

Evaluating sustainable urbanization: A comparative study between Salt Lake town and New Town, West Bengal, India.

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ABSTRACT

Urban environmental degradation is a common phenomenon through out the world. Sustainable urban planning is the key concern for the betterment of the overall urban environmental health. The present study is being focused on the issue of sustainable urban planning through the lenses of Landuse landcover pattern of two planned urban centers of West Bengal, namely Saltlake and New Town. Landuse and Landcover maps have been prepared using Landsat 8 images of both the urban centers. Secondary data based on air pollution level of these two urban centers have been compared to identify the impact of landuse and land cover on the environment. A comparative analysis has been done between two urban centers in terms of policy implementations also. Finally the research work is aimed to come to a conclusion about the effectiveness of sustainable urban planning in both these towns and in general.

1. Introduction

Urbanization is the growth engine of the economy. The entire world is witnessing a rapid urban expansion. With this rapid urbanization, the concern about environmental sustainability taking new dimensions of significance. Urban planners are the major stakeholders in this field of sustainability, as they are the brains behind innovative ways of sustainable urban planning [1]. Urban population is very much heterogeneous in nature. The demand of urban population is varied in nature in terms of occupation and socio-cultural aspects [2]. As a result of varied demand of population, the land use land cover of the urban centers become more complex than the rural counter parts.

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Environmental sustainability is reflected through the land use land cover pattern. In India, both planned and unplanned cities co-exist. Unplanned cities are mostly devoid of thoughtful land use planning, rather organic use of land by the urbanites. Planned cities show much more rational use of land, as they are previously designed in such a way that it cannot hamper the public interest as well as the issue of environmental sustainability [3].

1.2. Selection of the study area

For the study of urban sustainability, two planned satellite towns of West Bengal have been selected, namely, New Town and Salt lake. Both the towns are situated in the vicinity of Kolkata metropolitan, West Bengal. Salt lake township was built up in between 1958 to 1965 to reduce the population pressure of Kolkata with sufficient amount of green and open spaces. The inception of New Town started in 2007. It is a satellite town built up in North 24 Parganas district encroaching wetlands in the vicinity of Kolkata.

1.3. Literature Review

Urban sustainability is a growing field of interest among the researchers. Before delving into the analytical side

of the paper some literatures have been reviewed. Sustainable urban planning is a multifaceted subject which can be addressed from various dimensions. The

taking the database from dimension data repository and Scopus data base. Majority of the research work have been done from the urban planning perspective (Figure 1). Urban planners are mostly involved in managing the placement of urban infrastructural facilities in such a way that it can bring sustainable long-term solution to the urban socio-economic problems [4], [5], [6]. The complex studies on planning feasibility have been done by the urban planners. Monitoring, implementation of new strategies of urban planning for maintaining environmental sustainability without creating any cause of injustice to the urbanites is a major concern for the planners [7], [8], [9].

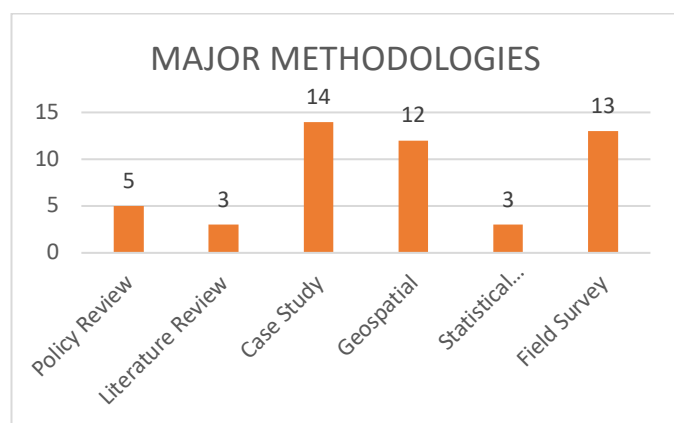


Fig.1: Methodologies used for analysis of Urban Sustainability

Second most numbers of contributions came from the perspectives of environmental sustainability (Figure 1). This is the closed allied dimension to the sustainable urban planning. The ecological imbalance due to unscrupulous use of natural resources is the prime concern of the environmentalists regarding urbanization [10], [11]. Ecological services are being tested on the basis of their monetary valuation in some of the research works. Urban pollution and their impact on human health is one of the key areas of work in the gamut of sustainable urban planning. Health issues create a huge socio-economic burden on the urban administration which in turn leads the way to collapse of urban facilities [12], [13], [14]. Inclusive developmental concept is discussed in some research works. Peoples' participation and public private partnership in urban planning procedure can make the sustainability issue smooth to run [15], [16], [17]. Geographers are mainly focused on the land use

pattern and change in land use and land cover. Their prime concern is how the change in population creates change in occupational structure [18], [19], [20]. This

sort change in occupational structure gives rise to changing form of land use. As a result, with the passage of time the landscapes of urban areas are changing continuously [21], [22]. This kind of changing scenario is creating deep impact on environmental sustainability.

2. Objective

The main aim of this current research work is to look into the nature of landuse and land cover pattern of New Town and Salt Lake town. Through the lenses of of land use and land cover the matter of urban sustainability will be highlighted. It will be also analysed, how environmental pollution level is different in these two towns from each other

3. Result and Discussion

The present study is being started with systematic literature review based on urban sustainability. For the analysis purpose, Land use and Land cover map have been prepared for New Town and Salt Lake using Landsat 8 image. Supervised classification method has been used for the preperation of the maps. Air Quality Index (AQI) values of New Town and Salt Lake have been compared for one month duration. Data have been collected from Central Pollution Control Board portal, Ministry of Environment, Forest and Climate Change, Govt. of India. Comparison of AQI data have been represented through simple graphical methods.

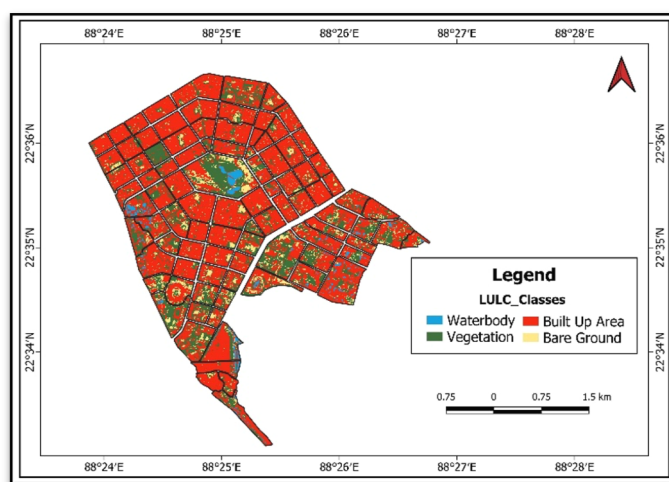


Fig. 2: Landuse Landcover Map of Salt Lake, 2022

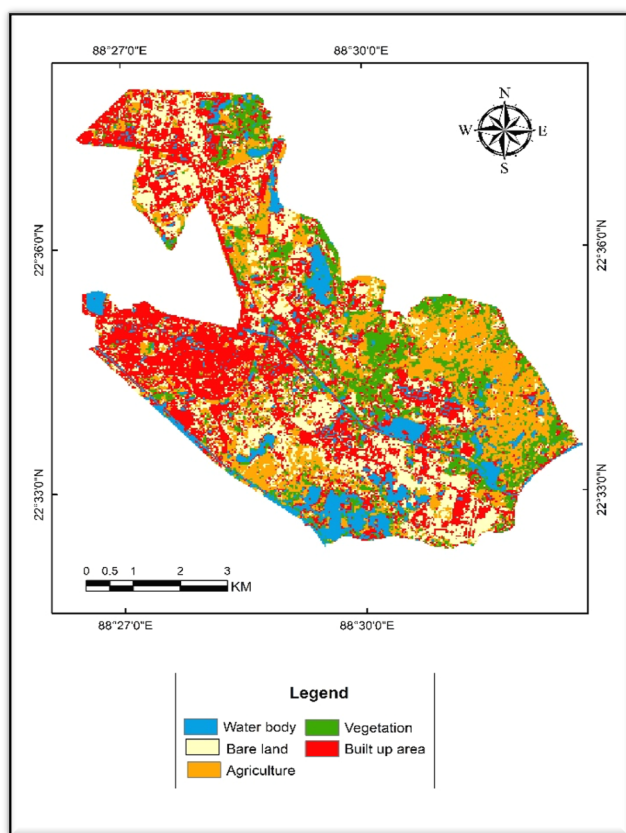


Fig.3: Landuse Landcover Map of New Town, 2022

As a result, Salt Lake area contain lesser amount of vegetation cover and water bodies in comparison to New Town. New Town still contains some agricultural lands, specially in the south eastern part of New Town. For Salt lake, agricultural lands are totally absent. In New Town, the built up areas are coupled with water bodies and vegetation to maintain the balance between concrete surface and natural surface. But on the other hand, Salt Lake area is having continuous concrete surface with little amount of vegetation and water bodies. Bare lands are also very minimal in case of Salt lake town which is present in a notable manner in New Town. Natural vegetation, water bodies are considered to be the breathing space for the urban settings. Natural vegetations help to reduce the environmental pollution, urban surface run off and also controls the atmospheric temperature of the urban locales [5].

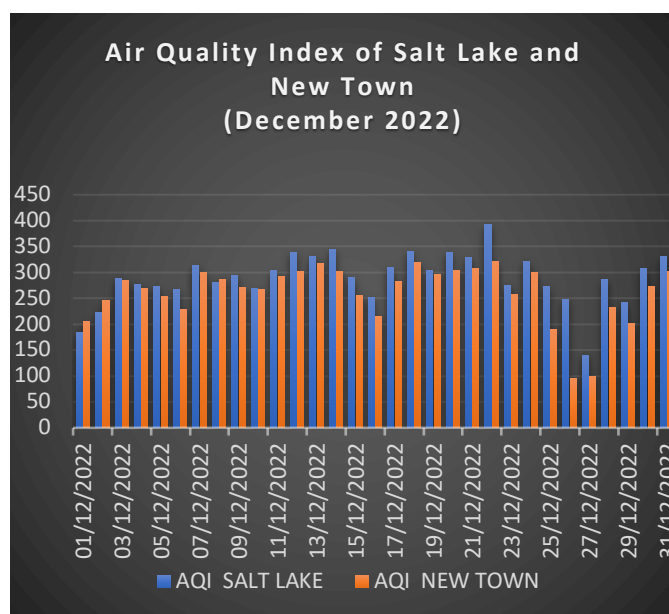


Fig. 4: Comparative AQI of Salt Lake and New Town (Data Source: Central Pollution Control Board, Govt. of India)

The Air Quality Index (AQI) is being calculated by the Central Pollution Control Board, Govt. of India taking the amount of eight pollutant in the ambient air, namely, Carbon Monoxide, Ozone, Nitrogen Dioxide, Sulfur Dioxide, Ammonia, Lead and Particulate Matter (PM 10 and PM 2.5). According to the index, higher values indicate poor air quality and lower index value counts for less polluted good air quality. There six categories of air quality have determined by the Central Pollution Control Board. The categories are:

Table 1: Air Quality Index Categories (Source: Central Pollution Control Board, Govt. of India)

Air Quality	Index Values	Description
Good	0 – 50	No health risk
Satisfactory	51 – 100	Health risk for sensitive people to pollution
Moderately Polluted	101 – 150	Serious health risk for sensitive people
Poor	151 – 200	Some general people may be affected
Very Poor	201 – 300	Health risk increased for every one

Severe	301 and higher	Serious Health alert, all general people will be affected
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Plate 2: City Beautification through gardening, New Town 2022 (Source: Field Survey, August, 2022)

From the analysis of AQI data for month of December 2022 it have been seen that AQI is more than 301 (Severe) in Salt Lake for 11 days in in one month and in New Town for 9 days in a month. From the graphical representation it can be seen that in most of the days, the AQI value is higher in Salt Lake in comparison to New Town (Figure 4). The average value of AQI for Salt Lake for the reference period is 289.74. the average value for New Town for the reference period is 261.3. Both the values come under the very poor category, but Salt Lake is having the higher value and the difference in the AQI is quite notable.

4. Recommendations

Sustainable urban practices are the need of the hour for both the satellite towns. Spread of built up area can not be restricted as the population is growing with the passage of time. In that case, intelligent urban space use can be one major way out towards environmental sustainability. Urban roof top agriculture, vertical gardening, roof top rainwater harvesting are some measures that can be some environment friendly moves that can be made. Use of more by-cycles, clean energy based fuels can be great help for decreasing the AQI values and make the air quality more health risk free.



Plate 1: Vertical Greenery, New Town, 2022 (Source: Field Survey, August, 2022)

5. Conclusion

Urbanization is the future need and growth engine of the economy for the entire world. The entire world is urbanizing with a fast pace. At the same time environmental sustainability is gaining a momentum like never before in the past few decades. In such juncture period the process of urbanization needs to move on the track of environmental sustainability. This deep philosophy of environmental sustainability will bring economic as well as social sustenance in the existing urban centres and the emerging urban centres also. Balanced growth of urban centres keeping the environment in its balanced form will be the most desirable condition which can be gained from intelligent and well executed urban land use planning.

References:

- [1] Afacan, Y. (2023). Impacts of urban living lab (ULL) on learning to design inclusive, sustainable, and climate-resilient urban environments. *Land Use Policy*, 124, 106443.
- [2] Wei, C., Meng, J., Zhu, L., & Han, Z. (2023). Assessing progress towards sustainable development goals for Chinese urban land use: A new cloud model approach. *Journal of Environmental Management*, 326, 116826.
- [3] Hafizi, H., & Kalkan, K. (2020). Evaluation of object-based water body extraction approaches using Landsat-8 imagery. *Journal of Aeronautics and Space Technologies*, 13(1), 81-89.
- [4] Mithun, S., Sahana, M., Chattopadhyay, S., Johnson, B. A., Khedher, K. M., & Avtar, R. (2021). Monitoring Metropolitan Growth Dynamics for Achieving Sustainable Urbanization (SDG 11.3) in Kolkata Metropolitan Area, India. *Remote Sensing*, 13(21), 4423.
- [5] Hasnine, M. (2020). An analysis of urban sprawl and prediction of future urban town in urban area of developing nation: Case study in India. *Journal of the Indian Society of Remote Sensing*, 48(6), 909-920.
- [6] Mukherjee, K., & Das, P. (2018). Modelling the Relationship between Urban Growth Modes and the Thermal

Environment-A Case Study of the Barasat Municipality, West Bengal. *J. Geogr. Environ. Earth Sci. Int*, 17(2), 1-19.

[7] Haughton, G. (1997). Developing sustainable urban development models. *Cities*, 14(4), 189-195.

[8] Tannerfeldt, G., & Ljung, P. (2012). *More Urban Less Poor: An introduction to urban development and management*. Routledge.

[9] Singh, R. B., Haque, M. S., & Grover, A. (2015). *Drinking water, sanitation and health in Kolkata metropolitan city*.