

# Geo-spatial settlement in Eastern Sikkim based on Urbanization

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**ABSTRACT:** Human settlement is a form of human habitation which ranges from a single dwelling to large city in other words it is process of opening up and settling on previous uninhabited area by people. The level of urbanisation and economic development are related with settlement. An increase in concentration of population at one place yield many positive externalities increasing productivity and efficiency. The relationship between the two is extensively researched in many cross country studies and cross country income differentials are examined , the level and growth of urbanisation and that directly related with settlement. The empirical evidences suggested that relationship between urbanisation and development changes with changes in the stage of development .Sikkim is a comparatively less urbanised but still around 60.0 percent of total GDP is generated in urban areas. The objective of the present paper is to analyse the relationship between growth in level of urbanisation and settlement of economic performance in last four decades in Sikkim.The paper found that present level of state per capita income has positive correlation with level of urbanisation as it is directly related to settlement. With regard to the relationship between growth of per capita income and growth of level of urbanisation the relationship is found insignificant during 1980-1990 but significant during the last four decade of 2000.

**KEYWORDS** :Urbanisation, development, settlement, growth, population , geospatial,economic,GDP

## I. INTRODUCTION

Sikkim is situated in the north-eastern region of India it has beautiful scenery. Sikkim shares its border with Tibet in North, Bhutan in

East, Nepal in the West and West Bengal in South. Host to the highest peak in India – Kanchenjunga, Sikkim is a perfect tourist destination which is suitable for rejuvenation of mind, body, and soul. Sikkim is a small state spread over an area of 7,096 km sq. Gangtok is the largest city and capital of Sikkim. Being a multi-lingual and multi-ethnic state, people in Sikkim speak a variety of languages such as English, Nepali, Sikkimese and Lepcha. It is a remarkable tourist destination. The remarkable achievements by the Government of Sikkim in the health sector are reflected by a drastic change in many health indicators that have made a great impact on the health welfare of the people in Sikkim

## II. DISCUSSION ON VARIOUS TOPICS OF SETTLEMENT & URBANIZATION

### 2.1 Population characteristics of Sikkim

Sikkim is the least populated state in India with a population of 6, 07,688 of which 1, 53,578 (25.15 per cent) is urban as per Census 2011. The total population of Sikkim has rose from 5,40,851 in 2001 to 6,10,577 in 2011 implying a decadal growth rate of 12.89 per cent, which is below the national average of around 17%. However, what is phenomenal about the population growth of Sikkim is that, while the rural population growth rate registered a negative figure of (-) 5.20 per cent the urban population growth rate for the same period is 153.43 per cent (Paul & Sharma, 2016) [22]. Gangtok is not just the largest city but can be described as the primate city of Sikkim accounting for more than 65 per cent of the total urban population of Sikkim[24].

### SIKKIM STATISTICAL PROFILE:

Area (Sq. Kms)	7096
Population 2011	6,10,577
a) Male	3,23,070
b) Female	2, 87, 507
c) Child Sex Ratio	957

Rural Population	4,56,999
Urban Population	1, 53, 578
Schedule Tribe Population	2, 06, 360
a. Male	1, 05, 261
b. Female	1, 01, 099
Schedule Caste Population	28, 275
a) Male	14, 454
b) Female	13, 821
No. of Districts	4
No. of Sub Division	16
Literacy (%)	82.6
Infant Mortality Rate per 1000	26
Crude Birth Rate per 1000	17.6
Crude Death Rate per 1000	2.02
Immunization coverage (State Report) (%)	92.6
Institutional Deliveries (%)	84.0
Per Capita GSDP (at Current prices)	Rs. 9, 95, 654
Per Capita GSDP (at Constant prices)	Rs. 5, 49, 095

### 2.2 Education in Sikkim

The literacy rate of Sikkim was 82.2% overall while it was 87.29% for males and 76.43% for females. The state has a total of 1,157 schools, which includes 765 schools run by the state government, seven central government schools and 385 private schools. For higher education, Sikkim has one Institute of National Importance, one central university and four private universities.

Sikkim has a National Institute of Technology, which is one among the ten newly sanctioned NITs by the Government of India [1]. Sikkim though being a small state has done very well in terms of education development and successive governments are putting their efforts to further improve the higher education infrastructure in the state.

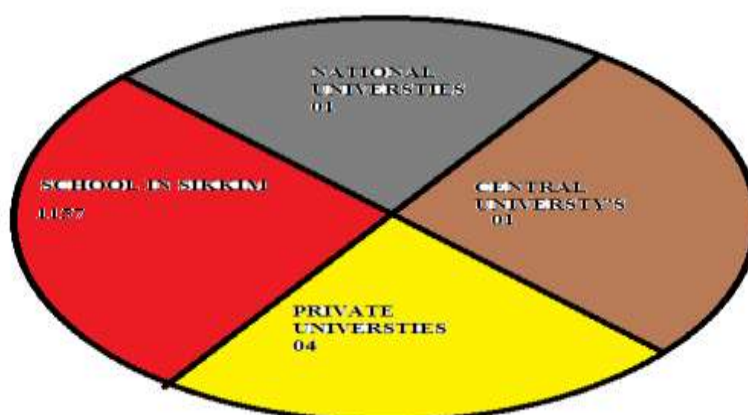


FIG 1

### 2.3 Transportation in Sikkim

The National Highway NH-10 links Siliguri to Gangtok. Sikkim Nationalised Transport runs bus and truck services for travelling. Private operated buses, tourist taxi, and jeep services operate throughout Sikkim and also connect to various cities of the state. Sikkim does not have significant railway presence due to its hilly and mountainous landscape. However, Siliguri Junction and New Jalpaiguri in West Bengal are relatively closest to the state. Pakyong Airport is the first airport of Sikkim developed in 2018.

### 2.4 Geography of Sikkim

Sikkim spreads over 7906 km sq area of the country. Located in the Himalayan foothills, Sikkim is characterised by mountainous terrains. The highest mountain peak of India-Kangchenjunga is one of the major attractions of the state. The state comprises of 28 mountain peaks, more than 80 glaciers, 227 high-altitude lakes, 5 major hot springs and more than 100 rivers and streams.

Area	7906 km <sup>2</sup>
Population Density	86 per km sq.
Forests	Evergreen and Deciduous Forests
Mountain Ranges	Highest Peak-Kangchenjunga
Rivers	Teesta, River Rangeet, Rangpo Chu, Lachung River etc.

### III. AIM & OBJECTIVE

The main objective of this paper is to have brief account on settlement of the capital region of Sikkim which is east district of Sikkim and to see impact on urbanisation on settlement specially after merger with union territory For the purpose of the present study, East Sikkim is taken as the study area.

Results are based on Primary & secondary data. Secondary data has been collected from different sources like census of India, District wise information on migration data and the related aspects are collected from census of India. The study is based on both descriptive and analytical in nature.



FIG 11

#### IV. CONCLUSION

Analysis of the changing land use pattern of sikkim clearly shows that the built-up area has been growing at a fast rate, especially after 1990. The density of the existing built-up area is increasing and more area is constantly being added to the built-up area. On the other hand, the percentage of area under cultivation is decreasing every year. The settlement due to urbanization in Sikkim rapidly increasing. As a result, applications of available resources developed due to optimum infrastructure and growth over the last decade this added to the urbanisation of this state. It also implies that the phenomenon of settlement urbanization in Sikkim is Gangtok centric which reinforces the imbalanced urban structure and primacy of Gangtok City. The pressure mounted on the surrounding environs of fertile and vulnerable lands is causing a faster rate of land conversion from non-urban to urban. This results in settlement change as we can say urbanization and settlement are directly proportional to each other or vice versa.

#### REFERENCES

- [1]. Ariti, A.T., Vliet, P. and Verburg, H. (2015). Land-use and land cover changes in the Central Rift Valley of Ethiopia: Assessment of perception and adaptation of stakeholders. *Applied Geography*, 65, 28–37.
- [2]. Arsanjani, Jamal Jokar (2012). *Dynamic Land-Use/Cover Change Simulation: Geosimulation and Multi Agent-Based Modelling*. Springer-Verlag, Berlin.
- [3]. Bhagwati, J (1979). "International Migration of the Highly Skilled: Economics, Ethics and Taxes", *Third World Quarterly*, 1(3): 17–30.
- [4]. Casado-Diaz, M. A. (1999). Socio-demographic impacts of residential tourism: a case study of Torrevieja, Spain. *The International Journal of Tourism Research*, 1(4), 223.
- [5]. Dyson, T., and Moore, M. (1983). On kinship structure, female autonomy, and demographic behavior in India. *Population and development review*, 35-60.
- [6]. Gallego, F. J. (2004). Remote sensing and land cover area estimation. *International Journal of Remote Sensing*. 25(15), 3019-3047
- [7]. Gangtok. (1997). 'Sikkim State: Annual Plan 1996–7', Bureau of Economic and Statistics, Planning and Development Department, Gangtok.
- [8]. Government of Sikkim (2001). 'Sikkim State Annual Plan 2000–2001', Planning and Development Department, Gangtok. Google Map (2011):
- [9]. 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.
- [10]. Huang B., Zhang L., and Wu, B. (2009). Spatio-temporal analysis of rural-urban land conversion. *International Journal of Geographical Information Science*, 23(3), 379–398.
- [11]. Joseph, Jolin and Vishnu Narendran (2013). "Neither Here nor There: An Overview of South-South Migration from Both Ends of the Bangladesh-India Migration Corridor", Working Paper No 569, The Hague: International Institute of Social Studies.
- [12]. Khadria, B. (2009). Adversary analysis and the quest for global development: Optimizing the dynamic conflict of interest in transnational migration. 53(3), 106-122.
- [13]. Kandrika, S. and Roy, P.S. (2008). Land use land cover classification of Orissa using multi-temporal IRS-P6 awifs data
- [14]. A decision tree approach. *International Journal of Applied Earth Observation and Geoinformation*, 10, 186–193. Kashagili, J.J., and Majaliwa, A.M. (2010).
- [15]. Integrated assessment of land use and cover changes in the Malagarasi river catchment in Tanzania. *Physics and Chemistry of the Earth*, 35, 730–741
- [16]. Lambin E.F., and Geist H.J. (2006). Land-use and land-cover change: local t
- [17]. Mukhopadhyay, A., Mondal, A., Mukherjee, S., Khatua, D., Ghosh, S., Mitra, D., & Ghosh, T. (2014).
- [18]. Forest cover change prediction using hybrid methodology of geoinformatics and Markov chain model: A case study on sub-Himalayan town Gangtok, India. *Journal of Earth System Science*, 123(6), 1349-1360
- [19]. Nandy, Chandan (2005). *Illegal Immigration from Bangladesh to India: The Emerging Conflicts*, Mellon-MIT Foundation on NGOs and Forced Migration., SLIFKA Program in Inter-Communal Coexistence, Brandeis University.
- [20]. NERDUP reopr(2012). North Eastern Rural Development Urban Project. Government of India, Delhi. Available at <http://mdoner.gov.in/content/sikkim-2>
- [21]. Paul, K., & Sharma, D. (2016). Post facto, trends and pattern of Urbanity in Sikkim. *Archives of Applied Science Research*, 8(5),

- 43-54.
- [22]. Peijun, D., Xingli, L.L., Wen, C., Yan, L., and Huapeng, Z. (2010). Monitoring urban land cover and vegetation change by multi-temporal remote sensing information. *Mining Science and Technology* 20, 0922–0932
- [23]. Provisional Population Totals, (2011), Sikkim State District Profile, Census of India, New Delhi.
- [24]. Rawat, J.S., Biswas, Vivekanand., Kumar, Manish (2013). Changes in land use/cover using geospatial techniques: A case study of Ramnagar town area, district Nainital, Uttarakhand, India. *The Egyptian Journal of Remote Sensing and Space Sciences*, 16, 111–117
- [25]. RGI, (1971). Series 21 Sikkim, part XII-A&B.
- [26]. RGI (1981). Series 19 Sikkim, Part XIII- A & B.
- [27]. 24RGI (1991). Series 22 Sikkim, Town Dictionary, Part XII A & B,
- [28]. District Census Handbook.
- [29]. RGI (2001) Town Dictionary, Part XII A & B, District Census Handbook.
- [30]. RGI (2011). General population tables, A-series, Registrar General of India, New Delhi, India.
- [31]. Roth, D. Moreno-Sanchez, R., Torres-Rojo, J. M. and Moreno-Sanchez, F. (2016). Estimation of human induced disturbance of the environment associated with 2002, 2008 and 2013 land use/cover patterns in Mexico. *Applied Geography*, 66, 22-34.
- [32]. Sharma, V. V. L. N., Murali Krishna, G., Hema Mallni, B., and Nageswara Rao, K. (2001). Landuse/Landcover Change Detection through Remote Sensing and its Climatic Implications in the Godavari Delta Region. *Journal of the Indian Society of Remote Sensing*, 29, 1&2, 86-91.
- [33]. Shrivastava, Prashant K., Han, Dawei., Rico-Ramirez, Miguel A., and Bray, Michaela., and Islam, T. (2012). Selection of classification techniques for land use/land cover change investigation. *Advances in Space Research*, 50, 1250–1265.
- [34]. Voogt, J. A., & Oke, T. R. (2003). Thermal remote sensing of urban climates. *Remote Sensing of Environment*, 86, 370–384.
- [35]. Google.com