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Analyzing the Effects and Consequences of Sustainable Urban Development with Respect to Socio-Economic Variables

Pratibha Singh¹, Shankar Lal Saini²

¹Research Scholar, Sunrise University, Alwar

²Assistant Professor, Sunrise University, Alwar

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Corresponding author: Pratibha Singh

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Abstract:

Sustainable urban planning prioritizes the well-being of city dwellers across economic, social, and environmental dimensions without sacrificing any. More people moving from the countryside to the city means more people living in cities, which puts a pressure on city infrastructure.

Keyword: Sustainable, development, economically, movement.

INTRODUCTION

The two terms "burden over resources" and "Symbol of development" have become synonymous with city life. For developing countries, this second consideration is of paramount importance. From the "burden" angle, mass migration from rural to urban regions causes "over-urbanization" and gives rise to a productively inefficient "informal sector." The UNFPA-State of the World Population report from 1986, on the other hand, had a more optimistic perspective on urbanisation, seeing migration to cities as a vital part of progress. City life has always been the engine that drives societal and economic development. People go to cities in search of greater job opportunities; this much is obvious. In rural areas, especially on small family farms, it is challenging to improve one's standard of living beyond subsistence. During times of flood, pestilence, or drought, it becomes very difficult to survive on a farm because

of how dependent one is on the ever-changing weather. Contrarily, cities are often thought of as centers of economic growth. Living in a city increases one's chances of becoming wealthy and moving up the social ladder.

According to the 2001 Census, out of a total population of 1027 million, around 286 million people in India reside in an urban location. Around 28 out of every 100 persons in the country live in metropolitan regions. Over the next two decades, the number of people living in urban areas is expected to almost quadruple, reaching around 550 million (2001–2021). Human activity alters the natural environment, and the extent and nature of these changes are affected by the dispersion and density of human populations. Water purification, sanitation, storm drainage, solid and hazardous waste management, food security,

housing, and water supply are falling behind as cities expand at a dizzying pace. As a consequence of all of this, pollution levels are rising and the environment is becoming worse.

The continuous loss of land, water, energy, forests, health, and sanitation, as well as the difficulties brought about by an ever-increasing urban population, are among the most critical challenges that mankind confronts today. Our ten million strong population and our relentless drive to create ever-better weapons to subjugate Mother Earth are causing us to destroy more land than Mother Nature can replenish. In the second half, we talk about how urbanisation has changed people's lives, how it has affected the environment, and how economic changes have benefited city dwellers. Consequently, the chapter is divided into four sections. Section three compares pre- and post-reform patterns of urbanisation. We also monitor demographic growth across different size categories of cities, trends in urbanisation, the overall number of towns, and the proportion and rate of increase of the urban population (including anticipated growth).

LITERATURE REVIEW

Wen Luo *et al.* (2020) Zhejiang Province has been in the forefront of implementing intelligent irrigation technology based on the Internet of Things (IoT) in recent years. This has raised the level of modern agriculture in the province and sped up the industry's transformation and upgrade. This study summarizes and analyses the present difficulties surrounding the diffusion and usage of IoT-based intelligent irrigation in Zhejiang Province, based on research into its implementation. Also, it provides relevant improvement ideas in the hopes that they will help intelligent irrigation systems that rely on the Internet of things to expand and be implemented more effectively.

Drashti Bhavsar *et al.* (2023) In many regions of the world, agriculture is not viable due to unpredictable rainfall, which calls for alternative irrigation strategies. In the future, clever and modern irrigation techniques may replace older, less efficient systems, allowing farmers to reap greater harvests. Drip irrigation is very effective in arid regions with few water sources because of its little water use and capacity to save water. On the other hand, sprinkler systems are widely used in horticulture because they cover a broad area with water droplets in a way that mimics rain, without the need for long pipes. Here we will examine the many types of internet-of-things (IoT) smart drip and sprinkler irrigation systems and the ways in which they address various issues. This article explores several internet-of-things-based irrigation solutions, including smart drip and sprinkler systems. Various comparisons have been conducted in both irrigation processes to ascertain the most efficient method. There is also a table that outlines the shared features of the various methods. Ultimately, it all contributes to water conservation and simplifies farming tasks.

Ram Fishman *et al.* (2023) Groundwater over-exploitation is an issue in water-scarce parts of South Asia. One solution might be to employ effective watering techniques, such as drip irrigation, more often. The Indian state of Andhra Pradesh was the site of a randomised control trial. The essay evaluates the potential benefits of smallholder drip irrigation in terms of efficiency and water savings. A control group was used for comparison, and monetary incentives were presented to a subset of well owners in an effort to get them to employ drip irrigation. The drip group began to concentrate on ornamental crops in the third year, which brought them more money and allowed them to sell more groundwater to other plots. Even if there are

electricity constraints, groundwater pumping will continue unabated in this setting. Drip irrigation would improve irrigation efficiency in southern India, but there is no evidence that it will reduce groundwater use, according to the study.

Barsha Mansingh *et al.* (2023) Water is essential for the survival of all known forms of life on Earth. Seventy percent of Earth's surface is comprised of water and other bodies of water. Since water shortage affects both the expanding human population and the need for food in indirect and direct ways, a concentrated effort to save water and divert it to agricultural root zones is necessary. Agriculture uses 70% of all freshwater withdrawals on average, and in certain underdeveloped countries that number may be as high as 95%. Through the use of a network of pipes and emitters, drip irrigation may provide water to plants' roots in the shape of little drops. The system's primary objective is to minimise water wastage while simultaneously increasing efficiency by providing a constant supply of water and nutrients to the plants. It is an excellent substitute for traditional irrigation methods because to its many advantages, such as reduced soil erosion and improved water efficiency.

Juan Martínez *et al.* (2014) The efficient use of irrigation water is a major concern in semiarid regions due to the scarcity of water in these areas. Although subsurface drip irrigation is beneficial, it has not been widely used due to a number of restrictions, including emitter blockage and the difficulty in locating and fixing leaks. A novel underground irrigation system that sidesteps the aforementioned problems has just been implemented in southern Spain. The efficacy of this approach will be evaluated by contrasting it with a surface drip-irrigation system. In an organic olive grove in the Spanish province of Almería, a three-

year field experiment was conducted to accomplish this goal. Both irrigation technologies were tested under three different irrigation water sources to determine their water-use efficiency. The findings show that the alternative subsurface irrigation system is more effective than drip irrigation. This is due to the fact that the first method outperformed the second in terms of the efficiency and yields of irrigation water usage.

EFFECTS/CONSEQUENCES OF URBANIZATION

From an ecological point of view, the existing status of city models is terrible. Without thinking about the effects on subsequent generations, these models take resources from outside, misuse them, and then dump the trash. As the effects of human activity on ecosystems grow increasingly apparent, cities throughout the globe can no longer shirk their duties. There are opportunities in cities, but there is also a lot of competition for those opportunities. Very few people become rich, so while they wait for their chance, the rest of us still need to figure out how to eat and sleep. The following broad problems emerge as a consequence of uneven urbanisation:

Shortage of Houses: Probably the most important thing for most city dwellers is finding a good place to live. According to the Tenth Five Year Plan, the nation needed an additional 22 million dwellings. Over half of our population lives in slums in certain cities because of insufficient housing, which drastically reduces their quality of life and overall well-being.

Slums: The 1955 book by Ashish Bose was defined as "a deprived human settlement-a settlement which is demographically, economically and environmentally vulnerable" (1955).³ The fast rate of urbanisation and the dearth of appropriate housing contributed to the explosive growth

of the slum population. The 2001 census revealed that out of all the towns and cities in India with 50,000 or more residents, 32.6 million were living in slums. Of the urban population in the states and union territories that have reported slum dwellers, 22.6% are part of this demographic. A lot of bad things happen to those who live in slums. They have an increased risk of being underemployed, malnourished, ill, and dying at an early age.

Poverty: When some individuals in India are unable to fulfil their most basic needs, we refer to them as being impoverished. A team of experts from the Planning Commission determined that the poverty line in urban areas is 2100 calories per day, while in rural districts it is 2300 calories per day. If one's caloric intake is insufficient to fulfil this fundamental requirement, they are said to be living below the poverty line. Due to their poor incomes, many city inhabitants are forced to cram their whole family into one room. Among the poor, this is a common pattern.

A. Environmental Impacts of Urbanization

A major issue for large cities is the disposal of the ever-increasing trash that comes with increased income and reliance on purchased goods. In addition to being an eyesore at disposal sites, the poisonous synthetic substances included in certain household appliances, packaging, and equipment might endanger surrounding rural areas or water sources. Despite efforts by local governments, the problem may be growing too quickly for developing countries to handle. Urban sprawl has the potential to cause significant alterations to the environment:

(i) **Temperature** - Cities may be as much as 10 degrees Celsius hotter than their rural counterparts for a variety of reasons. The paving over of once-forested land

causes a number of problems, one of which is an excessive concentration of heat sources. "Regional heat islands" created by highly populated regions may alter local temperatures.

(ii) **Air Pollution** - There is a noticeable difference in the air quality in cities and rural places. The generation of electricity and the subsequent increase in traffic from motor vehicles are two of the main causes of the haze that blankets many cities. Not only is this air pollution bad for the environment, but it also poses health risks to the general population.

(iii) **Water Issues** - Rapid urbanisation alters the local water cycle in significant ways. To start, cities get more rain than rural areas because pollutants and convection currents draw in precipitation. Runoff systems redirect precipitation as it falls, removing pollutants from the ground instead of allowing them to be absorbed by the soil. Cities in developing nations are especially hard hit by this kind of pollution because of the high volumes of untreated sewage and industrial waste.

B. Destruction of Habitat - The transformation of a once-natural area into an urban centre result in the complete loss of all previous life forms. The destruction of ecosystems and the extinction of species that depend on them may be seen, for example, in the case of wetlands that are paved over. As a less severe example, consider erosion: as cities expand into valleys, they often wash away the rich topsoil that formerly resided there.

C. Benefits of Urbanization

Given the above, urbanisation seems to be a negative phenomenon. Why should we allow this detrimental behaviour to continue? However, you must not be deceived. A number of benefits are available, including:

(i) **Efficiency** - Cities are often remarkable for their efficiency. Assume for a moment that a huge plot of land is home to one hundred unique dwellings, each housing a family. Think about all the identical hundred households crammed into just one apartment block. The flats make it much simpler to provide these households with energy, water, heating, and trash disposal. Additionally, because to the great efficiency of collection in metropolitan areas, recycling systems can only be implemented there.

(ii) **Convenience** - In a city, you can find almost everything. Cultural events, social services, schools, and hospitals are all much more accessible in urban areas than in more remote rural areas. Because everything is so close by, many city inhabitants may discover they no longer need their automobiles. This is especially true when people in rural locations do not have access to the well-developed public transport choices that people in metropolitan areas enjoy.

(iii) **Concentration of Resources** - Since most people, wealth, and resources tend to congregate in urban areas, many organisations simply could not function in less densely populated areas. Cities are the only places where ideas for cultural, political, economic, and social activities may come to fruition due to the concentration of a large number of people. Urban regions are essential for the emergence of many institutions, including universities.

D. Benefits of Economic Reforms to the urban population

After the changes, the Indian economy began to develop at a faster rate than it

normally does. After implementing economic reforms in the 1990s, India saw improved growth performance in comparison to previous decades. This economy has shown that with the right reforms in place, it is possible to attain high rates of growth. When it comes to international trade, India's economy is quite well-connected. New migration data from the 2001 census shows that the percentage of people who moved to the country during the 1990s rose significantly, from 27% to 29%. Class I cities have an abnormally high population density due to the positive correlation between the urban population and the proportion of the urban population residing in these cities. According to Table.1b, which displays the relationship matrix between several urbanisation indicators and socio-economic parameters in India throughout time, the ratio of towns to rural residents has grown in tandem with the country's per capita net national product. Both the percentage of the people dwelling in urban zones and the proportion resident in class I cities are strongly correlated with a degree of 0.96. The majority of urban migration has taken place in class I cities, perhaps due to the better educational and healthcare options available there. Many pieces of evidence support this line of thinking, including a highly significant positive correlation (0.98), a very significant negative correlation (-0.97), and a correlation between the percentage of urban in class I cities and IMR and the percentage of literacy. There is a negative correlation of 0.61 between the percentage of urban people and the number of towns per 10,000 rural residents in states and areas with dense rural populations.

Table 1a: Different Indicators of Urbanization and Socio-economic Variables in India

Census Year	% of Urban population	Urban Growth in (Million)	No. of towns per 10 lakhs rural	% of Urban in class I cities	Per capita Income NNP at 1993-93 prices (US\$)	% Literacy	IMR
1951	17.3	62.3	9.5	33.63	85	18.33	138
1961	18	78.9	6.6	51.32	102	28.3	138
1971	19.8	109.1	5.9	57.23	115	33.35	120
1981	23.1	159.5	6.3	60.37	123	33.57	110
1991	25.5	217.6	6	65.2	168	52.2	80
2001	27.7	286.2	6	68.67	237	65.38	63

Source: *Census of India, 1991, 2001 and GOI, 2003*

Table 1b: Correlation Matrix

Indicators	% of Urban population	Urban Growth in (million)	No. of towns per 10 lakhs rural	% of Urban in class I cities	Per capita Income NNP at 1993-93 prices (US\$)	% Literacy	IMR
% of Urban population	1						
Urban Growth in (million)	0.99 (0.000)*	1					
No. of towns per 10 lakhs rural	-0.61 (0.100)	-0.59 (0.111)	1				
% of Urban in class I cities	0.96 (0.001)	0.93 (0.002)	-0.80 (0.027)	1			
Per capita Income NNP at 1993-93 prices (US\$)	0.93 (0.003)	0.97 (0.001)	-0.55 (0.129)	0.89 (0.009)	1		
% Literacy	0.98 (.000)	0.99 (.000)	-0.70 (0.060)	0.98 (.000)	0.95 (0.002)	1	
IMR	-0.98 (.000)	-0.99 (.000)	0.65 (0.079)	-0.97 (0.001)	-0.96 (0.001)	-0.99 (.000)	1

Source: Calculation based on Table 3.1a

On the whole, the pace of urbanisation has been rather slow. We are well cognizant of the fact that many regions of the country continue to suffer from insufficient transportation, communication, and power generating infrastructure. As a result of inadequate infrastructure, urbanisation is proceeding at a snail's pace in certain regions of the world, despite the fact that we live in a very linked society.

URBAN SOCIAL SUSTAINABILITY

Most discussions on urban sustainability have focused on environmental and economic factors, ignoring the social component and the need to evaluate the role of urban design. To fill this information gap, this study uses the city's expansion plan as a case study and aims to get a better understanding of the effects of urban planning on cities. As a first step towards a theoretical framework for urban social sustainability, we provide the following definitions of urbanity, community, and equality. The case study is examined through the lens of the framework, which exposes the intricate network of past and present municipal policies and plans as the reason why the area in question has been unable to preserve its social worth to the community. A contributing factor to this deficiency is the lack of sufficient emphasis on equity, community, and urbanity in urban planning as a basis for city expansion.

The capacity of a city to continue serving its residents, employees, students, and visitors for the foreseeable future is what we mean when we talk of "urban social sustainability" in this setting. Life is full, communities are strong, and residents enjoy where they live in a socially viable city. The main purpose of this study is to provide a definition of "sustainability" and discuss how this concept may guide studies of the social

processes that influence city life and residents' sense of belonging.

The social and economic components of sustainable urban development in the Delhi NCR and Haryana regions are extensively covered in the next two chapters. Two of the most important parts of development, health and education, are discussed in this chapter. These two regions form the backbone of the economy's growth. An accessible and succinct synopsis of the citywide data set is included in the study's executive summary. The selected health and education indicators are examined and analysed extensively in this chapter using the USI value approach, which is explained in Chapter 7 as an Urban Sustainability Measurement. The economic challenges facing the city in light of urban renewal, development, and sustainability will be discussed in detail in the next chapter.

In a similar vein, we will discuss housing, slums, transportation, sanitation, clean drinking water supply, and other important public services and infrastructure in the states of Haryana and Delhi NCR. Case studies for each of the selected urban sustainability criteria were drawn from the regions of Delhi NCR and Haryana in this research. We have also taken a look at and dealt with the primary threats to sustainable urban development. We have highlighted the key results and provided future suggestions to improve the city's socio-economic indicators. In order to provide a more realistic picture of the city, let's start by identifying the various zones and their distinguishing characteristics.

It is commendable in and of itself to strive for better healthcare and educational facilities. A person's life and the lives of others around them may be improved by any of these. Education and health have been extensively studied because they are indicators of human development and useful

methods for achieving it (Sen, 1999). There has been a lot of talk and study on how health and education both contribute to sustainable development. Asian growth Bank (1997) and World Bank (1993) found that the country's impressive socioeconomic record indicates that strong healthcare and education systems are essential for economic growth and prosperity. Also, the five Millennium Development Goals that member states of the United Nations adopted in September 2000—all of which pertain to education or health—show that there is consensus on human development on a worldwide scale. New ideas for bettering development strategy have arisen as a result of studies that have shown links between health and education. Development is a complex process in which several parts interact with one another. Aside from health and education, the most important factors that drive development are climate and geography, cultural and historical legacies, political and administrative variables, and health and education. Numerous studies have shown the positive effects of health and education on development. If there is a synergy between the two, we could be minimising their impacts. Recognising the interdependencies between health and education is critical for policy integration and societal sustainability.

CONCLUSIONS

It has been stressed before that rapid economic expansion is impossible to achieve outside of cities. Countries like India, where the economy is booming, often see increases in urbanisation alongside this trend. The growth of only a handful of megacities defines urbanisation in the developing world, even if it is an essential requirement for modernity. One way to put it is as the movement from more rural areas to more populous cities. The reality is that urbanisation will persist in India for the time

being, increasing environmental pressures. Therefore, in order to come up with appropriate urban development plans, it is essential to understand the process of urbanisation in different places.

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