

Transforming Urban Environment: Analyzing the Anthropocene Effect on Urbanization in India

Dr. Shumpenthung Ezung¹

Assistant Professor, Department of Sociology, Don Bosco College, Kohima, Nagaland, India.

ORCID ID: <https://orcid.org/0009-0006-3975-2543>

Sanihe Ariijii²

Assistant Professor & HOD, Department of Sociology, Don Bosco College, Kohima, Nagaland, India.

Razoukhrienuo Seletsu³

Assistant Professor, Department of Sociology, Don Bosco College, Kohima, Nagaland, India.

Dr. Abel Kavahru⁴

Assistant Professor, Department of Sociology, Don Bosco College, Kohima, Nagaland, India.

ORCID ID: <https://orcid.org/0009-0002-0341-8579>

Dr. Neikesonuo Rame⁵

Assistant Professor, Department of Sociology, Don Bosco College, Kohima, Nagaland, India.

Dr. Velhou Koza⁶

Assistant Professor, Department Of Sociology, Don Bosco College, Kohima, Nagaland, India.

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Abstract: *This quantitative study investigates the socio-psychological factors influencing student motivation and academic achievement among marginalized learners in Nadia district, West Bengal. Drawing on frameworks from educational psychology and critical social theory, the research examines the role of self-efficacy (Bandura, 1997), socio-economic background (Sen, 2000), school environment, teacher support (Zimmerman, 2000), and parental involvement in shaping academic outcomes.*

Data were gathered from a stratified random sample of 400 students in upper primary and secondary schools using a structured questionnaire based on validated psychological scales (Pintrich & De Groot, 1990; Deci & Ryan, 1985). Statistical analyses including Pearson's correlation, multiple regression, and path analysis were applied to test hypothesized relationships among socio-psychological variables and student performance.

Findings reveal significant disparities in motivation and achievement linked to caste, gender, income, and school infrastructure (Sen, 2000). Self-efficacy and perceived teacher support demonstrated a strong positive relationship with academic achievement (Zimmerman, 2000). Conversely, students from marginalized groups exhibited lower intrinsic motivation and higher academic stress, which adversely affected performance.

The study emphasizes the urgent need for educational reforms that promote psychological empowerment, equitable resource distribution, and inclusive school practices. By integrating context-sensitive insights into achievement research, this work

challenges traditional models and offers a holistic framework relevant to rural and marginalized learners in India (Freire, 1970; Bronfenbrenner, 1979).

Keywords: *Anthropocene era, Urbanization, India's environmental struggles, Sustainable urban development, Globalization and environmental impact.*

INTRODUCTION

The term "Anthropocene" refers to a geological epoch in which people are the primary cause of significant and persistent environmental changes, such as those seen in climate change. The modern era is referred to as the Anthropocene because of how dominant human activity has become in the earth's history (Nijhuis and Jauslin, 2015). The Anthropocene's fast urbanization is one of its key characteristics. metropolitan centers are thought to be the center of human activity, and as life advances more quickly, people are congregating in metropolitan areas. It is estimated that by 2050, around 66% of the world's population would reside in urban areas. Nonetheless, a sizable body of literature has surfaced recently emphasizing the drawbacks of unchecked, rapid urbanization. According to Kennedy et al. (2009), cities are one of the main sources of greenhouse gases that contribute to climate change. In addition, urban heat islands were created by increasing the impervious surface through the removal of vegetation. Natural cover fragmentation and change endangers species distribution, energy flow, nutrient cycle, and biodiversity. The low return on ecosystem services is indicative of this.

The United Nations Brundtland Commission's Agenda 21, which included all of its components in 1987, gave guidance on how to achieve urban sustainable development. In this regard, a great deal of study was also done (Wu, 2013). Nevertheless, it has been determined that the current urban expansion paradigm is unsustainable and has eventually severely damaged the ecosystem (Millennium Ecosystem Assessment, 2005). According to a study on Australian cities, increasing the tree canopy by 10% can result in a 19% reduction in the urban heat impact (Osmond and Sharifi, 2016). As a result, it is abundantly evident that taking environmental concerns into account is crucial for sustainable urban planning and design. Since the 1990s, urbanization in India, the second-most populated country in the world, has increased dramatically. Economic opportunities are the primary driving force behind India's urban development plans and strategies. The preservation of the urban environment is given very little thought. Urban centers grew erratically as a result, with the peri-urban environment suffering the most. Numerous recent studies have documented a notable decline in the environment as a result of India's unchecked urbanization. The most notable ones are the disappearance of priceless wetlands and natural vegetation cover. In spite of all of this, there is currently no systematic approach to the sustainable management of Indian cities that addresses environmental transformation and protection.

Anthropogenic landscapes and urbanism typically address these two subjects apart from one another. However, there is an unbreakable link between city and artificial landscapes. Urban environments are anthropogenic, or "human made," by definition. Furthermore, the services and resources that urban dwellers use create anthropogenic landscapes both inside and outside of cities. The archaeological record has long been used to study urbanism and anthropogenic landscapes. The origins of urbanism can be found approximately 6,000 years ago. Having been formed early in human history, anthropogenic landscapes are significantly older, having gained prominence with the start of the Neolithic Revolution approximately 10,000 years ago (Ruddiman 2013). For a very long time, people have been altering their surroundings and producing various man-made landscapes. Urban settlements and the landscape adaptations required to meet subsistence needs are both examples of anthropogenic landscapes. Since the invention of tools, humans have altered the environment in both deliberate and inadvertent ways, as evidenced by historical accounts. Therefore, even while anthropogenic landscapes were created early in human history, the extent of anthropogenic landscape transformation grew as full-time settlement grew in size, population density, and longevity. Urban areas are the most anthropogenically altered landscapes. In this review, we first define human landscapes before examining the history of urbanism and its various manifestations. We then look at the connections that were made

between archaeological landscapes and urbanism. Lastly, we consider the lessons that may be drawn from historical landscape usage and urbanism to place our debate in the context of today. We contend that urban theory, which was created for modern landscapes (Sorensen & Okata 2010), might be helpful in conceptualizing and placing ancient landscapes in perspective. As a result, we believe that ancient urbanization and anthropogenic landscapes can be interesting in modern settings.

It is apparent that the Indian government has begun to place more emphasis on the creation of eco-friendly smart cities across the nation in recent years. With the support of the Danish Royal Embassy and the European Union's International Urban Cooperation (IUC) Program, TERI conducted groundbreaking work in this area through policy discussions on "Making Liveable Cities: Challenges and Way Forward for India." It seeks to establish sustainable urbanization in India that is "people-centric." Studies highlighting sustainable liveability in the quickly expanding metropolitan centers have also been conducted by a number of other academics (Saitluanga, 2014). According to historiography, the foundation of contemporary urban planning was created in the middle of the 19th century in response to changing circumstances brought about by the industrial revolution. As a result, cities across the world are at varying levels of development and use the bulk of natural resources while housing and supporting the greatest number of people.

Surface changes brought upon by urbanization are significant. Deep structures include a city's physiography, climate, geology, and bioclimatic zones. These profound structures continue to exist as important players in both history and the future. Resilient urban form is more common in city designs that are in harmony with the deep structure of the surrounding area. It should also be more practical and affordable. Deep structures are crucial in determining the kind, capacity, and quality of municipal infrastructure, including transportation, water and power supplies, sewage systems, building scales, and neighbourhoods. These are all supporting structures that ought to be both aesthetically pleasing and able to support life (Axelsson et al. 2013).

The obvious shortcoming, though, is that, in terms of sustainable city management, relatively little thought is given to the ecological state of the cities. Few studies addressing the environmental concerns for urban sustainability were conducted locally after a specific city. It is still lacking a comprehensive synopsis of the systematic study of environmental problems in Indian cities. This study reviewed other studies and provided a thorough compilation of information on the topic of "transforming urban environment: Anthropocene effect on urbanization in India."

METHODOLOGY:

The study is based on secondary data collected from various sources like Government reports, books, articles, and journals.

ANTHROPOGENIC LANDSCAPES

At least 75% of the world's landscapes exhibit traces of human influence, with the exception of areas covered in ice. Between 0 and 1000 BCE, mankind changed 50% of the planet's landscapes. People and their cities had a major impact on these transformations. When it comes to classification, landscapes are more likely to be descriptive than cities, which can be classified in a multitude of ways, some of which are contentious. For instance, in addition to urban and rural, social and economic, and ceremonial landscapes, there are also robust and vulnerable landscapes. Here, landscapes are categorised as either man-made or natural; yet, historical ecology reveals that even in this simple dichotomy, there are subtleties. When talking about anthropogenic landscapes, the two primary factors that are considered are human settlements and subsistence activities. Thus, typologies of contemporary anthropogenic landscapes distinguish further between extensive industrial agriculture, plantation agriculture, shifting cultivation, developed villages, agricultural villages, pastoral villages, suburban landscapes, urban residential landscapes, and intensive nonpresidential disturbance of landscapes. But considering what we know about the past from archaeological research, most classifications are too narrow to take into consideration all

anthropogenic adaptations. Something as easy as setting fire to the plants covering an area might result in several environmental changes (Bowman et al. 2011).

A landscape can be profoundly altered by humans obtaining the resources they need. This was the situation in central Europe, as mining activities created lakes in an area that had not previously had many. In the modern world, China develops islands in the South China Sea for military and territorial goals, whereas Dubai in the United Arab Emirates builds islands styled like palm trees for affluent residential occupation. It is clear that most regions of the world have produced a sizable quantity of artificial ground through deliberate and inadvertent processes—in the past as well as the present. In long-occupied places, the extent of landscape change is frequently underestimated and challenging to quantify.

Byproducts from mining and industry are not only taken out, transferred, and redeposited for various construction-related purposes, but they are also added to landscape fills or utilised to construct new landscapes. What are referred to as "legacy sediments" are the sediments left behind by a variety of human-caused landscape disturbances, including "vegetation clearance, logging, agriculture, mining, grazing, or urbanisation." Large-scale silt deposits may occur accidentally or on purpose.

Many of these sediments and dense fills form the foundations of the cities we live in today. Price et al. note that substantial artificial land is found even in non-industrial places; York, a northeastern heritage city, has eight metres of occupancy fill beneath it. They also mention that Salford and Manchester in northwest England have ten metres of artificial ground. There are also extensive soil enrichment, redeposition, and excavation processes. Cities and the built environment are mutually dependent. The majority of people who use food, clean water, and other resources or commodities live in cities. According to archaeological studies, population density increases the economy's overall production.

Urbanisation, in turn, is associated with higher economic development and hence with "the degradation of local and regional environments, threatening basic ecosystem services and global biodiversity." Many waste items were produced concurrently by urban populations; they were either dumped in the terrain beyond urban limits or repurposed into building materials that were then applied as fertiliser to fields. In order to provide the general public with the services they need and to facilitate the acquisition and transportation of these commodities, interconnected networks were developed.

Historical ecology ideas can be applied to the analysis of artificial and urban landscapes (Balee 2006). The long-term implications of artificial landscape-related environmental changes—terracing modifies water flow and retention, deforestation modifies temperature, and farming modifies species composition, may or may not be known. Therefore, anthropogenic landscapes and urbanism interact symbiotically.

In addition to the man-made urban landscape, it is useful to consider the spatial relationships between subsistence practices and settlements, as well as the ways in which subsistence needs impact the surrounding environment. Sometimes the habitats of subsistence and cities are merged, and other times they are maintained apart. Our perspective of the urban process and the size and density of urban areas are influenced by our judgements of the degree of colocation between subsistence systems and cities.

MODERN URBANISM AND THE PAST

In archaeology, there is a lot of debate over how to interpret the past and whether or not ancient cultures can be compared to modern capitalist economy (Feinman 2013). With the same issue, one may wonder if archaeology can help us comprehend modern urban theory or if it can be used to understand ancient cities, including whether megalopolis and edge cities existed in the past. There seem to be affirmative answers to both of the queries. Archaeological research indicates that a concentric city organisation modelled after early-20th-century Chicago, with poorer workers living adjacent to the city centre, more closely approximates the spatial layout of the ancient Maya city of Caracol than a more simplistic model in which elite residences were expected to encircle downtown areas and the poor lived further afield (Chase & Chase 2007). Relatively recent research on ancient urbanism has found important parallels between historical and modern occurrences in

terms of urban layout and function. The role that ancient communities played in early cities, the historical development of urban sprawl, and the use and function of open spaces in urban areas are really the main areas of present archaeological study concentration. There has also been a renaissance of interest in integrating agriculture to give contemporary urban landscapes a communal identity. Restoring trees to artificial landscapes has also resulted in the emergence of an interesting modern phenomena. Even while most tropical areas feature anthropogenic landscapes that are now covered by rainforest, there is a relationship between temperate anthropogenic landscapes and the current development of urban sprawl in megacities. A cleared region with independent farmers has significantly changed over the last 300 years, becoming a forested area where the majority of people live in cities rather than on farms. Thus, increased urbanism and urban sprawl under some conditions lead to widespread reforestation of previously cleared and changed landscapes.

In order to understand historical urban settlements by comparing them with contemporary landscapes, there has been a recent endeavour to scale urban efficiency—which is defined as "capturing the balance between socioeconomic outputs and infrastructural costs"—and city size. This study used the number of miles of roads in metropolitan regions as a proxy to efficiently simulate the socioeconomic output (gross metropolitan product) and several aspects of modern city infrastructure. An initial attempt was made to extend the modern scaling principles to the ancient sites in the Valley of Mexico; roughly 1,500 settlements spanning 2,000 years were viewed in terms of population size and settlement area, and it was contended that these were consistent with the more recent data (Ortman et al. 2014). The ancient urban form, however, may have varied considerably more. As a result, the attempt to fit all urban settlements into a similar scaling framework (Bettencourt 2013, Ortman et al. 2014) may be aspirational but not entirely realistic. For the Maya Classic Period, two distinct urban patterns can be identified, where the population size, density, and areas settled do not scale on a single vector but rather on two distinct lines. Even though the sample size is smaller than that utilised for the Valley of Mexico and contemporary research, this is still the case. Even though "most urban indicators scale linearly with city size, regardless of the definition of the urban boundaries," the proposed scaling principles were also tested on a range of city sizes in Wales and England, with a similar conclusion that "population size alone does not provide us enough information to describe or predict the state of a city as previously proposed, indicating that the expected scaling laws are not corroborated."

A GOOD ANTHROPOCENE

There is a lot of debate about what constitutes the Anthropocene. "Recent rupture in Earth history arising from the impact of human activity on the earth system as a whole" is, in the words of Hamilton (2016), what we call the Anthropocene. Anthropocene dangers arise from cross-scale interactions between the local and the global, resulting from worldwide intertwined social, ecological, and technological forces³⁷. It is becoming increasingly clear that more fundamental and radical changes are needed to bring about systemic change in order to alter the course of the earth system and pave new paths towards a better Anthropocene. These intricate relationships between sustainability initiatives and resilience, as well as between systems, are becoming increasingly understood. Generally speaking, a "dystopian Anthropocene" is one that is comparable to the current era and in which human societies persist in experiencing extreme inequality, excessively high levels of social and environmental injustice, development trajectories and growth-oriented economic models, the use of law as a stopgap measure to uphold the status quo, and environmental issues brought on by pollution, climate change, and ecosystem degradation that are either unchanged or worse. Conversely, we define "good" Anthropocene's as ones in which these trends are reversed and the future is sustainable at all scales and robust in terms of society, ecology, and the environment. The future we want will need radical changes in human behaviour, mental processes, and cultural norms, but we and others believe that these changes may begin by amplifying the "seeds" of good futures that are now present in communities throughout the globe. Both the expansion of these seeds and well-articulated future orientations that engage with diverse worldviews, values, and power structures—financial and political—can promote shifts in the direction of normative society objectives. Such seeds of a positive Anthropocene include social movements, new economic instruments, projects, organisations, and new ways of acting that support a prosperous and

sustainable future while accounting for cross-scale dynamics and internal and external drivers of these interconnected systems. It is important to incorporate systems methods fundamentally in addition to scaling up present projects and innovations for transformation to be successful and potentially scale at the pace needed to solve global concerns affecting human society and non-human actors.

URBANISATION AND GLOBALISATION AS THE DRIVERS OF ANTHROPOCENE

Globalisation and urbanisation are inextricably linked. The major symbols of the twenty-first century are these two operations. It is critical to examine how the two relate to big data, landscape sustainability, and the Anthropocene. The UN called the 21st century the "urban century" since half of the world's population lives in cities. A defining characteristic of urbanisation is the extensive use of natural resources. Trends in urbanisation are still increasing, both globally and within individual countries. Urbanisation rates range from 50% to 60% in certain Asian countries, while they are 100% in others. One of the continents that is urbanising the quickest is Africa, where slums make up 70% of its metropolitan areas. In contrast, there is an 80% increase in urbanisation occurring in Latin America and the Caribbean. These trends carry inherent risks related to climate change and land use changes. The pace of urbanisation emphasises how severely pressured the landscape is both within and outside of metropolitan areas. Cities are connected across continents and regions via socio-ecological and economic dynamics. Every kind of natural zone, including drylands, highlands, coastal zones, and rainforests, is home to big, expansive cities. Globally, the land area devoted to urban areas by the year 2000 made up around 2.8% of the planet's total land area. The approximate size is 0.3% of the planet's land mass. Meybeck and Vosmarty (2005) draw a link between the Anthropocene and urbanisation, pointing out that megacities affect global river flows. The authors characterise this as an Anthropocene feature. Urbanisation raises carbon emissions, amplifies changes in land cover and usage, and redistributes energy on land. Urban areas are responsible for 70% of global net energy and emissions. Cities also include most of the principal means of modifying the earth due to their heavy dependence on resources. The Anthropocene movement travels to many major cities to present its case. Urban archaeologists claim that stratigraphic artificial grounds that mark the beginning of the Anthropocene may be found in London, Istanbul, Beijing, Mexico City, Rome, and Novgorod. According to the previously cited findings, urbanisation acts as a hub for the other Anthropocene driving factors. Urbanization's pressures on the landscape may be studied using a variety of data types and formats.

Given that they both have an immediate impact on the landscape, urbanisation and globalisation are connected. Researchers find that the two processes have a significant link that is supported by time-space telescoping theory and global city theory. The two theories contend that globalisation causes a rise in the depth and intensity of urbanisation across national borders. The terrain's topography is fast changing due to economic liberalisation, globalisation, and the presence of international corporations. In places like Singapore, which has become more urbanised, industrial globalisation creates options for organising urban space. The concept of urbanisation is born because of the overlap between the two stages. The concept of "urbanisation" describes the ways in which resource use and connectivity patterns inside cities are transforming their built environments. The globe is becoming more open and connected as a result of globalisation. According to Bradbury and Seymour (2008), the transition of Earth into the Anthropocene is mostly due to globalisation. Allenby (2008) connects cities, information, and the Anthropocene via the interconnectedness of communication and information networks. Sassen (2009), however, argues that the global urban network has ecological implications. Cities play a significant role in the Anthropocene debate because to their high population density, industry, energy needs, and widespread natural resource usage. Given the importance of urban areas in the Anthropocene discussion, landscape scientists should focus on the systematic changes in the landscape that take place within and around cities. It is also important to measure the externalities, or the impacts of a certain metropolis on the ecosystems of other cities and rural regions to which it is connected via globalisation.

CONCLUSION

In conclusion, the Anthropocene has been recognised as a critical epoch in Earth's history due to the substantial environmental effect of human activities. The increasing urbanisation that has led to rising greenhouse gas emissions, urban heat islands, and the fragmentation of natural cover—all of which represent significant threats to ecosystem services and biodiversity—has been one of the most prominent features of the Anthropocene. The current paradigm of unchecked urban development has led to environmental degradation, which is particularly evident in countries like India. This is true even if international programmes like Agenda 21 advocate for the creation of sustainable cities. Urbanisation is the main feature of this geological epoch, when people control the whole terrain. However, a sustainable balance between the natural and urban settings is required for everyone's benefit. Ecologically conscious urban planning has gotten relatively little attention since its inception. As a result, it led to many environmental issues in the cities, making them less liveable. Consequently, in every country lately, there has been an increased focus on environmental management in cities. Regretfully, there isn't much research in developing countries like India to lead researchers in the direction of the present field of study when it comes to addressing the eco-environmental transformation of urban areas. This research aims to explore the strategies that have been used lately to address sustainable urban development and to bring attention to the issues brought about by the eco-environmental transition. After that, a little talk is held to show how these methods are used in the Indian context. In the end, it may be said that integrating environmental concerns into urban planning and design requires a greater understanding of the functions and services provided by environmental units. The study's conclusions may provide researchers a clear direction for where to go with their present body of work in this area.

Anthropogenic landscapes, or those modified by human activity, are a hallmark of the Anthropocene. Because urban areas are landscapes that have been altered by human activity, there is a complicated interplay between them and the environment. Historical sources claim that urbanisation has sped up the thousands of years that people have been changing their surroundings. Understanding the past of artificial landscapes and urbanisation may provide important insights for contemporary sustainable urban development.

The evaluation emphasises how important it is to include environmental issues in urban planning and design, especially in light of the Anthropocene. The research on India demonstrates the urgent need for a systematic approach to sustainable city management, particularly in light of the detrimental effects that increasing urbanisation is having on wetlands and natural vegetation. The relationship between urbanisation and globalisation is also explored in the article, with a focus on their connections. The emergence of "urbanisation" highlights the significance of cities in the Anthropocene debate because of their concentrations of people and resource usage. Examining the systematic alterations in the landscapes within and outside of cities is essential given the ecological ramifications of the global urban network.

Proponents of a "good Anthropocene" argue that significant adjustments to social structures, cultural values, and human behaviour are necessary to build a strong and sustainable future. The need to scale up efforts and integrate systems methods to solve the global issues brought about by urbanisation and globalisation emphasises the need for a thorough understanding of the implications of the Anthropocene.

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