SUSTAINABILITY IN URBAN DEVELOPMENT : AN INDIAN STANDPOINT

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ABSTRACT

Sustainable development means attaining a balance between environmental protection …….. present and future needs. It means equity in development and sectoral actions across space and time (1). It requires an integration of economic, social and environmental approaches towards development. Sustainable urban development refers to attaining social equity and environmental protection in urbanization while minimizing the costs of urbanization. This paper deals with the role of environment and climate change in sustainable urban development. The first section deals with urban basic services and sustainable urban development in India. The second section notes the inefficiencies in the land policy of India ……..and its implications for sustainable urban development in India. The last and third section summarizes the discussion and ends with way forward. This paper aims at discussing some of the important issues relating to sustainable urban form that would lead to sustainable urban development with possible references to India. The paper is based on available literature and secondary data. The paper is divided in two parts.

INTRODUCTION

UN General Assembly convened a conference on the "human environment" at Stockholm in June 1972, which came out with guiding principles on "human environment". It emphasized that man has the fundamental right to environment of quality and also that he has a responsibility towards protecting the environment for present and future generations. It also maintained that natural resources of the earth must be safeguarded for the benefit of present and future generations. About a decade later, to address the issues concerning continuing depletion of natural resources and unsustainable development, the World Commission on Environment and Development was created in1983. Popularly known as Brundtland Commission (1983) (2), it described sustainable development as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*". After twenty years of Stockholm Declaration, the UN Conference on 'Environment and Development' (also known as 'Earth Summit') was held at Rio-de Janeiro in 1992 that adopted an action plan, popularly known as 'Agenda 21'.

The agenda 21 promised to reduce poverty, provide clean water and health care, and protect the natural resources and so on. Also to be noted that some of the Millennium Development Goals (3) (see UNDP) have urged for ensuring environmental sustainability and reduction of the percentage of the population under extreme poverty. Similarly, explaining implications of climate change for sustainable development the Intergovernmental Panel on Climate Change notes (IPCC) (4) the importance of social and environmental equity in development. Thus all the major world conferences and initiatives taken so far on environment and development have stressed on economically viable development, socially equitable development and protection of the environment for attaining sustainable development.

Sustainable urban development specifically means achieving a balance between the development of the urban areas and protection of the environment with an eye to equity in employment, shelter, basic services, social infrastructure and transportation in the urban areas. With rapid expansion of urban

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population around the world there has arisen a wide awareness about minimizing the environmental costs of urbanization. Concerns are raised at environmental damages and depletion of nonrenewable resources and rising levels of pollution in urban areas. In recent times cities have become places of urban environmental degradation and wasteful use of resources, which is proving to be costly to generations present and future. In order to mitigate the problem we require to minimizing the depletion of non-renewable resources and resort to environmentally sustainable economic development. But this has to be done in ways that are socially, economically and politically acceptable. While planning for sustainable development of the towns, we should also take into account the factor of climate change. According to this, ensuring environmental sustainability means taking steps, which include a) integration of the principles of sustainable development in the policies and programmes of the country, b) reversal of loss of environmental resources, c) reduction of the proportion of people without sustainable access to safe drinking water, d) improving the lives of slum dwellers. Before discussing the different aspects of sustainable urban development and city form we explain the relation of climate change with sustainable urban development and city form in the next section.

OBJECTIVE

The objective of the document is to improve the understanding of Sustainable Development and the various concepts related to Sustainability in urban development. It also highlights the deficiency in urban basic services in India and its management for sustainable urban development.

THE STORY OF A PARADISE SQUANDERED!

Long, long ago on a little island (about 20 square kilometers) named Karu, people lived happily. Their island had everything they needed- food, water, shelter, magnificently spreading trees for fresh air, shade, animals, birds and ocean full of fish. Two hundred years ago, an English sailor discovered Karu and called it Pleasant Island. Another century passed before an expedition was carried out to Karu. Discovering that the island had one of the richest piles of phosphate rock on the globe, for most of next century, millions of tons of phosphate was mined and shipped to other countries. The population on the island included 7000 Karuan natives and another 3000 imported workers. Karu has only one road around the island, but an average Karuan family has at least two vehicles. They possess all electronic gadgets for their convenience including microwave ovens, stereo equipment and multiple televisions per family. Nine out of every ten Karuans are obese and average young men weigh more than 135 kilos. This is because their native food was replaced by imported foods, subsidized by the government. Meat brought from another country more than 3200 kilometers away is cheaper in Karu than it is in that country. Karuans receive their housing, power supply, water, telephones, education and medical services free of cost or at a nominal charge. The tiny island has two hospitals, and Karuans needing specialist treatment are flown to other countries at the expense of the government.

Today Karuans even import fish! Due to the change in the eating habits, the health of the people on the island is being affected. The average life span of a Karuan is expected to be about 55 years. Diseases like hypertension, heart disease and diabetes are very common. Where does all this wealth come from? The Phosphate. Of course! Then what is the problem? The phosphate supply could run out before the next century. The government is now desperately searching for phosphate reserves even as the interior of the island lies ravaged by mining. They even plan to demolish the President's residence in their search. Karuans continue to tear their island apart, live and spend as if there is no tomorrow. At this rate, there may be no one on the plundered island.

What kind of development do you think is going on in the island? Is it going in the right path?

What do you think has gone wrong in the island of Karu?

LET'S EXPLORE MORE ON THIS!!!

'Development', generally, is measured in the form of economic growth that contributes to a nation's wealth. As seen in the example above, it was a narrowly defined 'income' or 'wealth and prosperity' based view of the government of Karu regarding the export of Phosphate from their island. But did this lead to the development of the people on the island?

What exactly do we understand by Development? Are there any other factors contributing to development?

The only parameter used to measure the development of the community was taken to be the Gross Domestic Product (GDP). It had its advantages but on the other hand, it had certain limitations also.

WHAT ARE THESE LIMITATIONS?

We have realised that it is not the country's wealth alone but the welfare of its people also, that is equally important. The major limitation of using GDP as an indicator of development in this case was that it did not consider the standard of living and human well being.

Hence, with the changing scenario, our concerns and commitments have also changed. It was realised that, if one wanted to prevent the rapid destruction of life systems, the development paradigm had to change. We thus moved ahead beyond the concept of development, from 'growth' to 'growth plus equity' whereby social justice, equality of opportunity and access for all the people in country's prosperity are the major concern. With this concept of development in mind, two things become very evident:

- Development involves continuous growth.
- It is concerned with human and environmental well being.

Sustainable Development (SD) implies economic growth together with the protection of environmental quality, each reinforcing the other. Sustainable Development, thus, is maintaining a balance between the human need to improve lifestyles and feeling of well-being on one hand, and preserving natural resources and ecosystems, on which we and future generations depend.

SD may also be defined as .

"To improve the quality of life while living within the carrying capacity of ecosystems"

IUCN (The World Consevation Union), 1991

Thus, Sustainable development does not focus solely on environmental issues. More broadly, it encompasses the three general policy areas namely economy, environment and society.

The Swiss 'Monitoring of Sustainable Development Project' MONET (BFS, BUWAL & ARE) in 2001, proposed the following definition:

'Sustainable development means ensuring dignified living conditions with regard to human rights by creating and maintaining the widest possible range of options for freely defining life plans. The principle of fairness among and between present and future generations should be taken into account in the use of environmental, economic and social resources. Putting these needs into practice entails comprehensive protection of bio-diversity in terms of ecosystem, species and genetic diversity, all of which are the vital foundations of life.'

MONET , 2001

There's another definition given by the famous Robert Prescott Allen, who has founded and chaired several influential IUCN-The World Conservation Union projects and has 18 years experience evaluating and advising development strategies on four continents.

Sustainability is just another way of saying "the good life" as a combination of (a) a high level of human well-being, and (b) the high level of ecosystem well-being that supports it.

ALLEN PRESCOTT

The main features that all the above definitions have (either explicitly or implicitly) are as follows:

- A desirable human condition: a society that people want to sustain because it meets their needs.
- A enduring ecosystem condition: an ecosystem that maintains its capacity to support human life and others.
- A balance between present and future generations; and within the present generation.

MODELS FOR SUSTAINABLE DEVELOPMENT

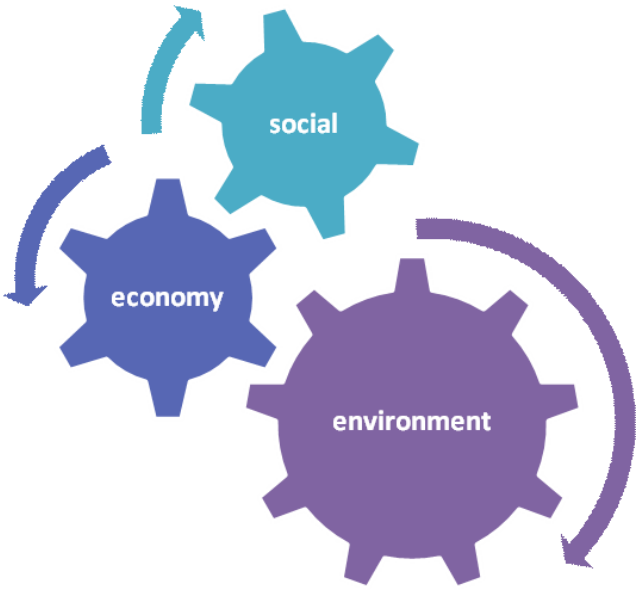
Moving towards sustainable development presents tremendous challenges. Man has all the tools necessary for achieving it. However we tend to forget that in order to survive, we need to adapt to nature and not vice-versa. We need to develop the ability to make a choice which respects the relationship between the three "Es" – economy, ecology and equality. If all the three "e's" are incorporated in the national goals of countries then it would be possible to develop a sustainable society. Models help us understanding the concepts of Sustainability better. Achieving SD thus, requires more effective, open, and productive association among the people themselves. Models help us gather, share, and analyse information; they help coordinating work; and educate and train professionals, policymakers, and the public in general.

The following are some of the constructive models for understanding SD.

THREE PILLAR BASIC MODEL

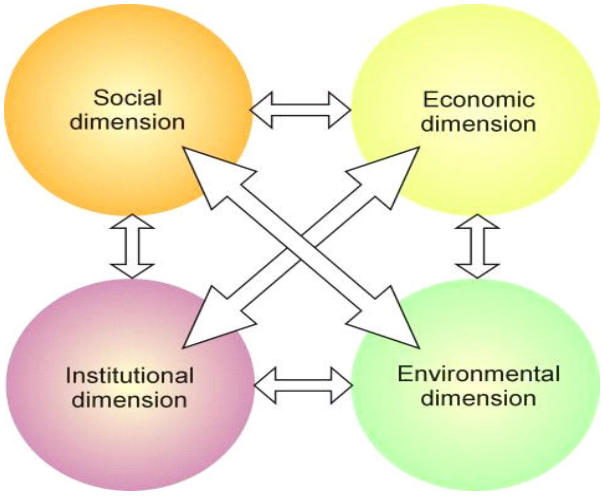
This is one of the most well-known models created using the three dimensions -Economy, Environment and Society. The diagram shows three interlocking circles with environmental (conservation), economic (growth), and social (equity) dimensions. Sustainable Development is modeled on these three pillars. This model is called 'three pillars' or 'three circles model'. It is based considering the society, but

does not explicitly take into account 'human quality of life'.



Dimension of Sustainability

However an improvement to this three circles model have been made and a dimension is being incorporated along with social, economy and environment. This forth dimension is institutional dimension that is playing a crucial role in sustainable urban development, whether it is government institution or private institution or alliance of both.



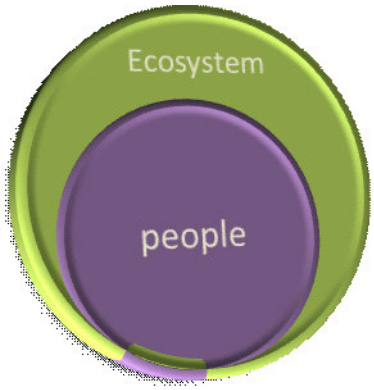
THE EGG OF SUSTAINABILITY

The 'Egg of Sustainability' model was designed in 1994 by the International Union for the Conservation of Nature, IUCN (cf. Guijt & Moiseev 2001).

It illustrates the relationship between people and ecosystem as one circle inside another, like the yolk of an egg. This implies that people are within the ecosystem, and that ultimately one is entirely dependent upon the other. Just as an egg is good only if both the white and yolk are good, so a society is well and sustainable only if both, people and the ecosystem, are well. Social and economical development can only take place if the environment offers the necessary resources: raw materials, space for new production sites and jobs, constitutional qualities (recreation, health etc.). Ecosystem is therefore to be regarded as a super coordinated system to the other dimensions of the triangle or prism models: social, economical, and institutional. These latter can only prosper if they adapt themselves to the limits of environmental carrying capacity.

Thus according to this model:

sustainable development = human well-being + ecosystem well-being



The Egg of Sustainability

IUCN's egg of sustainability (Source: IDRC 1997)

ATKISSON'S PYRAMID MODEL

The Atkisson Pyramid process supports and accelerates the progress from identifying the vision of sustainability, through analysis and brainstorming and agreements on a credible plan of action. The Structure of the Pyramid guides through the process of first building a firm base of understanding, searching for and collecting relevant information and ideas, and then focusing and narrowing down to what is important, effective, doable, and something that everyone can agree in.

The Atkisson's Pyramid is a blue print for the SD process. Its five steps or levels include:

This model is designed to help groups of 20-40 people move quickly up the sustainability learning curve, from basic principles and frameworks, to systems analysis, to innovative strategies for action. Along the way, groups practice cross-sectoral teamwork, make linkages, generate dozens of new ideas, and work toward an "Agreement" which is a set of actions they agree to follow through within the real world.

THE AMOEBA MODEL

The Amoeba Approach is a model used to visually assess a system's condition relative to an optimal condition. The model is circular with the various indicators positioned around the outside. Lines radiate from the center to the indicators, on a continuum from unsustainable (in the center) to sustainable (the outside of the circle). A circle would indicate the optimum conditions. This type of model allows simultaneous assessment of different indicators, and easy comparison between components of the system. "The Amoeba Model" is a powerful technique for accelerating the innovation process and training to be far more effective in achieving SD.

A TALE OF TWO INDIA

India with its 30 states and seven union territories displays great regional disparities in terms of economic growth and specialization. A two-speed, divergent India has emerged with infrastructure development a key piece of the puzzle. Under typical patterns of economic development, countries or areas tend to go through labor-intensive manufacturing cycles before they specialize. But in India, fast growth states or areas have skipped steps in the economic development models and focused where they appear to have comparative advantage, according to a 2006 International Monetary Fund working paper. That is, leading regions like Delhi, Karnataka (Bangalore), and Maharashtra (Mumbai) which embraced the IT wave with their first-tier cities, have realized faster growth and rising incomes alongside better infrastructure offerings.

Conversely, slow growth or lagging regions —Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh—suffer with growing, less-educated populations, which are expected to follow more traditional economic growth and development patterns. These areas may also be a political force for redistributing resources unless they are incentivized to reform governance, business climates, and infrastructure offerings. Recent research reports that politicians in electorally competitive states announce large numbers of infrastructure projects ahead of elections, and then don't follow through. States, particularly in lagging regions, have proved wasteful and corrupt in infrastructure spending.

An antidote for both fast growth states attracting most of the foreign investment—in dynamic cities such as Delhi, Mumbai, Bangalore, and Chennai—and lagging states, may be a new approach to private investment in infrastructure. As a new form of public-private partnership, global capital markets can offer a viable source of funds, promote better governance, and bring transparency to infrastructure's complexities. With India ready to further embark in public-private partnerships for infrastructure projects, getting the formulas right is imperative. This can make the difference between further regional divergences and politicization which deters reforms and development, and the opportunity for more balanced growth for those who will need it most.

HOW ENVIRONMENT AND CLIMATE CHANGE AFFECT SUSTAINABILITY IN URBAN DEVELOPMENT

While planning for sustainable development of the towns, we should also take into account the factor of climate change. Explaining implications of climate change for sustainable development the Intergovernmental Panel on Climate Change notes(5)"*Sustainable development represents a balance between the goals of environmental protection and human economic development and between the present and future*

needs. It implies equity in meeting the needs of people and integration of sectoral actions across space and time." (Cruz et al, 2007). One of the greatest challenges that the world is facing today is climate change. Climate change is the variation in the earth's global climates over time. It involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years. These changes can be caused by dynamic process on earth, external forces including variations in sunlight intensity and more recently by human activities. Human influences can be by increase in CO2 levels due to combustion of fossil fuels, aerosols, cement manufacture etc. Other factors like ozone depletion, animal agriculture and deforestation also change climate. The effect of climate change can be found on among other things, on rising sea level that may accelerate coastal erosion, on increasing temperature, on increase in intensity of natural disaster, and very importantly on vector borne diseases. There has been an increasing trend in the annual mean temperature in India. In recent decades the east coast has been experiencing fewer rainy days while the northwest has been experiencing heavy summer monsoon. There have also been some extreme climatic events like heat wave, intense rain, floods and droughts in India. Researchers have documented the increase in frequency of hot days and multiple-day heat waves in the past century. There has been record rainfall in Mumbai, India on 26 to 27 July 2005, which led to loss of large numbers of lives. Consecutive droughts between 2000 and 2002 caused crop failures, mass starvation and affected millions of people in Orissa. Also, increased water stress poses to be a major problem for India. Accelerated glacier melt is likely to cause increase in the number and severity of glacial melt-related floods, slope destabilisation and a decrease in river flows as glaciers recede. The researchers have predicted that with the current trend in the melt of glaciers, the Ganga, Indus, Brahmaputra and other rivers could likely become seasonal rivers in the near future and affect the lives of people residing around them (Cruz et al, 2007).

Thus, it is likely that climate change will hamper sustainable development of India as it increases the pressures on natural resources and the environment associated with rapid urbanization, industrialisation and economic development. In order to reduce the effect of climate change, we need to include climate-proofing concepts in national development initiatives. Urban areas mostly face problems of air quality pollution, green house gases, unsustainable consumption and of inadequate sanitation and water supply. Thus translated into policy initiatives, environmental sustainability of urban form should aim at energy efficiency in transport and buildings, optimal planning solutions in terms of locations, distances and spaces, which will reduce air and noise pollution. It should also aim at sustainable management of sanitation and water supply, promote equity in provision of services and of course reduce deforestation. The recently announced National Action Plan on Climate Change by the Prime Minister in June 2008 visualises to make economic development of India energy efficient. All these concerns, questions and initiatives about sustainable environment and climate change have resulted in experiments and debates over city forms that are sustainable. Before discussing the relevant city forms it would be pertinent to discuss the sustainable management of urban basic services and the inefficiency in the land policy in India and its implications for sustainable city form and development in India, which is done in the next part.

URBAN BASIC SERVICES IN INDIA

Shortcomings: Sustainable city planning should aim at achieving social and environmental equity while improving the lives of the people. For that to happen we need to have a sustainable city form as well as provision and proper management of the services. Thus, in order for a city or urban area to be sustainable it needs to produce and manage basic services like water, waste, energy, and transportation in a way that it conforms to the principles of sustainable development. In other words, the city should be able to produce and distribute the services in an economic, environment friendly and equitable way. Cities in the developing countries are deficient in the provision of basic services that pollute the environment. It is to be noted that though there are some differences between cities and between rich and poor nations, in general urban infrastructure systems are designed without much attention to environmental and social impacts. Mostly the delivery of the services like water, energy, waste, transportation, are based on non-renewable energy sources (Pinderhughes, 2008). Moreover, the inequality in the provision of these services is very high. Indian cities are characterized by high density of population, deficiency in services and air pollution. Let us see the status regarding these in India. In urban India in 2001, 69 (6) per cent of the households had safe drinking water, 61 (7) per cent of

the households had their latrine facilities within their houses and only 35 per cent of the households had closed drainage facilities (Census 2001) (8). Eighty-eight per cent (88%) of the urban households had electricity and only 0.2 per cent had solar energy in 2001(Census, 2001) (9). In Delhi, the capital city of India, 77 (10) per cent of the urban households had tap as source of drinking water, 63 (11) per cent had their latrine facilities within their premises and 52 per cent of the households had closed drainage facilities (12). Delhi generated 5922 tons of solid waste per day in 2004-05 (13).Air pollution has become a major problem in Indian cities. Taking the case of Delhi, we find that there are around 54 lakh vehicles in Delhi. Around 70 per cent of the air pollution in Delhi happens to be due to vehicles (14). It has been found in a World Bank study based on 1994-95 air quality data that around 10,000 people die every year prematurely due to air pollution in Delhi alone. According to Delhi Medical Association the incidence of asthma in Delhi is ten times the national average (Centre for Science and Environment). Densities of Indian cities are very high. Management of the basic services should be done keeping in mind the deficiency in the services, the environmental impacts and the inequality in the provision of the services. Thus we have two issues here, the first one is covering the deficiencies in services and the second one involves how to provide the services in an environment friendly way. We discuss some of the options for alternative and environmental management of the services.

SUSTAINABLE MANAGEMENT OF URBAN BASIC SERVICES

Water supply management: The effect of climate change on water supply will be negative in almost all the countries. Thus care should be taken that energy efficient alternative systems are innovated. As for efficient practices, water consumption can be limited by using raw water, recycled water for gardening and landscaping. In the state of Vermont, U.S.A., a wastewater treatment system uses a series of tanks containing plants and other organisms to naturally clean wastewater that serves 500,000 people per year (Pinderhughes, 2008). There have been other scattered evidences of use of wastewater but the example of a city doing it on large scale is rare. In India the water from Sewage Treatment Plants (STP) in factories are used for landscaping and gardening. However, in developing countries the main challenge is to provide clean drinking water to all the urban residents adopting sustainable water management practices. Rainwater harvesting has its possibilities for partially managing water supply. Conservation of old water bodies like lakes, ponds can be made for increased and sustainable water supply. It has been considered as an optional reform under Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in India. In Delhi itself, one after another marshlands and water bodies are being converted in residential areas, garbage dumps,petrol pumps and so on, the latest victim being the Jahangirpuri marshland (Hindusthan Times, 2008). Marshlands recharge ground water substantially. Much is yet to be done regarding this in India. Other environmentally sustainable methods can be explored.

Waste management: Waste management practices should be started from the production and distribution stages of economic activities through reuse and recycling. Reuse of things like metals, glass, paper, plastic, textiles, organic waste and water will reduce demand for energy, raw materials, fertilizers and fresh water sources (Pinderhughes, 2008). However, care should be taken that hazardous wastes do not go for recycling. Plastic should be used less.

In Delhi more than 5000 tons of municipal solid waste is generated everyday, which is disposed of in landfills. Too much land is being consumed for disposal and is creating danger of ground water contamination. As such the department of environment of the government of India recommended that other 'best practices' in waste management should be adopted in a large scale. The practices include vermiculture, pelletisation, aerobic composting and so on. A research study by NEERI has recommended mechanical composting as the viable option for such a huge amount of waste (15). The Supreme Court of India, hearing public interest litigation on solid waste management of Delhi directed the Municipal Corporation of Delhi to improve the system.

Energy management: Energy management practices should be encouraged in the planning of buildings and the city form. Buildings and city forms that are energy efficient and use sustainable energies like solar and wind energies should be considered. There are fragments of evidences in India of settlements using solar power, water recycling techniques and waste management practices. But in general the environment friendly techniques are yet to be practiced in urban areas, especially in large cities where the differences would be felt. City forms should be such

that it uses energy efficient transport. Coming to the financing part, it can be said that the policies should help energy efficient practices. The loans should be easily available and tax benefits provided for such practices.

Reduction in inequality: Management of basic services in the cities should reduce inequality in services between rich and poor. The concept of commercial viability does not hold for social services always. City form should take into account social conditions also. The ability of urban poor to pay for the full cost of water supply would remain low in India. Thus reduction in grant of the government and introduction of private sector in this sector is likely to make the situation worse. It is also well known that much of the subsidized schemes in the past have gone to the middle and high-income areas (Kundu and Thakur, 2006). Apart from deficient, non-environment friendly and unequal basic services, the other major problem in developing a sustainable city form in India is inefficient land policy of the country, which we discuss next.

INEFFICIENT LAND POLICY OF INDIA

Since this paper has reference to India, it would be pertinent to mention the inefficiencies of land policy of India in this context. This is because land is an important input for producing goods and services for urban development. Under the conventional analysis, factors of production i.e. land, labor and capital flow to make goods and services but the social and environmental consequences are not reflected in such analysis. Sustainable urban development does take account of social and environmental effects and means balance between the development of the areas and protection of the environment with an eye to equity in employment, shelter, basic services, social infrastructure and transportation in the urban areas. For this to happen, one has to ensure that land is properly used to meet these objectives. Urban India is plagued by shortage of housing facilities and scarcity of land for social overheads like roads, footpaths, parks, schools and so on. The roots of these problems can be found in the inadequate, inefficient, iniquitous land policy of the country. This is why it is important to have an effective and appropriate land policy that would promote sustainable development.

National Commission on Urbanization of India (NCU, 1988) recognized the need for adequate supply of land, efficiency and equity in allocation of land and promotion of flexibility in land use. Thus it mentioned that the objectives of urban land policy should be a) to achieve an optimum social use of urban land, b) to make land available in adequate quantity to both public authorities and individuals at reasonable prices c) to encourage cooperative community effort as well as individual builders to develop land and construct houses, d) to prevent concentration of land in few hands, e) to use land to finance urban development, f) to encourage socially and economically efficient allocation of land so that land development conserves resources and land utilization is optimal, g) to promote flexibility in land use in response to a growing city (16).

Also, the Eleventh Five Year Plan (2007-12) of India emphasizes, "governments at appropriate levels including local authorities have to strive to remove all possible obstacles that may hamper equitable access to land" (17). It identifies failure to adopt appropriate urban land policies and land management practices as the primary cause of inequity and poverty. Thus the Eleventh Five year Plan calls for a flexible land policy which will make conversion from one use to another, cost efficient and promote equity. It judges that urban planning tools like master planning, zoning and regulations are not enough for the requirement of land supply for rapid urbanization. The problem has also been addressed somewhat by Jawaharlal Nehru Urban Renewal Mission in India. This section discussed the role of land in sustainable urban development with particular reference to land policy of India. The next section discusses options for the right city form for sustainable urban development in India.

SUMMARY AND WAY FORWARD

We have dealt in this paper with some issues relating to sustainable development and sustainable urban development with special reference to India. The paper first discussed the concept and importance of sustainable development and especially that of sustainable urban development. All the major conferences on world environment have stressed on need of development of the economy with social equity and protection and conservation of the environmental resources. In recent times, cities have become places of wasteful use of nonrenewable resources and urban environmental degradation. Apart from that, Climate change is posing a challenge to the world and it has the potential to affect the economies, rich and poor both. This is likely to affect the water supply and ecosystems among other things. Climate change would affect the poor of the world more because they are more

vulnerable and does not have the means to protect themselves against the vagaries of extreme climatic conditions. Manmade pollution of water, air and environment seriously affect the climates. Sustainable urban development should take account of all this and try to reduce the ill effects of climate change, depletion of nonrenewable resources and degradation of the urban environment.

Next the paper discusses the deficiency in urban basic services in India and its management for sustainable urban development. It also mentions the role of land in sustainable urban development and inefficiencies in the land policy of India. Urban form is important for sustainable urban development but equally important are the environmental friendly management of basic services like water-supply, sanitation and also of energy. The issue of equity in delivery of services is one important requirement of sustainable urban development, which should be kept in mind while planning for them. There are three main issues here, which are meeting the deficiencies in services, how to manage the services in an environment friendly way and the need to make them more equitable.

The issues can be numerous and varied for attaining sustainable urban development. But all of them should consider economic, social and environmental aspects of development. In the end it can be said that economic growth does not mean economic development. True economic development should contribute to increase in efficiency and quality of life of a community. It is to be seen that positive externalities (such as more employment) of economic growth of a city does not give rise to negative externalities like air pollution, traffic congestion and so on. It is also to be remembered that such an effort should be made at local, regional and global level. Above all the solutions should take account of the local characteristics, acceptability and indigenous practices.

(1) See Cruz et al (2007).

(2) World Commission on Environment and Development (WCED) known by the name of its Chair Gro Harlem Brundtland was convened by the United Nations in 1983.

(3) Millennium Development Goals (MDGs) are eight goals to be achieved by 2015 that responds to the world's main development challenges. These are drawn from the targets and actions contained in the Millennium Declarations in the UN Millennium Summit in September 2000.

(4) For detailed discussion on climate change see the report of Intergovernmental Panel on Climate Change, the source can be found under Cruz et al. (2007) in the reference.

(5) For detailed discussion on climate change see the report of Intergovernmental Panel on Climate Change, the source can be found under Cruz et al. (2007) in the reference.

(6) 68.7 per cent had tap water, 16.2 per cent had hand pump and 5.1 per cent had tube well.

(7) 14.6 percent had pit latrine and 46.1 per cent had water closet.

(8) See Census of India 2001, Series-1 India, Analytical Reports on Housing Amenities.

(9) See Census of India 2001, Series- 1 India, Analytical Reports on Housing Amenities.

(10) See Statement 1.1 of Census of India 2001, Series-1 India, Analytical Reports on Housing Amenities.

(11) 15.2 per cent had pit latrine and 47.4 per cent had water closet, See Statement 3.1 of Census of India 2001, Series-1 India, Analytical Reports on Housing Amenities.

(12) See Statement 3.2 of Census of India 2001, Series-1 India, Analytical Reports on Housing Amenities.

(13) Source: Central Pollution Control Board of India.

(14) See White Paper on Pollution in Delhi with an Action Plan.

(15) See White Paper on Pollution in Delhi with an Action Plan.

(16) See NCU Report (1988) vol. II, pp 226.

(17) See pg. 411 of chapter 11 of Eleventh Five Year Plan Volume III.

REFERENCES

Bertolini, L. (2005). The multi-modal urban region: A concept to combine environmental and economic goals. In *Future Forms and Design for Sustainable Development*, M. Jenks And N. Dempsey eds. Oxford, U.K.

Breheney, M. J. (Ed.) (1992). *Sustainable Development and Urban Form*, Pion, London.

Census of India (2001). *Analytical Report on Housing Amenities*, Series 1, India.

Centre for Science and Environment. http://www.cseindia.org/html/lab_air_pollution.htm last accessed on 6.08.2008.

Chen H., B. Jia , S.S.Y.Lau (2008). Sustainable urban form for Chinese compact cities: Challenges of a

rapidly urbanized economy. *Habitat International* Vol.32, Issue 1, March 2008, pp.28-40.

Cruz, R.V., H. Harasawa, M. Lal, S. Wu, Y.Anokhin, B. Punsalmaa, Y. Honda, M. Jafari, C. Li and N. Hu Ninh (2007): Asia. Climate Change, 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to The Fourth Assessment Report the Intergovernmental Panel on Climate Change, M.L.Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson Eds, Cambridge University Press, Cambridge, U.K. 469-506.

Dempsey, N. and M. Jenks (2005). Future forms for city living? In *Future Forms and Design for Sustainable Cities*, M. Jenks And N. Dempsey eds. Elsevier, Oxford, U.K.

Govt. of India, Ministry of Environment and Forests, White Paper on Pollution in Delhi with an Action Plan. http://envfor.nic.in/

Govt. of India, Planning Commission (2008). *Eleventh Five Year Plan, 2007-2012 vol. III.* Oxford, India.

Hindustan Times, (2008). Death of the lakes. In *Hindustan Times*, August 5, New Delhi, Metro Edition.

Jenks, M. & N. Dempsey, (2005). The language and meaning of density In *Future Forms and Design for Sustainable Cities*, M. Jenks And N. Dempsey eds. Elsevier, Oxford, U.K.

Kenworthy J.and F.B. Laube (1999). *An International Sourcebook of Automobile Dependence in Cities* 1960-1990, University Press of Colorado, Boulder.

Kundu A. and S. Thakur (2006). Access to drinking water in urban India: An Analysis of emerging spatial pattern in the context of new system of governance In *Managing Water Resources: Policies, Institutions and Technologies*, V. Ratna Reddy and S. Mahendra Dev eds. Oxford, New Delhi.

National Commission on Urbanisation, (1988). *Report of the National Commission on Urbanisation* , Vol. II.

Opp. Susan M. (2008). Roles and realities. In *Local Sustainable Urban Development in a Globalised World,* Lauren C. Heberle and Susan M. Opp eds. Hampshire, Ashgate Publishing Limited, England.

Pinderhughes, R. (2008). Alternative urban futures: Designing urban infrastructures that prioritize human needs, are less damaging to the natural resource base and produce less waste In *Local Sustainable Urban Development in a Globalized World,* Lauren C. Heberle and Susan M. Opp eds. Hampshire, Ashgate Publishing Limited, England.

Prud'homme R. and Lee, C. (1999). Size, Sprawl and the Efficiency of Cities. *Urban Studies*, 36 (11). 1849-1858.

Pucher, J., N. Korattyswaropam, N. Mittal, N. Ittyeraah (2005). Urban transport crisis in India. www.elsevier.com/locate/tranpol