

Low cost housing and infrastructure sustainable cities: A global perspective

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Governor Dave, Dr. Varadarajan, Ladies and Gentleman,

I should at the outset thank the President and members of the organizing committee of the Indian National Academy of Engineering for inviting me to deliver the keynote address at the International Seminar. I have chosen the topic 'Sustainable Cities' as enlightened management of cities is crucial to development and to assure for present and future generations that still elusive goal: a productive and healthy living environment for all.

I shall start with recalling four milestones in the field of human settlements: May 1976 the UN conference on human settlements in Vancouver; 1987 – International Year of Shelter for the Homeless 1989 – Global Strategy for Shelter to the Year 2000; and June 1992 – the adoption of the brown Agenda by the Earth Summit in Rio. If Vancouver marked the birth of a movement, it was the International Year of Shelter for the Homeless; observed in 1987, that truly brought the global recognition of the plight of the millions of people with no home – the pavement dwellers, those who must sleep in doorways, subways and recesses of public buildings. It also brought to the international arena, for the first time, the plight of hundreds of millions who are homeless or lack a real home – one which provides access to safe water, sanitation and secure tenure; within easy reach of employment, education and health care; and at a cost that the people and society can afford. If IYSH created global awareness by bringing shelter to the centre stage, the Global Shelter Strategy, through its enabling strategy provided a concrete plan of action to mobilize the energy and resources, of community-based organizations, NGOs, local authorities and the private sector to achieve adequate shelter for all. With the adoption in Agenda 21 at Rio of 'promoting sustainable human settlement development', human settlements

agenda has finally come of age in the context of environment and development.

Why should we be concerned with the problems associated with dramatic urban growth? Many of the concrete responses to rapid urbanization call for solutions which engineers in cooperation with urban planners, architects, urban economists, sociologists and environmentalists, must provide. Urban growth means construction of buildings, housing, public utilities, physical infrastructure, and the delivery and maintenance of services such as communications, transport, energy, water supply, sanitation and waste management, at optimal conditions to sustain economic growth, and development. The 'world of cities' will increasingly dominate human settlements of the 21st century in a large majority of developing countries. Neither wars, natural disasters, nor public policies have been able to stem this trend. This challenge which forms the core of the future urban agenda can be met successfully only through new thinking, new policies and decisive actions within the urban domain.

Population grew rapidly in the cities and towns of the industrialized countries during the latter half of the nineteenth and early twentieth centuries and a similar 'urban revolution' is now taking place in the developing countries. For instances, Mexico city and Sao Paulo which in 1950 had a population of 3.1 and 2.8 millions in 1950 are projected to reach 24 millions by the year 2000. The scale and pace of urban growth has been unprecedented. This has resulted in a swift multiplication of cities with over one million or more from 31 in 1950 to 74 in 1970 and 150 today, and to reach 279 by the year 2000. Even more striking is the rise in the number and size of megacities, those with more than 5 million residents. By the year 2000, there will be at least 30 cities in less developed countries housing more than 5 million. Seoul, Rio, Jakarta, Teheran, New Delhi, Bombay, Calcutta and Shanghai are projected to grow more than 13 million

each while Cairo, Manila, Bangkok, Karachi, Madras and Beijing more than 10 millions. Bangalore and Hyderabad are not far behind.

It is clear that the processes of urbanization and urban development play a vital role in the performance of both economic and ecological systems, locally, nationally and globally. If economic, social and environmental goals are to be achieved within the context of sustainable development, cities must work well, and be soundly managed, through the devolution to them of both the responsibilities and the resources commensurate to their growing economic and environmental tasks. This observation holds true for cities of all sizes, in both industrialized and developing countries. Environmental improvement will, in large part, be the result of successful local action in many and varied places worldwide.

As cities and towns can be a major source of dysfunction in both ecological and economic systems, they must play a central role in policies and measures to improve both. Although some observers of the global environment are fond of saying that the good news about the state of the Earth these days is that so many more people on every continent are paying attention to the bad news about it, it is also true that society has never had a greater potential – and I should like to emphasize the word 'potential' – for sustainable development. Nevertheless, a number of cities throughout the world are approaching or have already crossed critical thresholds. A deteriorating social structure in many urban communities, marked by growing poverty, crime and violence, is evidence of another kind of breakdown, often stemming from and sometimes threatening the economy and the environment.

Today's world population of more than 5 billion is likely to double within the next 40 to 50 years. The distribution of that population will create an urban planet tied together in a complex network of communications, social and economic linkages. During this decade alone, while the cities of the indus-

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trialized world will grow only by about 70 million, those of the developing countries will increase by more than 700 million. Most of the growth in the latter will accrue to cities with populations of more than half a million.

A few years ago, the World Commission on the Environment and Development estimated that a five- to ten-fold increase in economic activity would be required to meet the needs and aspirations of this burgeoning population and to begin to reduce mass poverty. Even today, in the developing countries, 50 to 60 per cent of GNP is generated, on average, in urban centres of all sizes. While this five- to ten-fold increase may sound enormous, it reflects annual growth rate of only 3.0 to 4.5 per cent. Given population trends, overall national income would have to grow around 5 per cent a year in the developing countries of Asia in order to have any significant impact on poverty.

While growth rates of this order of magnitude may be necessary to satisfy future needs and aspirations, they represent a colossal new burden on the ecosphere. We must consider the implications of such rates of growth for necessary investments, in housing, urban infrastructure, transport, industry, agriculture and other sectors. If current forms of energy development were employed, for example, energy supply would have to increase by a factor of 5 just to bring developing countries, with their present populations, up to the level of consumption now prevailing in the industrialized world. Similar factors can be cited for food, water and the other essentials of life.

While some may argue that reaching the levels of consumption now prevailing in the industrialized North is neither necessary nor desirable, it is nevertheless also an indisputable fact that just to lift the developing countries out of health- and life-threatening poverty, to provide everyone with the basic sustenance of human existence, will result in higher consumption levels, even if they do not reach those now prevailing in the developed world. Over the past 30 to 40 years, the physical growth in many developing country cities has been so rapid that it is equivalent to an entire new city built next to or over the old city every 10 to 15 years. What the sheer numbers of people involved in developing countries urban population growth that I have alluded to is, that

during the course of this decade, nine out of ten new additional urban dwellers will be living in the urban areas of the developing world. By the year 2000, about 2.2 billion people will be living in the urban areas of the developing world. This means that within the span of two generations, the share of the developing countries overall population living in urban areas will virtually triple. Such an increase has no precedent. In less than forty years from now, urban populations will be twice the size of rural populations in developing countries overall.

While the urbanization levels just described may reduce the pressures on the rural environment in the developing countries, they are increasing the pressures on the urban environment. For just as it is true that the majority of the developing world's population will soon be living in cities and towns, it is equally true that it is there where much of the pollution, from effluents and emissions, is generated and where many, if not most, of the victims of environmental pollution live and work. And as the physical and natural environment in and around cities deteriorates, the most affected are the urban poor, whose substandard living environment does not protect them from contact with human and other wastes and from pollution of all types.

There are immense and growing problems with air and water quality, traffic congestion and noise pollution. While urban air pollution, for example, has been reduced in high-income countries, it has been worsening in low-income countries.

In the second half of the 1980s, about 1.3 billion people worldwide lived in urban areas that did not meet the standards for particulate matter (airborne dust and smoke) set by the World Health Organization. Such excessive levels of suspended particulate are responsible for between 300,000 and 700,000 premature deaths annually as well as for half of the instances of chronic childhood coughing. High levels of lead in the air, primarily from vehicle emissions, have been identified as the greatest environmental threat in a number of large cities in the developing world. According to World Bank estimates, the average child in Bangkok, to cite one city, has lost four or more IQ points by the age of seven because of elevated exposure to lead, with subsequent consequences for adult produc-

tivity. In Mexico City, lead exposure may contribute to as much as 20 per cent of the incidence of hypertension. An estimated 1 billion people live in cities that exceed WHO standards for sulphur dioxide. Nitrogen oxides and volatile organic compounds are a problem in a smaller number of rapidly industrializing cities with high concentrations of motor vehicles. Governments of developing countries should set a target date for lead free gasoline to be used by vehicles, as also replacement of two stroke by four stroke engines in scooters and three wheelers to reduce pollution.

In addition, for many of the urban poor, indoor air pollution may pose a more immediate and greater threat to health, because of their indoor use of biomass fuel in the poorly-ventilated and badly-constructed shelters to be found in the teeming squatter settlements which mark the landscape in every large urban centre of the developing countries.

Risks from hazardous wastes, even if local, tend to be acute. Studies of industries in major urban centres in the developing countries confirm again and again that most liquid industrial effluents and wastes are dumped untreated in the nearest water body. In some very large cities, the daily outpour of industrial wastes into water bodies and rivers may reach millions of cubic meters. All of this has severe implications for the Earth's shrinking supply of fresh water, as this pollution is part of a global pattern from which no country is excepted in small or greater measure.

By the end of this decade, many countries will have only half as much fresh water per capita as in 1975 – while facing higher demand because of economic and population growth. When one adds to this the fact that in many developing-country cities 30 per cent, and sometimes even more, of the piped water supply is lost due to leaks and poor maintenance, we must face the fact that we will soon face a 'water shock' more serious than the 'oil shock' of the seventies unless pollution is controlled, water is managed more efficiently and recycling practised. Already, excessive pumping of ground water has led to subsidence, structural damage and flooding in Bangkok, Mexico City and Jakarta, to name just three cities where increased demand has in turn led to other forms of ecological decay.

In addition to industrial waste, uncollected household rubbish poses a whole range of environmental and health risks in large urban centres in the developing countries. In a city of one million people, waste produced each day average 50–80 metric tons. There, an estimated 30 to 50 per cent of the solid waste generated is left uncontrolled, even in cities which appear to be relatively well served by rubbish-disposal services. As a consequence, diseases are spread by rotting garbage and blocked drains; ground water is polluted. This situation stands in contrast to that in developed countries, where the problem is not so much of collection, as of the safe disposal and recycling of the 70 to 80 per cent of solid waste that is generated by households.

As the urban environment deteriorates in developing countries, the most affected are the urban poor. The increased costs of health care and the productivity loss due to mortality and morbidity from gastroenteric and respiratory diseases and malnutrition are only indicators of the economic and environmental impacts on the poor; we cannot adequately measure the unquantifiable costs in human suffering and lowered quality of life. For the poor, the main environmental priorities, therefore, remain improved housing and the provision of basic water, and sanitation services at affordable costs.

For while large quantities of fresh water are being polluted, wasted or squandered, at least 240 million people in urban areas of the developing countries are still without access to a supply of clean safe water, and some 331 million lack adequate sanitation. These figures are most probably underestimates of the reality on the ground. At least 250 million people worldwide may move during the decade to cities to live in unsafe housing, in shanty towns and slums without adequate water supply or sanitation. Their houses may be on hillsides, in watersheds or floodplains, and on other precarious or ecologically fragile sites. This is why many observers concur that along with pollution caused by industries and vehicles, the absence of adequate sanitation, water supply and waste disposal, as well as the lack of adequate housing in safe locations, are principal causes for environmental deterioration in cities and for the decline of health conditions in the developing countries. The link

between poverty and environmental degradation, in both rural and urban areas, is what also distinguishes the environmental situation in the developing countries from that in the industrialized countries. Certainly urban economic growth will also not proceed if environmental problems are ignored: high levels of air pollution are already forcing temporary shutdowns of schools, and industry as in Mexico City; water scarcity is affecting the economy in many cities as in Madras; and traffic congestion is reducing urban efficiency and productivity as in Bangkok.

It is easy, of course, to attribute all the environmental problems in the megacities of the developing countries to the pace of urban physical expansion and the scale of population growth, especially the sheer numbers involved. But it is not only that. The authorities at the local level who, in theory, are responsible for investments in infrastructure and services often lack *the power and resources to fulfil* those responsibilities. They often also lack the training, skills and commitment. They also many times fail to provide or *enforce the regulatory framework*.

Most city governments have virtually no investment capacity in infrastructure and service provision; their budgets are almost entirely spent on meeting recurrent costs. Most of the revenues collected locally and drained off by national or state governments are not returned in due proportion. Adhoc grants are no solution. Certainly a *necessary first step towards improving urban environmental conditions in developing countries is the improvement of urban management practice as well as the devolution of authority and resources to local levels of decision-making*. In addition, what will be required are local administrations capable of working with the urban poor, as well as with other segments of the urban community, in true partnership. The sustainable cities programme launched by Habitat in 1990 was to assist cities in strengthening the municipal capacity for planning and management. Twelve cities worldwide are participating in the programme.

Municipal or local Governments must identify *industrial and business enterprises which benefit immensely from urban development* to participate actively in protecting the resources and environment of cities during the process of economic transformation. Enterprises

can play a crucial role in developing methods and technologies for (1) reducing air and water pollution in urban areas, (2) collecting efficiently and disposing of solid wastes produced by industrial and commercial enterprises (3) working cooperatively with local authorities in transport planning, and (4) public private partnerships for processing of ferrous and non ferrous metals, plastics and polymers for reuse in manufacturing; and wastewater reclamation for effluent irrigation. Technological solutions for safe and efficient waste disposal and resource conservation exist, but the challenge for city governments is to mobilize the financial resources, offering new incentives to enterprises to use those technologies, and thereby establish a true partnership in pursuing ecologically sustainable development in the decades ahead. If this can be accomplished, and this is a big 'if', we will have taken a giant leap in the right direction.

My emphasis here on the environmental problems of cities in developing countries should, however, not convey the false impression that there are no environmental problems of any consequence in the industrialized countries of the North. The opposite is, of course, the case we all know. My reason for emphasizing the situation in developing countries here is that it will be in these countries where the vast majority of the world's population and urban growth will be taking place over the coming decades, where unfulfilled basic needs and pervasive poverty require rapid economic growth for sound political, ethical and moral reasons. It is also where financial resources, skills and technology are lacking. The real challenge to the goal of sustainable development will be found here in the years to come.

Yet, this should not blind us to the fact that it is in the industrialized countries where most fossil fuels are still consumed, where most of the carbon and sulphur emissions which are producing global warming and acid rain are emitted, and where most of the globe's 500 million motor vehicles are to be found, reflecting not just the lifestyle but also the spread-out and vehicle-dependent urban settlements pattern of many industrialized countries. The expected doubling of this motor vehicle stock to one billion by early in the next century means that sweeping change is needed to protect the atmo-

sphere. In the near term, decreased pollution and increased fuel economy can limit the damage, but the only safe option for the long term is transport based on non-polluting and non-fossil fuels (battery operated scooters, and automobiles and eventually hydrogen as fuel).

Transport is the most expensive among urban infrastructure systems, in terms of the cost of its development, operation and maintenance which rise rapidly with the size of the city. With few exceptions, the need to increase the capacity and improve the quality of public transport is most pressing in Asian cities, in particular those with large population. Most developing countries lack firm and purposive policies on public transport, although no government denies its interest in public transport. Large cities in developing countries cannot avoid substantial investment in their transport systems if the cities are to survive, the environment protected and basic needs of the people met. With motorization increasing almost everywhere, and a total lack of discipline among road users, traffic management can bring about only limited improvements. In very large cities, *rail bound, high capacity public transport modes become indispensable.*

Independent transport development banks could help in raising funds from financial institutions, governments and project beneficiaries. Such banks could also assist in carrying out project feasibility studies and facilitate the integration of urban transport systems. For transport strategies to contribute to productive and sustainable development of cities, considerable improvements are needed in the management of urban transport sector such as institutional arrangements, regulatory framework and financing of the sector. The way to financial sustainability of public transport lies in distributing the costs widely among both direct and indirect beneficiaries. The financial support from outside the fare box should necessarily be used for development of transport infrastructure and operating conditions. The sustainability of cities will depend on the sustainability of the urban transport system at large. This will call for strong metropolitan authorities because only at that level could right choices be made to set the

prices of transport services and to justify the impacts on land use.

Advances in communications and information processes have transformed business and social relationships, and they can be expected to have the same impact on human settlements. However, since human settlements have fixed and relatively inflexible physical fabrics, the changes will come slowly, incrementally and, probably, by adaptation. This is a normal process as human settlements have been adjusting their physical fabrics to social and technological change for centuries, and, in many of them, remnants of the original setting are still visible, despite the radical transformation that has taken place. New functions will be met by bringing forth new elements and fitting them into existing pattern which will adjust to accommodate them.

This process will apply both to national patterns of settlements and to the arrangement of individual settlements. It might be argued that the spread of easy communications and the simplicity of access to information will remove the need for concentrated centres, leading to a dispersal of population and functions in a loosely connected distribution of small centres: this has been argued in the past on the basis of previous technological changes – automobiles, telephones, television – but has not happened. The fact that people can be dispersed does not mean that they will be dispersed; the great majority might still prefer to be in large cities in close proximity to neighbours and with access to all the services and facilities which can still only be provided in a metropolitan centre.

Where human settlements management can experience a great change is in the increased capacity to use data because of the power of new information technologies. In the past, decision-making has often been crucially hampered by lack of usable management data and/or by inability to analyse data adequately. This deficiency can now be overcome, new data-management systems have the potential to place constantly updated data in the hands of managers and can be programmed to manipulate the data in almost unlimited ways to simulate decision-making impacts, so that the probable results of decisions can be understood much more

readily than in the past. Because of this capability, it will be possible to monitor management performance very closely and to make adjustment to decisions at frequent intervals, avoiding the compounding of errors which can occur when there is no effective way of evaluative actions except through long periods of laborious manual data collection.

As stated earlier, in both developed and developing countries the road to environmental improvements passes, invariably, through human settlements. By improving the living and working environment of people in cities, we also improve the urban physical environment and reduce the negative impact of urban activities on the biosphere, which in turn enhances the prospects for sustainable development. Whether the issue is the reduction of vehicular pollution (and the health and environmental risks associated with it) through reliance on more environment-friendly mass transport and less-harmful fuels, or whether it is a question of reducing the generation of urban wastes or of their safe disposal, there is an inescapable link between the enhancement of the immediate living environment and improvement of the natural environment. Improvement of the quality of life in the cities inevitably enhances the ecology, and vice versa, one might add.

All of the foregoing ideas, if seriously embraced, will certainly hand to us a formidable challenge. Certainly, sustainable cities will in future require not only that cities reduce their emissions, their use of natural resources and their generation of wastes, but that this be done in such a way as not to lower their productivity and their contribution to the national economy. Correspondingly, urban management must have as a principal goal the improvement of living and working conditions, particularly of the poor, and a generally amenable quality of life in cities throughout the world. I asked Governor Suzuki, Governor of Metropolitan Tokyo, what makes Mega Tokyo work, he replied 99.9 per cent reliability of services.

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