Studies on urban sustainability in city Varanasi, India

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Urban planning resulting into sustainability is the key component of any fastest growing city. But at the present scenario the various cities in India are facing tremendous difficulties regarding this lack in sustainability standards. Urban planning for a particular city is basically the study of the some parameter on that basis a sustained city can be envisaged. These parameters are termed as indicators. Although there are an ample of indicators evaluating the feasibility of sustainability at a broad scale, but here only two set of indicators are selected and analyzed decisively. Through this paper an attempt has been made to assess the sustainable development in city Varanasi on the basis of chosen set of indicators, the social indicator and economical indicator mainly comprising of health, education, adequate housing, employment and demographic dynamics. The major emphasis has been made on the current social and economical issues in city Varanasi, which falls in top million cities of India, having its own cultural significance but still far behind in the list of well developed cities in India due to disorganized planning and management. Thus keeping in view all the fatal consequences of unsustainability, a socio-economic indicator has been proposed incorporating the socio-economic issues in Varanasi. Further the proper implementation of these indicators to other cities like Varanasi has to be also planned to attain the sustainability goals.

Keywords: Varanasi, Urban Planning, Sustainable development, Socio-economic Issues, socio-economic Indicators

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1. Introduction:

The number of people living in India's urban area is rising rapidly. The country's urban population, which was 109 million in 1971, has been grown to over 300 million by now. Urban areas make a significant contribution to economy of the country. According to the 11th plan document (volume 3, chapter 11), the urban sector contributes about 60-63% of the GDP and it is expected to be increased around 75% by 2021. It further states that, Indian cities will be the locus and engine of economic growth over the next two decades, and the realization of an ambitious goal of 9 to 105 growths in GDP depend fundamentally on making Indian cities much more livable, inclusive, bankable and competitive.

As per 2001 census approximately 28% of total population of India is residing in urban areas and it is expected to reach 40% by the year 2050. It is not only the percentage but also the shear of actual number i.e. 285.35 million in 2001, which is mind-boggling. Urban areas play a vital role in Indian's socio-economic transformation and contribute 50-55% of the Gross Domestic Product (GDP). The role and importance of urban sector was first recognized by Government by way of constitution of National Commission on urbanization in 1987 followed by passage of 74th Constitution Amendment Act (CAA) 1992, which provided momentum to urban sector reforms in the country.

Research objectives:

1. To study the various aspects of the sustainably developed city, keeping in views all the affecting parameters.
2. To study the impact of urbanization for a local urban body.

3. To explore the nature of urban governance system of various mega cities in India.

4. To make policies and putting programmes at place insuring that the desired results can be achieved.

5. To reinforce the infrastructure quality for the procurement of best services to the society.

2. A case profile – City Varanasi:

For the achievement of stated objectives, I have chosen Varanasi city. The city is located in the middle Ganga valley of North India, in the Eastern part of the state of Uttar Pradesh, along the left crescent-shaped bank of the Ganga River. The "Varanasi Urban Agglomeration" — an agglomeration of seven urban sub-units — covers an area of 112.26 km² (approximately 43 mi²). The urban agglomeration is stretched between 82° 56'E - 83° 03'E and 25° 14'N - 25° 23.5'N. Being located in the Gangetic plains of North India, the land is very fertile because low level floods in the Ganges continually replenish the soil

The population of Varanasi urban agglomeration in 2001 was 1,371,749; the sex ratio was 879 females every 1000 males. However, the area under Varanasi Nagar Nigam has a population of 1,100,748 with the sex ratio being 883 females for every 1000 males. The literacy rate in the urban agglomeration is 77% while that in the municipal corporation area is 78%. Approximately 138,000 people in the municipal area live in slums.

Demographic profile:

Population Density:

Present area under MCV jurisdiction is 79.79 sq km. The area under jurisdiction of the municipal Corporation is a function not of its population growth or densities, but of political and administrative changes related to development/urbanization of the urban fringe areas. Planning area has changed from 56.65 sq km to 79.79 sq km over the last decade. Overall population density of the town is 150, 70 persons per sq km (i.e. 150 persons/ha), which is considerable, compared to other sustained cities in India.

Population Growth: The present area under Municipal Corporation of Varanasi (MCV) jurisdiction is 79.79 sq km with a population of 1.2 million in 20012. Owing to its rich tourism potential, the estimated daily flow of tourists and pilgrims to the city is 2, 50,003. Varanasi town shows a constant increase in the population with varying rate of increase from decade to decade. In last seven decades the population has grown almost six folds, with increase in population from 207,650 in 1931 to 1,202,443 in year 2001. The growth of the population can be seen from the figure below.

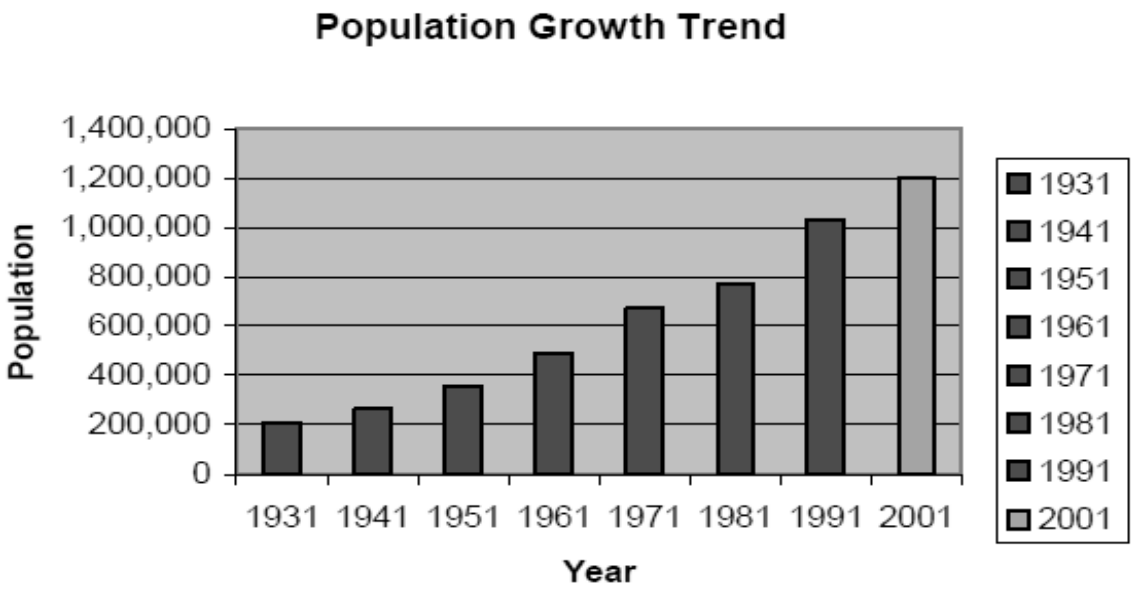

Fig.1: Yearly variation in population growth

Sex Ratio:

As per the census 2001, the current sex ratio (female population per 1000 male) in Varanasi town is 876, which is lower than the state urban average of 885 and national urban average of 901.

3. Urban planning and sustainable development:

Planning sustainable cities, reviews recent urban planning and approaches, discusses constraints and conflict therein and indentifies innovative approaches that are more responsible to current challenges of urbanization. It notes that traditional approaches to urban planning particularly in developing countries have largely failed to promote equitable, efficient and sustainable human settlement and to address 21st century challenges including rapid urbanization, shrinking cities and ageing, climate change and related disaster, urban sprawl and unplanned peri-urbanization as well as urbanization of poverty and informality. It concludes that new approaches to planning can only be meaningful and have a greater chance to succeeding, if they effectively address all

these challenges are participatory and inclusive as well as linked to contextual socio-political processes.

Land use: Land management is a critical element in the city's development. Also in the pretext of urban expansion, valuable agricultural lands are converted into urban lands. Urban land is a scarce and costly resource and needs to be apportioned to various uses very judiciously. In order to plan the future land uses, a study of the existing land use is necessary The Varanasi Development area has been broadly divided into 2 zones: Zone A and Zone B. Zone A comprising of the area to the left of River Ganga (comprising of areas like BHU, Varanasi Municipal area) and Zone B along the right bank of river Ganga (including areas like Ramnagar and Mughal Sarai). The Master Plan 2011 has been prepared for zone A. As per this Master Plan of Varanasi, total area under planning jurisdiction was 14494.40 hectors for 1991.

The Master Plan in Banaras: In 1982 the Varanasi Development Authority (VDA, formed in 1974) made an assessment of the earlier plans of the city. And, under its direction, the Town & County Planning Organization, TCPO, prepared a comprehensive Master Plan of Varanasi 1991-2011, during which time the population of Varanasi Agglomeration is expected to double of the 1991. The five-tier areal units are defined on the basis of administration and planning strategy, taking Varanasi Development Region, VDR (as in Master Plan 2011). From lower to higher hierarchy they are: Varanasi City Municipal Corporation 84.55 km^2, Varanasi Urban Agglomeration, VUA 112.26 km^2, Varanasi Master Plan - Operative Area 144.94 km^2, Varanasi Master Plan - Projected Area 179.27 km^2, and the outer most Varanasi Development Region, VDR 477.34 km^2. Under the Master Plan 2011 the expanded area proposed for the Greater Varanasi is 179.27 km^2, however no way the land use categories fit to the standard norm of ecological balance.

Master Plan 2011 proposals: Varanasi Development Authority (VDA) has prepared a Master Plan 2011 for the future development of the city, which states that total area of the city will increase from 14494.40 ha to 17927.22 ha. This increase in total area is very nominal with 23.68% compared to previous master plan.

Table 1: Land use pattern: proposed for 2011

Sl.No.	Land use	Area (hectare)	Pecentage
1.	residential	9254.61	51.6
2.	commercial	618.23	3.45
3.	industrial	656.19	3.66
4.	Public and semi public	1309.07	7.30
5.	recreational	984.47	5.49
6.	services	103.97	0.58
7.	Govt. and semi govt.	1433.15	7.99
8.	Tourism and heritage	423.73	2.37
9.	Transport and communication	1460.35	8.15
10.	agriculture	1683.45	9.39
	Total	17927.22	100

Source: Master Plan-2011, Varanasi

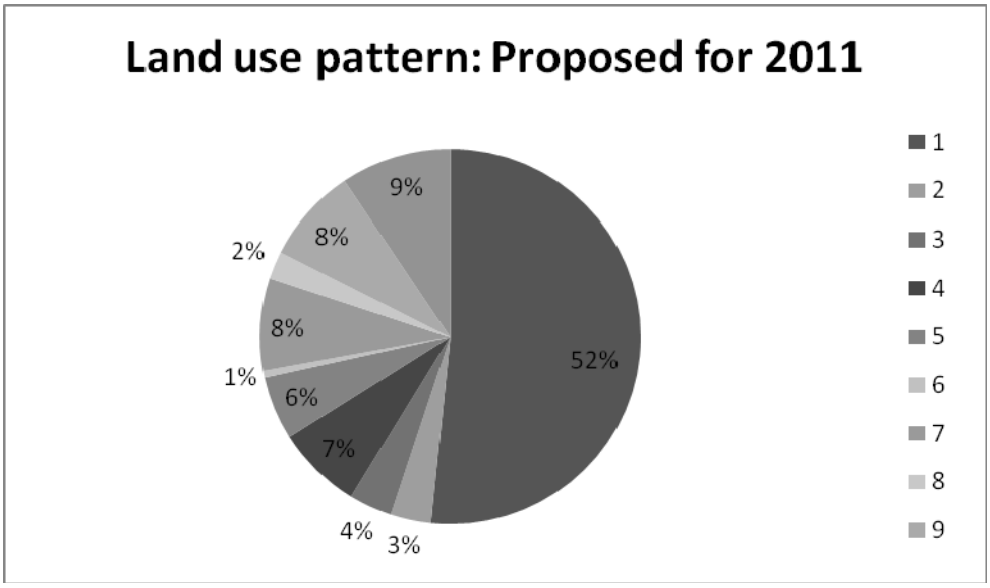

Fig 2: The distribution of land use in city Varanasi

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Urban Characteristics and Housing:

Housing, one of the basic services, which is to be provided for better quality of life, shall be given the importance in the plan. The increasing level of urbanization has created the stress on housing sector in Varanasi. As indicated by the last two decades population demographic data, it can be seen that there is a high increase of 33% population from 1981-1991 while it came down to 17% in next decade, but the increase in housing cannot catch the pace of increasing population hence resulting in the housing gap.

Urban infrastructure and governance:

The main thrust of the strategy of urban planning is to ensure improvement in urban governance so that the ULBs and parastatal agencies become financially sound with enhanced credit rating and ability to access market capital for undertaking new programs and expansion of services. With this improvement, public-private partnership (PPP) for various services would become feasible. To achieve this objective, the state government, the ULB and parastatal agencies in the city will be required to accept implementation of reform agenda.

Table 2: Chosen set of indicators for city Varanasi

Module	**Category**	**Sustainable Development Indicators (SDIs)**
1. Spatial Indicators	1.1 Sustainable land use pattern	urban land use change
2. Demographic Indicators	2. 1 Population growth	Population growth rate urbanization rate
	2.2 Migration pattern	Migrated persons per year
	2..3 Demographic characteristics	Sex-ratio
3. Socio-economic Indicators	3.1 Health	Infant mortality rate per 1000 population Healthy life expectancy in years
	3.2. Education	Adult literacy rate Gross enrolment ratio
	3.3. Housing	Proportion of unauthorised housing Percentage of slum –dwellers
	3.4 Employment	occupational structure GDP per capita
	3.5 accessibility of basic civic amenities	safe drinking water, electricity and means of communication
4. environmental/ Ecological Indicators	4.1 Air pollution	Green house gas emission per capita
	4.2 Solid waste disposal and management	Garbage removal cost
5. Institutional/Administrative Indicators	5.1 city governance	Civic /welfare associations per 10,000 people

4. Conclusion:

So far the main focus has been made to select the most appropriate set of indicators for city Varanasi. By now five main set of indicators like spatial, demographical, socio-economical, ecological, and institutional have been selected and further the selected indicators have been thoroughly analyzed in order to achieve the sustainability in city Varanasi. The socio-economic indicators have proved to be one of the most vital set of indicator comprising of health, education, housing and employment status in city Varanasi. The study of the variation in rapid and uncontrolled population growth shows an adverse effect on infrastructure quality and unavailability of basic civic amenities resulting into unsustainability. The socio-economic model has to be further planned as a prospective approach towards sustainability.

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