the State has grown up by a shocking 153.43%. Consequently, this upswing is largely because of the conclusion of the government to take in the present towns into municipalities by integrating a number of neighboring villages into these towns. It indicates that Sikkim is at acceleration stage of the process of urbanization. Till the census of 1941, Sikkim had no urban population. Merely in the census process of 1951 Gangtok was rendered urban status. For another two decades it was the alone urban settlement of Sikkim. However, the census enumeration of 1971 half a dozen of new town were identified. Subsequently, when the immigrants swelled the population numbers of some other settlements and particularly the numbers of persons engaged in non-agricultural activities the number of census town was likely to rise still further (Table 1).

The form of urban growth across districts is considerably different from that of the levels of urbanization. The pre-merger urban growth history of Sikkim was irrelevant. In 1951 only 2 per cent of the state's population subsisted in urban area, the corresponding figure for 1961 is around 6 per cent which rose to around 10 per cent in 1971. Till 1961, exceptionally east the urban scenario has not been documented in other districts. Yet, post-merger period until 1991, have revealed truncated progress on urban population. In contrast, high proportion of urban population (64 per cent) was conceded by east district in 2001, the corresponding figure rose to (80 percent) in 2011. In short, the number of urban dwellers in the district amplified from 0.38 lakh in 2001 to 1.20 lakh in 2011. Table 1 reveals that state's population is becoming increasingly urbanized. Comparatively, the rate has been rather rapid during the recent decade. The proportion of urban population in the state is likely to cross 2.43 lakh (35%) by 2021. It is expected to touch 45 percent by 2031. The estimated urban population at the current growth rate would be about 5.19 lakh (58%) in 2051. It may also be perceived from data that the urban population growth rate would be highest in East, followed by South, West and North. The highly urbanized district attracted population in urban areas due to pull factor and infrastructural investment. The rapid urbanization in the recent past is attributable to substantial rural to urban migration.

The urbanization practice has, thus, become rigorous in smaller town in recent years, with comparatively little growth in established town. The pace of urbanization has become rapid even in smaller town like Rangpo, Mangan and Nimachi in the last decade. The high growths of urban population in these small towns are generally due to a large influx of employment bound floating population. The rapid growth of pharmaceutical and allied industries employed large number of population from the different parts of Sikkim and other states. On the other hand, high growth all eight cities concentration of urban population continuously increases of over the periods of time, but obtained that Namchi city population rapidly growing in the last decades of Census (Table 3 and fig 7). The consequences of hydal power project, which pulled large number of migrants from different parts of the country. It means the growth of urban population has been phenomenal, rapid and unprecedented during 2001-2011.

As per 2011 census, of the total urban population of Sikkim, Gangtok town alone bestows more than 65 per cent of urban population. East and South district joint together have accommodates more than 93 percent of the state urban population. The total urban population of East as per 2011 census is 1.20 lakh. This is a vibrant addition of 82250 persons in ten years which has registered 213.63% growth during 2001 -2011. The urban population of South district has amplified by 205 % in the last decade. Among the four districts, East District with an urban population 120750 continues to be the most populated district of the state and North District is the least populated. According to the present census, the total urban population of North District is 4644 person's accounts for 3 per cent of the total population. The insignificant level of urbanization 4 per cent has been reported in West District.

Rural-Urban Ratio

The Rural-Urban ratio is an indicator used to describe the proportion of the population living in urban and rural areas. In fact, rural urban ratio which is a simple index employed to evaluate numbers of urbanites for each rural person. The urban-rural ratio for Sikkim in 2011 turns out to be around 33, meaning that against every 100 rural peoples there are 33 urbanites in Sikkim in 2011. In accordance with 2011 census, 4, 55,962 people consisting 2, 42,122 male and 2, 13,840 female living in the rural areas and 1, 51,726 people comprising 79,539 male and 72,187 female in urban areas. At instant, East District is the biggest urban population in the State with three major statutory and one Census town situated in this district accounting for a population of 1, 20,750, which is 79.59 per cent of total urban population of Sikkim. The Percentage Decadal Growth 12.36 per cent has been recorded in the last decade (2001-2011). While the rural population has remarkably tumbled by 5.20%, consequently the urban population of the State has rushed up by a striking 153.43%. The rural population of North district has dropped down by 2.70 per cent in the 10 years between 2001 and 2011; however, the urban population has enlarged by 272.44 per cent. In West and South district the rural population has deteriorated at the rate of 7.93 and 1.51 per cent, while urban population has grown up by 187.23 and 434.44 per cent respectively.

Reason for high growth

At instance, considerable urban growth has been the outcome of immigration which was obviously required to man and manage the several plans, projects and schemes initiated, after Sikkim's merger in the Indian Union, for the socio-economic enhancement of the people of Sikkim. Generally, for opening infrastructural facilities such as schools, hospitals, training centers, universities, research center, waterpower, industries, tourist spots, banks and co-operative sectors, building and setting up small and medium scale enterprise have centripetally attracted bulks of population from various states. Recently, expanding existing infrastructural facilities; initiating many schemes for the development of towns has also accelerated the tempo of urbanization in the State.

The inter district urban population distribution shows (Table 4) that the level of urbanization diverges extensively among the district. East district is the utmost settled district in the state, in facts of urbanization, where over 80 per cent of the population subsists in urban areas. North has the lowest level of urbanization where not more than 3 per cent of the total population exists in urban space. The percentage of urban population to the total population is below the state average in south (13 percent) followed by west (4 percent) and North (3 per cent).

As of now, none of the towns in Sikkim fulfills the criteria to be a first class town. Until 1991, more than 87% towns in Sikkim have been categorized into VIth class town having more than 5000 population. However, which has reduced to less than 40% in 2011(table 5). Out of eight towns' only single town (Gangtok) has fulfilled IInd Class criteria in 2011. Now, nearly 50% towns in the state are in IV and V class Size respectively.

Techniques of Mean city population size (Table: 6) has given clear idea about attention of urban city population of Sikkim resided on types II category (includes Gangtok) as per 2011 Census, whereas

last census 2001 it is belong to types II towns. However, contribution of Gangtak urban population excluded from the table than scenario of mean/Index mean city population size will be seen different or very pathetic situation in contrast to India (table 7).

Each value Z characterizes a city distribution. The greater the value of Z, the greater is the concentration of population in the largest cities relative to the smallest cities. Advantages of this index is that it facilitates the national comparison of city distribution by reducing them to a single value as well as in the change in the concentration over a period. It has also shown that effect (table 8) on rank one city (Gangtak) much powerful because of all the facility & accessibility are there, so that trends of urbanity still rising over the decades from 1971 to 2011.

Newly, this upsurge in urban population is primarily because of the government's resolution to upgrade the prevailing towns into municipalities by amalgamating a number of contiguous villages around these towns. For example, the rural population of North district has dropped down by 2.70 per cent in the 10 years between 2001 and 2011; however, the urban population has enlarged by 272.44 per cent. Since its largest town, Mangan, utmost of which was documented as rural in 2001 is now encompassed into urban class.

Conclusion

The decadal population growth rate of Sikkim, according to the Census data, has been inconsistent as compared to that of the country as a whole. This could be attributed to the merger of Sikkim with the Indian Union and the subsequent in-migration triggered off by large-scale development activities in the State. Temporal analysis of urban demographic pattern for the last 60 years demonstrates that population growth in urban areas is now mounting up.

Urbanization process is not mainly migration lead but a product of demographic explosion due to natural increase. Overall, faster urbanization does not rely on increased rural to urban migration only, but on geographical expansion through the emergence of small towns, or merging of small towns with medium class towns. Concentration of population in the big cities and the spread of population to the peripheral areas around a big city is also an important reason for urban growth. The decadal population growth rate one third reduced as compared from the previous Census 2001. The present trend of population growth that has been observed in the state is the noteworthy outcomes of migration. The problem is more acute in Gangtok town where there is large influx of unemployed and underemployed migrants from other parts of the state. Consequently, this leads to a chronic problem of shortage of houses, water scarcity, traffic congestion etc. Thus, the sustainable development planning is required on the basis of fundamental principle of optimum land use. Besides, the transformation of rural to urban areas is revealed from the decrease in the urban rural growth differentials. Understanding the urban patterns, dynamic processes, and their relationships is a primary objective in the urban research agenda with a wide consensus among scientists, resource managers, and planners, because future development and management of urban areas require detailed information about ongoing processes and patterns. Hence, new alternative policies and strategies should be framed in a long run vision in order to grip the complications twisted through enormous inflow of people into the towns. The tempo of urbanity will depend stable policy of state government with central or adjoining state mutual relationship in terms of infrastructure and economic development in various tourism based cities in Sikkim.

References

- Acioly, C., & Davidson, F. (1996). Density in urban development. *Building issues*, 8(3), 3-25.
- Becker, C. M., Mills, E. S., & Williamson, J. G. (1986). Modeling Indian migration and city growth, 1960-2000. *Economic Development and Cultural Change*, 1-33.
- Bose, A. (1974). *Studies in India's urbanization, 1901-1971* (No. 1). Tata McGraw Hill Pub. Co..

- Bhagat, R. B. (2004). "Dynamics of Urban Population Growth by Size Class of Towns and Cities in India". *Demography India*, Vol. 33 (1), pp. 47-60.
- Bhagat, R. B. (2011). "Emerging Pattern of Urbanization in India". *Economic & Political Weekly*, Vol 16 (34), pp. 10-12.
- Batty, M., & Howes, D. (2001). Predicting temporal patterns in urban development from remote imagery.
- Chandna, R.C (2002): '*Geography of Population- Concepts, Determinants and Patterns*, Kalyani Publishers, New Delhi
- Census of India (2011), General population tables, A-series, Registrar General of India, New Delhi, India.
- Census of India, 2001, Town Dictionary, Part XII A & B, District Census Handbook
- Census of India (1991), Series 22 Sikkim, Town Dictionary, Part XII A & B, District Census Handbook.
- Census of India (1981), Series 19 Sikkim, Part XIII- A & B
- Census of India, (1971), Series 21 Sikkim, part XII- A&B
- Central Statistical Organisation (1998), 'Statistical Abstract of India 1998', Government of India.
- City Development Plan-Gangtok City, Urban Development and Housing Department, Government of Sikkim
- Kingsley, D. (1962). Urbanisation in India-Past and Future. *India's Urban Future*, University of California Press, Berkley.
- Davis, K., & Golden, H. H. (1954). Urbanization and the development of pre-industrial areas. *Economic Development and Cultural Change*, 6-26.
- Donnay, J. P. et. al. (2001). "Remote sensing and urban analysis. In Donnay, J. P,
- Donnay, J. P., Barnsley, M. J., & Longley, P. A. (Eds.). (2003). *Remote Sensing and Urban Analysis: GISDATA 9*. CRC Press.
- Lavalle, C. (2002). *Towards an urban atlas: assessment of spatial data on 25 European cities and urban areas* (Vol. 30). European Environment Agency.
- Gangtok. (1997), 'Sikkim State: Annual Plan 1996-7', Bureau of Economic and Statistics, Planning and Development Department, Gangtok.
- Geymen, A., & Baz, I. (2008). Monitoring urban growth and detecting land-cover changes on the Istanbul metropolitan area. *Environmental monitoring and assessment*, 136(1-3), 449-459.
- Goldstein, S., & Sly, D. (Eds.). (1977). *Patterns of urbanization: comparative country studies*. Ordina Editions.
- Government of Sikkim (2001), 'Sikkim State Annual Plan 2000-2001', Planning and Development Department, Gangtok.
- Google Map (2011):
https://www.google.co.in/search?q=sikkim+map&biw=1366&bih=643&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwi45oqThb_JAhVGkI4KHSLFDNYQsAQIHA&dpr=1
- Hedblom, M., & Söderström, B. (2008). Woodlands across Swedish urban gradients: Status, structure and management implications. *Landscape and Urban Planning*, 84(1), 62-73.
- Herold, M., Couclelis, H., & Clarke, K. C. (2005). The role of spatial metrics in the analysis and modeling of urban land use change. *Computers, Environment and Urban Systems*, 29(4), 369-399.
- Jensen, J. R., & Cowen, D. C. (1999). Remote sensing of urban/suburban infrastructure and socio-economic attributes. *Photogrammetric engineering and remote sensing*, 65, 611-622.
- Kundu, A. (2006). Trends and patterns of urbanization and their economic implications. *India infrastructure report, 2006*, 27-41.
- Lama, M.P (2001) 'Sikkim Human Development Report, 2001, Social Science Press, New Delhi
- Lama, M. P. (Ed.). (1994). *Sikkim: Society, Polity, Economy, Environment*. Indus Publishing. Mandal, R. B. (1999). *Urban Geography: A text book.*, New Delhi
- Mitchell, J. C. (1987). *Cities, society, and social perception: a Central African perspective*. Oxford University Press.
- Sivaramakrishnan, K. C., Kundu, A., & Singh, B. N. (2005). *Handbook of urbanization in India: an analysis of trends and processes*. Oxford University Press, USA.

Páez, A., & Scott, D. M. (2005). Spatial statistics for urban analysis: a review of techniques with examples. *GeoJournal*, 61(1), 53-67.

Provisional Population Totals, (2011), 'Sikkim State District Profile, Census of India, New Delhi.

Wang, W. W., Zhu, L. Z., Wang, R. C., & Shi, Y. J. (2003). Analysis on the spatial distribution variation characteristic of urban heat environmental quality and its mechanism. *Chinese geographical science*, 13(1), 39-47.

Rahman, S. A., & Verma, B. (2006). *The Beautiful India-Sikkim*. Reference Pr.

Jenks, M., & Burgess, R. (2000). *Compact cities: sustainable urban forms for developing countries*. Taylor & Francis.

Fig 1: Location Map of different cities of Sikkim



Sources: https://www.google.co.in/search?q=sikkim+map&btn=1366&bih=643&fbm=isch&fbo=uc&source=univ&sa=X&red=0ahUKEwi45oqTbb_JAhVGkI4KHSFLFDNYQsAQIHA&dpr=1

Fig 2: Definitional is Census of towns

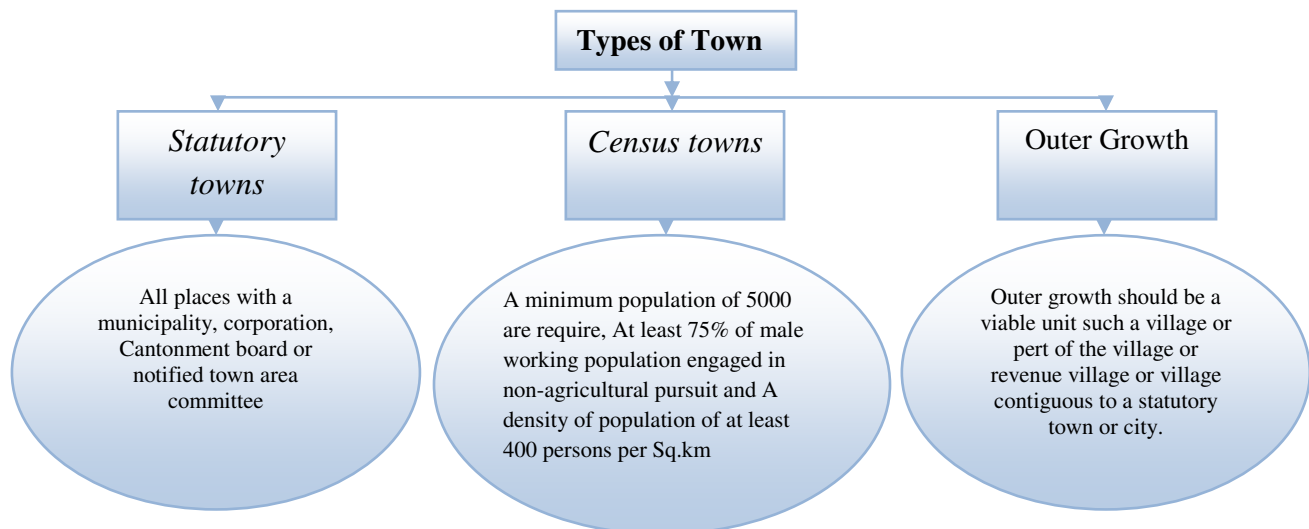


Fig 3: classification of towns

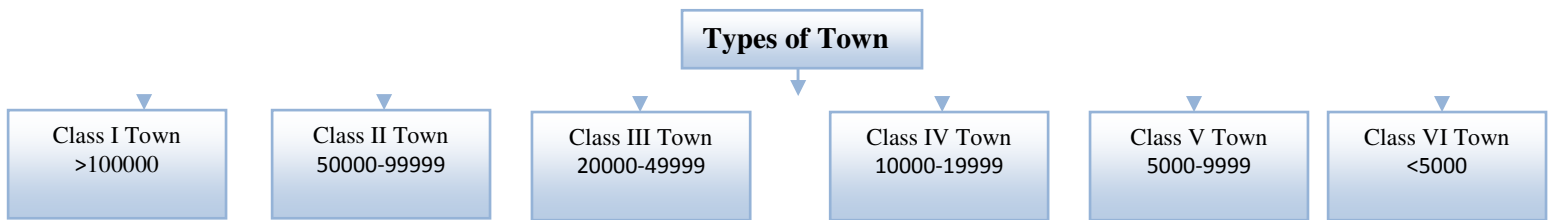


Fig 4: Importance of Urbanity

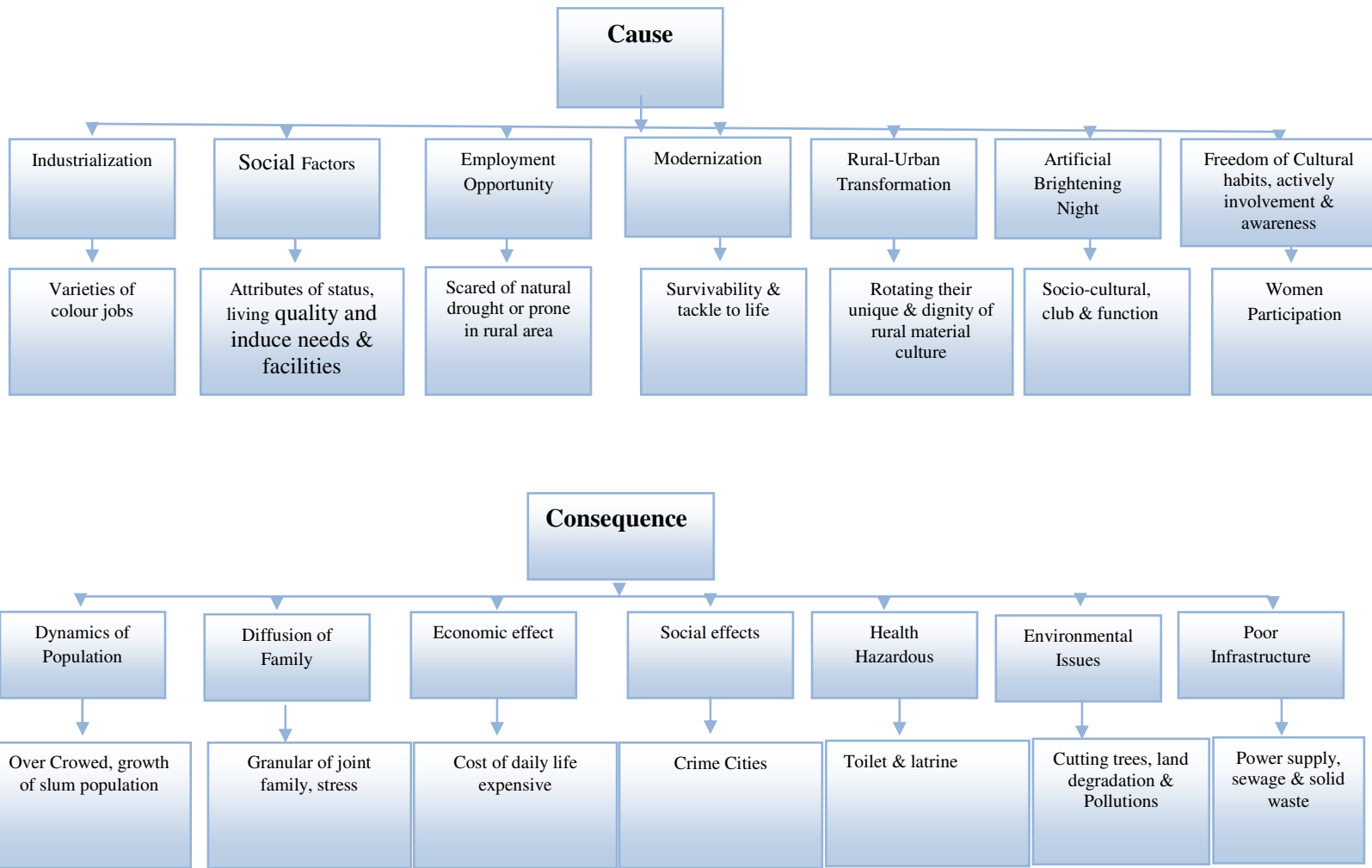


Fig 5: Urban Population at Sub-division Level.



Fig 5: Process of Urbanization in Sikkim

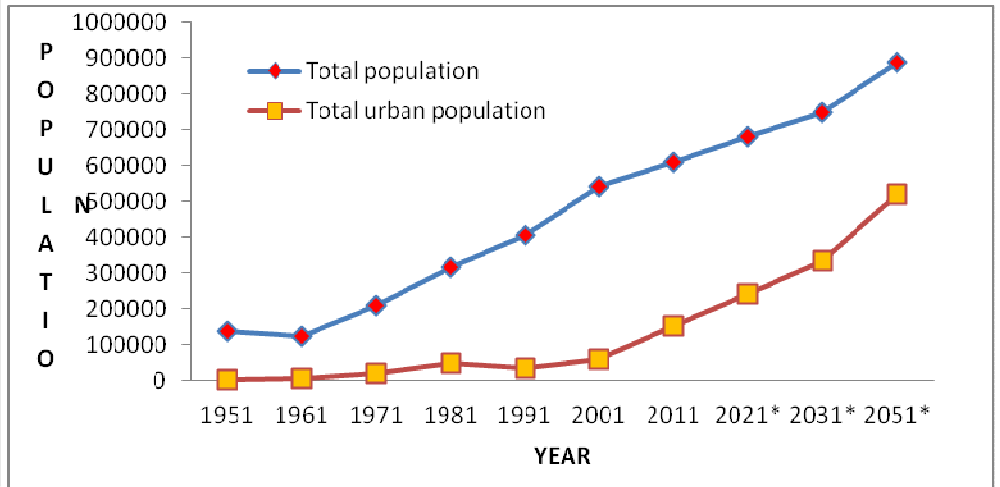


Fig 6: Population Characteristics, 1951-2011

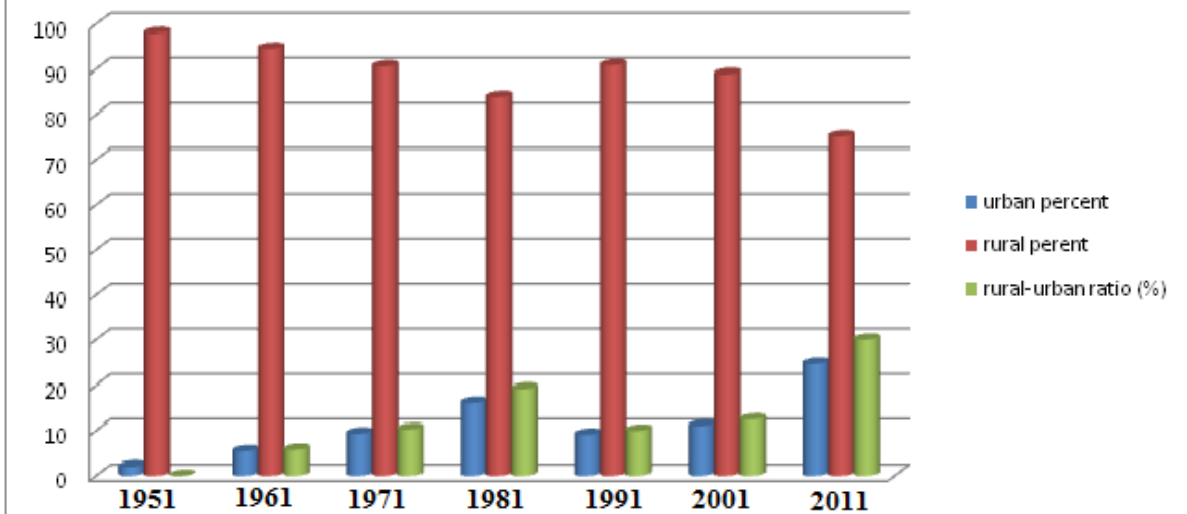


Fig 7: Change in Index in India (1971-2011)

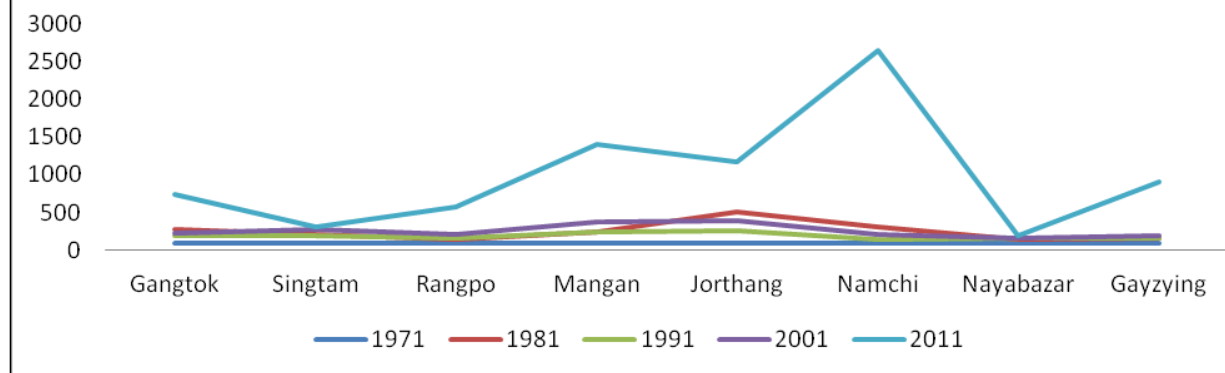


Table 1: Demographic Characteristics of Sikkim

Year	Total population	Total urban population	Total Rural Population	Total urban population (%)	Decennial growth (%)
1951	137725	2744	1,34,981	2	-
1961	126189	6848	155341	5.42	149.56
1971	209843	19662	190175	9.37	187.12
1981	316385	51096	264301	16.15	159.98
1991	406457	36988	369473	9.1	-27.61
2001	540851	59870	480981	11.07	61.86
2011	610577	151726	458851	24.84	153.42
2021*	680309	243590	436719	35	60.54
2031*	750029	335450	414579	44.26	37.71
2051*	889481	519170	370311	58.35	54.76

Source: District Census Handbook 1971, 1981, 1991 and Primary Census Abstract 2001 & 2011 Census of India * Projected figure

Table: 2 Sikkim: Trends of Urbanization

Table 2: Total urban population 1971-2011

Towns	1971	1981	1991	2001	2011
Gangtok	13308	36747	25024	29359	98658
Singtam	1926	4043	3868	5432	5874
Rangpo	1785	2452	2980	3709	10326
Mangan	331	780	803	1248	4644
Jorthang	762	3921	1939	2967	8895
Namchi	460	1444	630	979	12194
Nayabazar	651	952	1045	996	1230
Gayzying	445	745	717	828	4009

Source: District Census Handbook 1971, 1981, 1991 and Census of India 2001 & 2011.

Table 3: Change in Index (1971=100)

Towns	1971	1981	1991	2001	2011
Gangtok	100.0	276.1	188.0	220.6	741.3
Singtam	100.0	209.9	200.8	282.0	305.0
Rangpo	100.0	137.4	166.9	207.8	578.5
Mangan	100.0	235.6	242.6	377.0	1403.0
Jorthang	100.0	514.6	254.5	389.4	1167.3
Namchi	100.0	313.9	137.0	212.8	2650.9
Nayabazar	100.0	146.2	160.5	153.0	188.9
Gayzying	100.0	167.4	161.1	186.1	900.9

Source: District Census Handbook 1971, 1981, 1991

Table 4: District-wise Urban population distributions (1951-2011)

District	1951	1961	1971	1981	1991	2001	2011
East	2744	6848	17019	43242	31872	62142	120750
West	-	-	1096	1697	1762	1824	5239
North	-	-	331	780	803	1248	4644
South	-	-	1222	5365	2569	6914	21089

Source: District Census Handbook 1971, 1981, 1991 and Primary Census Abstract 2001, 2011 Census of India.

Table 5: Size class of urban centers, 1971-2011

Size Class	1971	1981	1991	2001	2011
Class I (100000+)	0	0	0	0	0
Class II (50000-99999)	0	0	0	0	12.5
Class III (20000-49999)	0	12.5	12.5	12.5	0
Class IV (10000-19999)	12.5	0	0	0	25
Class V (5000-9999)	0	0	0	12.5	25
Class VI (<5000)	87.5	87.5	87.5	75	37.5
Total	100	100	100	100	100

Source: Census Handbook 1971, 1981, 1991 and Census Town Directory 2001, 2011.

Table 6: Index of Mean City Population Size (Class II-VI) in Sikkim, 1971-2011

Index	1971	1981	1991	2001	2011
Prop. of urban Population in Class cities	0.09	0.16	0.09	0.08	0.24
Mean City Population Size	9433	27253	17739	20172	69543
Index of Mean City Population Size	884	4400	1615	1698	16609

Source: Census Handbook 1971, 1981, 1991 and Census Town Directory 2001, 2011.

Table 7: Index of Mean City Population Size (exclude Gangtok population) in Sikkim, 1971-2011

Index	1971	1981	1991	2001	2011
Prop. of urban Population in Class cities	0.03	0.05	0.03	0.03	0.08
Mean City Population Size	1324	2921	2525	3482	8651
Index of Mean City Population Size	40	132	74	104	668

Source: Census Handbook 1971, 1981, 1991 and Census Town Directory 2001, 2011.

Table 8: Calculation of Rank Size Rule in Sikkim cities

Year	Z Index
1971	1.866**
1981	2.003***
1991	1.885**
2001	1.815**
2011	1.862**

Source: Census Handbook 1971, 1981, 1991 and Census Town Directory 2001, 2011.

*less than 1, ** in between 1.0-2.0, *** more than 2.01

Z is called Rank Size Rule