Sustainable Urban Development: A Need For 21st Centaury

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Abstract

Cities are the growth engineer of the nation and the development of nation is depending on the city's urbanization level. As per statistics urban population of the world was estimated to be 2.96 billion in 2000 and it was estimated that nearly 50 million people are added to the world's urban population each year. But the urbanization level of developed country is almost stabilized and that with the improved infrastructure and high standard of living. The developing counties are also making same pace and direction as developed countries. But they could not able to make pace in tem of life style and infrastructure provision and that will creating the problems in the urban area in term of pollution, traffic congestion, substandard housing, degraded quality of life, congested residential areas etc. This all addressing the issues of sustainability and hence this paper is intended to provide the broader view for cites of developing county by having sustainability index in form of sustainability Indicators. This paper focuses the methodology for selection of sustainability indicators for Indian context.

Keyword- Sustainable Development, Sustainability Index, Climate change

I. INTRODUCTION

India is the second most populous country in the world after China. India supports 16.87 percent of the world's population on its meager 2.4 percent world surface area of 135.79 million square kms. The selected demographic characteristics of the population of India are presented in Table 1. At the time of independence country's population was 342 million. The country's population size had grown from 361 million in 1951 to around 846 million in 1991 and 1027 million in 2001. The population of India almost tripled during the period of 1951-2001. The phenomenal increase in the population during the last fifty years has led to rapid industrialization and high rate of urbanization which have created tremendous pressure on natural resources like land, air and water. The urban population has increased three and half times, from 62.4 million in 1951 to 217.6 million in 1991 and it again increased to 288 million in 2001. The percentage of urban population increased from 17.28 percent in 1951 to 23.33 percent in 1981, 25.71 percent in 1991 and which further increased to 28 percent in 2001. The decadal growth rates of the population are irregular, as it increased from 13.31 percent in 1951 to 24.8 percent in 1971 and afterwards it marginally declined to 24.7 percent in 1981, 23.9 percent in 1991 and 21.34 percent in 2001.

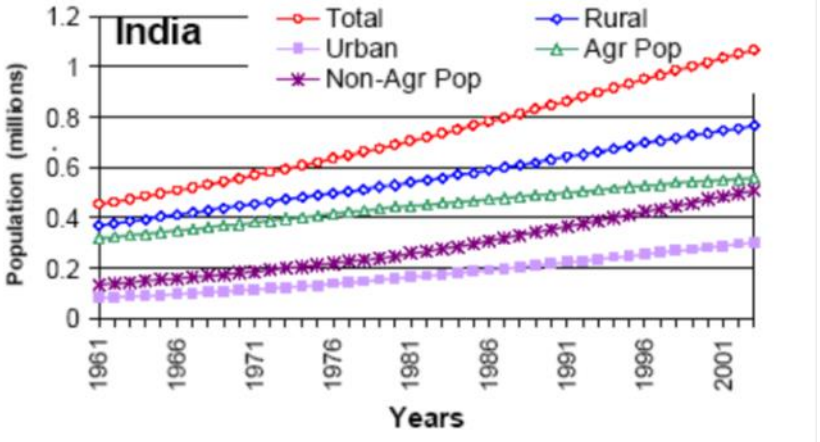

Fig. 1: Indian population scenario
(Source: Ministry of urban Affairs)

The impact of Urbanization on growth is on space, environment and quality of life will be, tremendous. The provision of infrastructural facilities required to support such large concentration of population is lagging far behind the pace of

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urbanization. As a consequence, the urban environment, particularly in large cities, is deteriorating very rapidly. All cities have severe shortage of water supply, sewerage, developed land, housing, transportation and other facilities. The level, quality and distribution of services have been very poor. Several studies have indicated large segments of urban population do not have access to drinking water, sanitation, basic health services and education. These deficiencies have serious health impacts particularly affecting the urban poor. Deteriorating infrastructure, weak municipal institutions and poor delivery systems have constrained the urban economy and its ability to generate employment, incomes and services for the poor.

Rapid urban growth has led to the problems of urban sprawl, ribbon development, and unregulated development. Land for Inadequate disposal of urban and industrial waste is other burning issue. With the increase of urban population, more and more agricultural areas have been converted into urban use. For example, during 1981-91, the increase in population of Vishakhapatnam was 75%, whereas the increase in spatial expansion was as high as 230% recording 3 times growth. Likewise, the increase of population and spatial expansion of Lucknow is 66% and 131% respectively. Large cities on the other hand do not have the land to spread out. For instance in Greater Bombay, spatial expansion was 34% compared to the increase in population of 77%.

II. CLIMATE CHANGE AND CARBON EMISSION

Climate change is one of the most important global environmental challenges, with implications for food production, water supply, health, energy, etc. Addressing climate change requires a good scientific understanding as well as coordinated action at national and global level. Historically, the responsibility for greenhouse gas emissions' increase lies largely with the industrialized world, though the developing countries are likely to be the source of an increasing proportion of future emissions. The projected climate change under various scenarios is likely to have implications on food production, water supply, coastal settlements, forest ecosystems, health, energy security, etc. The adaptive capacity of communities likely to be impacted by climate change is low in developing countries. The most effective way to address climate change is to adopt a sustainable development pathway by shifting to environmentally sustainable technologies and promotion of energy efficiency, renewable energy, forest conservation, reforestation, water conservation, etc. The issue of highest importance to developing countries is reducing the vulnerability of their natural and socio-economic systems to the projected climate change. India and other developing countries will face the challenge of promoting mitigation and adaptation strategies, bearing the cost of such an effort, and its implications for economic development.

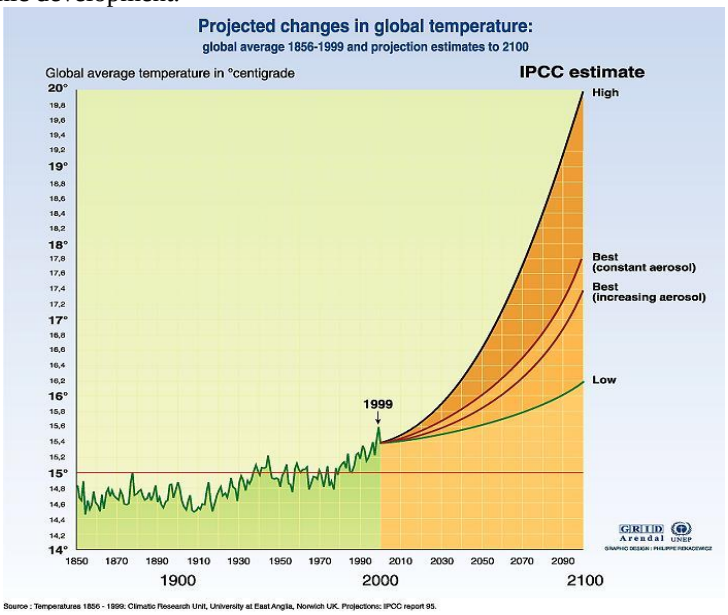

Fig. 2: Changes in global temperature
(Source: International association for urban climate)

Over the period, the GDP growth rate declines slightly, but remains above 8.5%.The CO_2 emissions of the economy increase to 4.0 GT in 2030, as shown in Fig. 2.6. The growth in per-capita CO_2e emissions under the Illustrative Scenario was also provided by the model, and is 2.77 tons CO_2e per capita in 2030 as highlighted in Fig. 2.7. There is continuous decline in the energy intensity of the GDP, at a CAGR of -3.85 percent during 2003-04 to 2030-31.

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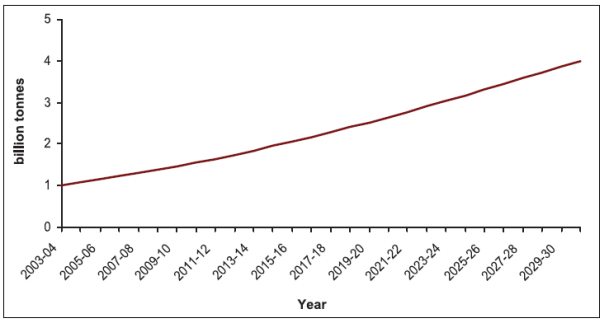

Fig. 3: Growth in aggregated carbon emission

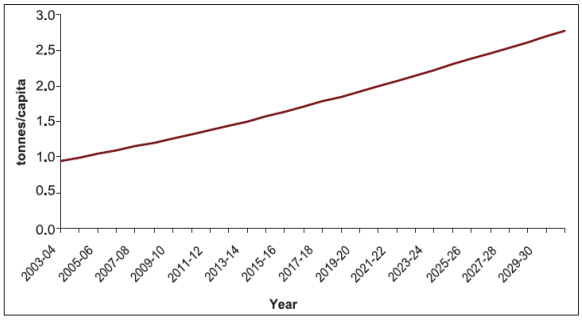

Fig. 4: Growth in per capita emission of carbon

(Source: GHG emission profile of India. Ref No. 11)

The trajectory of aggregate Carbon emission in the Illustrative Scenario till the year 2030-31 is presented below in table 2.2. The aggregate Carbon emissions increase from 1.6 GT in 2005 to 5.7 GT in 2030. This works out to 3.9 tons/CO_2e per capita in 2030.

Carbon Emission per year (GigaTonne)	*2005*	*2020*	*2030*
	1.6	*3.2*	*5.7*

Table 1: Carbon Emission in India

(Source: GHG emission profile of India. Ref No. 11)

III. NEED FOR SUSTAINABLE DEVELOPMENT

Rapid economic growth, social polarization, and the worsening of environmental and health conditions characterize the ongoing development processes especially in Asian mega cities. The economic growth is connected with enormous urban growth, as well as the increase of industrial and commercial zones and traffic. Industrial production with low environmental standards, individual cars and insufficient housing conditions produce health-endangering environmental loads. Human settlements are material and energy consuming and throughput systems: high amounts of resources (e.g. water, oil, food, building materials and energy) are imported into cities and urbanized regions, partly transformed (energy production), used – and in the end exported as solid waste, wastewater, waste heat, etc. These processes occur not only on a local level, but are also internationally linked, and thus influence environment and health on a global level; they raise global environmental and health risks. These global environmental and health risks demand for a sustainable urban development.

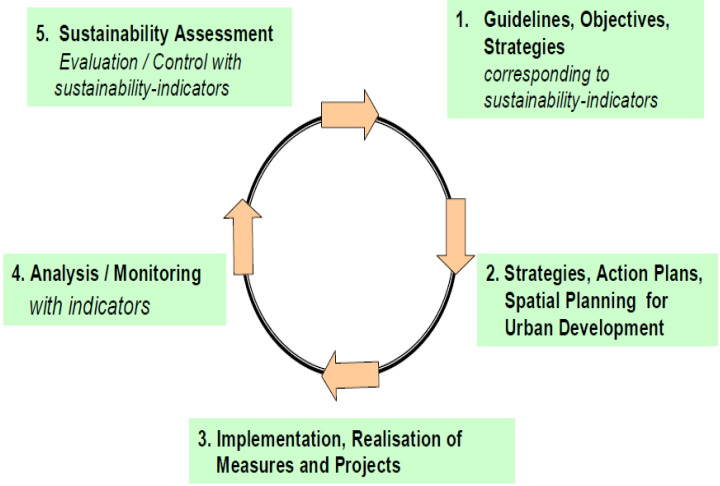

Fig. 5: Cycle for sustainable urban development

Sustainable development shall meet the needs of the present without compromising the ability of future generations to meet their own needs. The general public shall be involved in decision-making and especially urban development processes. Many cities try to implement sustainable urban development on the local level. Sustainable urban development is an integrative dealing with ecological, economic, social, and cultural aspects of urban development in a long-term perspective, including also good human health conditions. It takes place on the local level while considering regional, national and global interrelationships. Sustainable urban development requires the co-operation of a variety of authorities, stakeholders and social groups on different political levels. Considering the global variety of urban social, economic, cultural, and environmental conditions, it becomes obvious that the above general meaning of sustainable development has to be transferred to the prevailing local conditions. In order to discuss

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sustainability with various groups, and in order to find out to what extent the real urban development processes comply with the envisaged sustainability, adequate assessment procedures and accordant instruments are required.

IV. SUSTAINABILITY AND SUSTAINABILITY INDICATORS

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development can be defined as an approach that evaluates and balances long-term environmental, economic and social aspects. Moving towards sustainability involves expanding the definition of cost beyond just short-term economic implications to include long-term economic, environmental and social concerns.

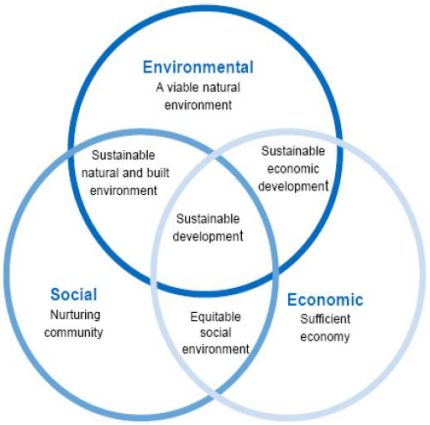

Fig. 6: Sustainability

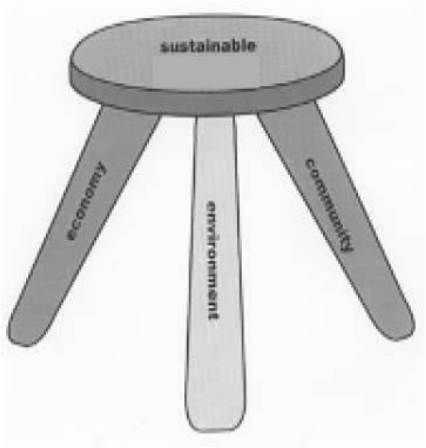

Fig. 7: Pillars of sustainability

(Source: Ref No. 12)

Sustainability is related to the quality of life in a community -- whether the economic, social and environmental systems that make up the community are providing a healthy, productive, meaningful life for all community residents, present and future. A view of community as three concentric circles (Fig. 6): the economy exists within society, and both the economy and society exist within the environment. As this figure illustrates, the economy exists entirely within society, because all parts of the human economy require interaction among people. However, society is much more than just the economy. Friends and families, music and art, religion and ethics are important elements of society, but are not primarily based on exchanging goods and services. Society, in turn, exists entirely within the environment. Our basic requirements air, food and water come from the environment, as do the energy and raw materials for housing, transportation and the products we depend on. Finally, the environment surrounds society. At an earlier point in human history, the environment largely determined the shape of society. Today the opposite is true: human activity is reshaping the environment at an ever-increasing rate. The parts of the environment unaffected by human activity are getting smaller all the time. However, because people need food, water and air to survive, society can never be larger than the environment. Sustainability requires managing all households individual, community, national, and global in ways that ensure that our economy and society can continue to exist without destroying the natural environment on which we all depend. Sustainable communities acknowledge that there are limits to the natural, social and built systems upon which we depend. Key questions asked in a sustainable community include: 'Are we using this resource faster than it can be renewed' and 'are we enhancing the social and human capital upon which our community depends? Sustainability is an issue for all communities, from small rural towns that are losing the natural environment upon which their jobs depend, to large metropolitan areas where crime and poverty are decreasing the quality of life. Indicators measure whether a community is getting better or worse at providing all its members with a productive, enjoyable life, both now and in the future.

Rapid economic growth, social polarization, and the worsening of environmental and health conditions characterize the ongoing development processes especially in Asian mega cities. The economic growth is connected with enormous urban growth, as well as the increase of industrial and commercial zones and traffic. Industrial production with low environmental standards, individual cars and insufficient housing conditions produce health-endangering environmental loads. Human settlements are material and energy consuming and throughput systems: high amounts of resources (e.g. water, oil, food, building materials and energy) are imported into cities and urbanized regions, partly transformed (energy production), used – and in the end exported as solid waste, wastewater, waste heat, etc. These processes occur not only on a local level, but are also internationally linked, and thus influence environment and health on a global level; they raise global environmental and health risks. These global environmental and health risks demand for a sustainable urban development.

The rapidity of Asian urban development as well as the coincidence of urban development processes and phases requires adequate approaches to urban management. Improving the steering potentials of local and metropolitan decision makers by introducing indicator-based urban management systems can be one solution for urgent environmental and health problems.

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Hence methodology for sustainability indicators is needed for sustainable development. To have sustainability indicators various parameters needed to compile in to one head. Following table 2.0 listing various parameters to be considered for sustainability development.

Economy	*Economic return as determined through cost benefit analysis. Expenditure on primary, secondary and tertiary education as a ratio to GDP. Gross domestic fixed capital formation as a ratio to GDP. Difference between percentage change in the upper quartile of after-tax household income and percentage change in the lower quartile of after-tax household income. Unemployment rate.*
Natural Resources	*Quantity of construction waste requiring final disposal per capita. Consumption of energy per unit of output ($ GDP). Volume of freshwater supplied and consumed per capita. The total remaining landfill capacity (by volume). Percentage of demand met by locally-derived freshwater resources. Quantity of municipal solid waste requiring final disposal per capita. Total area of area-based significant landscape features. Total number of point-based significant landscape features and old and valuable trees.*
Biodiversity	*Area of managed marine habitat for conservation. Area of managed terrestrial habitat for conservation. Area of Hong Kong of high marine ecological value. Area of Hong Kong of high terrestrial ecological value.*
Leisure and Cultural Vibrancy	*Percentage of population living within districts with a shortfall of required provision of open space.*
Environmental Quality	*Quantity (tonnes) of carbon dioxide emitted per year. Composite index for criteria air pollutants based on percentage of the Air Quality Objectives. Percentage of population exposed to excessive noise. Composite index for marine water quality pollutants based on percentage of the Water Quality Objectives. Percentage of EPD's river monitoring stations ranked "Excellent" or "Good" using the EPD's Water Quality Index. Composite index for toxic air pollutants based on percentage of acceptable risk.*
Mobility	*The cost of road-based freight transport, the cost of charges and operating costs as a ratio to GDP. Average travel distances: the distance in kilometers traveled by passengers during morning peak by all major groups of transport modes. Average network speed: calculated as total passenger kilometers divided by total passenger hours.*

Table 2: List of sustainable Indcators

V. SELECTION OF SUSTAINABILITY INDICATORS

The selection of indicators is to a large extent determined by the purpose of the indicator set. From their inception, the overarching purpose of the indicators has been to inform policy at the national level. In addition to using indicators to assess overall progress towards sustainable development, many countries successfully use them to measure success within the framework of their national sustainable development strategy.

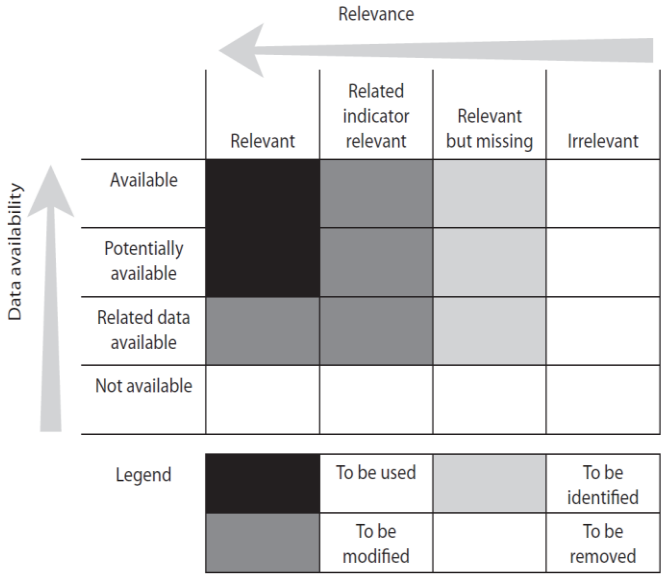

Fig. 8: Matrix for adapting Indicators of Sustainable Development
(Source: Ref No. 4)

Most indicators should be relevant and fall into the first category. The second category covers indicators that are not themselves directly relevant for the purpose, but are closely related to relevant indicators. It may also contain national indicators that address the same issue as indicators but measure it differently. For example, the indicators contain a number of indicators

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measuring objective dimensions of the health status (disease prevalence, nutritional status, immunization), but some countries use instead a subjective indicator on people's satisfaction with the health status, based on survey data. There may also be indicators where the underlying issue is closely related, but not identical to a national issue. For example, countries whose strategies include regional trade integration may want to monitor the share of trade with regional partners rather than share of trade with developing countries.

The black boxes contain those indicators that can be incorporated without any changes to national indicators. The dark grey boxes are for those indicators that have to be modified for a given country, either because there exist related and more relevant or specific indicators or because data for the original indicator cannot be made available. The light grey boxes contain those indicators important for a country but not included in the set. The task of identifying appropriate indicators could then include assessing the availability of data. As indicated above, the number of indicators in those boxes should be quite small. The remaining blank boxes would include any indicators that a country does not consider useful.

SOCIAL		
SUB - THEME	**INDICATORS**	**VARIABLES**
Education	Literacy	Literacy rate
Equity	Poverty	Percentage of population below poverty line
Population	Population Change	Population Growth rate
		Sex ratio
Health	Sanitation	Percent of Population with Adequate Sewage Disposal Facilities
	Water	Population with Access to Safe Drinking Water
ENVIRONMENTAL		
Atmosphere	Air quality	Ambient Concentration of Air Pollutants in Urban Areas
Waste	Generation and Management	Generation of solid waste and percentage recycling
Land	Green cover	Percentage of Green space
ECONOMIC		
Economic structure	Economic performance	Average income per capita
	Unemployment	Average unemployment rate
Consumption and Production Patterns	Energy Use	Annual Energy Consumption per Capita
		Intensity of Energy Use for transportation (petrol and diesel)
	Transportation	Distance Traveled per Capita by Mode of Transport

Table 3: sustainability Indicators for Indian Context

VI. CONCLUSION

The population is rising at a rapid rate in Indian cities. The impact of Urbanization growth is on space, environment and quality of life will be tremendous. The provision of infrastructural facilities required to support such large concentration of population is lagging far behind the pace of urbanization. So there is need to develop new technologies to cope up the infrastructure demand in sustainable manners. The sustainable development is one of the ideas to the sustainability but there is not such any tool to measure the sustainability. Sustainable indicator is tool to measure the sustainability. Sustainability indicators are useful for the decision making and a powerful tool for the planners to plan the future requirements.

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