

Changing Residential Patterns and Ecological Problems in the Context of an Indian City

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INTRODUCTION

With urban industrialization, social development and population increase there has also been the physical expansion of the cities which in many cases failed to adhere to the land use plans and as well as not give much importance to the ecosystem that supports it. It has been quoted that the physical expansion that does not take into account the dependence of the city and its hinterland on the ecosystem that are very 'ground' the city stands on, can never lead to city growth that is sustainable (Kessler, 1996). Without access to natural capital such as clean water, clean air, clean soil etc, the cities that can sustain themselves will be impossible'. Many definitions have been quoted in this context and from the ecological -economics point of view the definition of a sustainable city is a city where socio-economic issues are in harmony with other factors that affect the whole environment. Thus discussions on city development are incomplete unless they take into account the ecosystem on which they depend for their very survival (Folke et al., 1996). Moreover if cities are to be sustainable it is imperative to recognise the services that these ecosystems provide and to ensure the future well being of the systems. Ecosystems are not only necessary to be an integral part of the city development process, as an estimated 43% of the world's population are city dwellers (Brown, 1987) but they are also crucial to the sustainability of this development, simply because the city needs functional ecosystems for the production of the renewable resources that are essential to human life. And UNCHS (1990) contends that human life settlements in turn have a central role in achieving sustainable development nationally and locally. It is only through rational management of all aspects of settlements, including mobilization, operation and maintenance in the provision of services to meet the needs of their citizens that sustainable development can be realized.

With this as a backdrop this paper tries to address the issue of the changing residential patterns and the consequent problems that arise in the city making Chennai an unsustainable one.

METHODOLOGY

Micro level data has been collected from different sections of the population from various niches of the city using both quantitative and qualitative techniques of data collection to establish the correlates between residential pattern and the ecological problems.

DISCUSSION

Profile of Chennai

Location: Chennai, the capital city of Tamil nadu state located at 13° 5' north and 80° 5' east on the eastern sea board of South India was originally in the form of scattered settlements which grew gradually and joined together to occupy at present an area of 174 sq kms, with a population of 5.3 million (Census of India, 1991). The individual settlements that had grown to form Chennai, now a mega city is one of the four metropolises in India.

Landscape and Climate: The city stands on a coastal plain hardly 2.0 m - 4.0m above sea level and is traversed west to east by the shallow valleys of Cooum and the Adyar river which divide the city roughly into three equal parts. The climate of Chennai is of tropical monsoon type. The temperatures of the city is warm to hot throughout the year with south-west monsoon setting in sometime in June and continuing up to July and north-east monsoon arriving in between late September to early October and continuing up to December.

While the coastal strip of the city particularly the south Chennai is well endowed with ground water potential the northern are of the city has its limitations due to poor drainage and encroachment of the sea shore.

With the arrival of the colonial powers in the city for trading, Chennai developed rapidly both in its size and population. The main factor responsible for the increase in population was the flourishing trade and the industrial developments that took place particularly after independence. This attracted a heavy inflow of migrants from different districts of Tamil nadu and as well as from the different states of India.

Along with the increase in size and population of the city the density of population in the city has been increasing from 11,151 per sq km in 1951 to 22,097 per sq km in 1991 (Census of India, 1971, 1991). This created a stress on the infrastructure of the city particularly on housing which was not sufficient to meet the demands of the increasing population. To meet the demands of the increasing population for housing large multi-storey apartments were constructed by demolishing the independent houses thus in turn creating a stress on the already inadequate infrastructures of the city like insufficient drinking water supply, improper drainage and sewerage, inadequate sanitation facilities increasing air and noise pollution thus resulting in ecological problems.

In spite of setting up of CMDA (Chennai Metropolitan development Authority) as an ad hoc body in 1972 for an integrated development of Chennai and its neighbourhood increasing the jurisdiction to 1177 sq kms which now includes the city, five municipalities, four townships, twenty seven panchayat and ten panchayat unions with a population of about 6.5 million (RadhaKrishnan, 1995) still the city faces acute shortage of housing in Chennai. Apart from the fact that housing in pleasant environment tends to be very expensive, even acquiring a house or an apartment either for ownership or for rent is becoming a costly affair. Taking advantage of the situation many agencies both public and private have gone on a land buying spree to construct multi-storey apartments even a small patch of land where a single house stood. Thus in a period of twelve years ranging from 1980 to 1992 public agencies have constructed 500 units or buildings, private builders have constructed 2000 buildings and individual owners about 4500 units and in the Chennai Urban agglomeration or in the peripheral area the agencies have

constructed 4000 buildings and private developers about 1500 units and another 1500 by individual owners. Thus altogether over a period of twelve years (1980-1992), 14000 units have been constructed and Tamilnadu housing board, a society started by the state government to provide housing for ownership and for rent at subsidy rate, have so far constructed 12067 houses for L.I.G and 15137 for M.I.G and H.I.G and 29814 for economically weaker sections in Chennai. This is simply evident in the fact that the area under residential land use in 1964 was 4028.4 hectares. But over the years to meet the housing demands this has been increased to 8081.98 hectares which accounts for 48.57 % of total land use.

Apart from the above buildings constructed by different agencies, among the migrants who come to the city to earn a living, a majority of them encroach on government or private lands to put hutment'' for their dwellings. According to the socio-economic survey conducted by an economists group in 1986, it is revealed that there were 1417 slums in Chennai, wherein 35 percent of the population of the city lives. Most of these slums, both vertical and horizontal in Chennai are built either near the railway tracks or on the banks of the waterways running through the city. As a result a large number of residents are compelled to live in substandard housing as the quality of available housing facility is very poor. Over crowding in dwelling units along with lack of minimum basic amenities with the houses built in a close proximity not allowing free air to get in causes health problems. Almost 42 percent of the urban households live in one room accommodation, relative poverty, growth of population, high cost of land, restrictive controls on development have not only led to a mismatch between affordability for housing but the changing residential pattern have increased the urban problems by encroaching on adjacent land putting more pressures and adding strain on the already inadequate natural resources thus resulting in loss of fragile ecosystem. this is particularly serious in a city like Chennai which not only lacks adequate infrastructure as it was previously planned for only a million inhabitants but over the years due to the increased urbanisation and improper land use

plans agricultural lands, nearly 200 water tanks, vegetation and open spaces in Chennai were encroached and used for residential and commercial purpose thus bringing about a micro climatic change in the environment. Moreover changes in the residential patterns, congested and insanitary / incinerate dwellings have increased ecological problems.

Ecological Problems

Insufficient Drinking Water Supply: In Chennai, with the high growth of population there has been an increasing housing density, resulting in demand for houses by all sections of population particularly by socially and economically weaker groups. This has resulted in rapid land conversions leading to the vertical developments that is, construction of the multi-storey apartments. In the last 70 years, the development of built up areas reduced the vegetation in the city from 9.24% to 0.82 resulting in the decline of natural systems particularly the water features affecting the hydrological system. The daily per capita availability of water which was 108 lpcd in 1951 was reduced to 93 lpcd in 1961 to 85 lpcd in 1971 and 78 lpcd in 1981 and in 1991. Chennai which depends on the north eastern monsoon for its drinking water supply is always confronted with a chronic water supply problem. At times when the monsoon fails the water supply becomes highly erratic resulting in tapping of ground water at an alarming rate. This results in the reduction of the water table which in turn allows the saline water to seep in.

And the situation becomes worse particularly in localities in Zone I, Zone II and Zone III where the concentration of the population is not sufficient to handle the situation. The water supply distribution system started in George town area located in Zone I in 1872 was expanded to other parts of the city in 1921 with 510 kms of pipes. At present in spite of 92 percent of the population being covered by piped water that is, the total length of water supply distribution being expanded to 1500 kms, still the water that is let into the distribution system is poor both in quantity and quality. Though the water supplied from the Red hills, Poondi and Sholavaram lakes and treated at various plants located at different parts of the city conforms to the standards still the

water that is let into the distribution system does not conform to the above standard and is highly polluted. It is because the pipes that carry the water are not only very old as they are laid more than a century ago having lot of corrosion and incrustations resulting in leaks in many places, but also due to lot of changes in residential pattern there is more pressure and strain on the already inadequate water sources of the city leading to water contamination.

Rapid growth of population in the city has also increased the demand for fresh water and this has resulted in a heavy dependence on ground water. The predominant environmental impact noticed on the ground water is the changes in ground water quality, water level and intrusion of salt water. The sources and causes of ground water table decline and ground water pollution in the coastal aquifer are closely associated with the human use of water and the intensity of human activities. Moreover the water pipes that are laid decades ago and the century old drainage system that has not kept pace with the growth in population but urgently in need of repairs run along side each other flaunting the rule of maintaining the minimum distance of eight feet between sewage and water pipes, thus leading to the contamination of the city's water supply. Apart from the surface water which gets polluted, the under ground water too is polluted. Since typical urban sewage has large concentration of chlorine, sulphate, sodium and magnesium the impact on human beings over a period of time can be fatal, urban waters due to various factors gets polluted by agents of infectious diseases – parasites, viruses and bacteria and in turn spread water borne diseases. In Chennai due to water contamination 90 percent of the diseases are water borne. Thus urbanisation accompanied by rapid land conversion leads to impermeable surface increasing the velocity of overland flow altering the water storage capacity of surface tanks and recharge of sub-surface water.

Inadequate Drainage and Sewerage: Sewerage system which was planned in 1910 for an ultimate population of seven lakhs is now serving more than 40 lakh persons thus making the sewerage system available only to the 60 % of the area with 1.1 lakh service connection,

indicating an average of sixteen people per connection. Even in these localities where the sewerage system is available there is lack of water to flush. The situation is worse in densely populated areas where the sewers are too old to cope up with the pressures either clogging or overflowing on the roads and streets. The existing treatment plants though effectively treat daily 100 million litres of sewage the excess sewage flows through the surface water ways thus contaminating the whole environment. In spite of the increase in growth of population and high density of households in Chennai the clogged sewers are still cleaned with split bamboo and ropes. Often men who get down to clean the sewers come into contact with human wastes thus making the whole operation a slow and delayed process. The situation in these areas is worse where land conversions has taken place that is, high rise buildings for apartments and houses constructed in the place of agricultural lands and tank beds where already there are no drainage and sewerage facilities. More over in slums both vertical and horizontal and in squatter settlements where the housing densities high, drainage and sewerage facilities are very poor thus forcing the poor to defecate near the slum colonies, street margins, banks of the waterways that run through the city, sea shore and use the water from these rivers and canals making them prone to water washed diseases. More over the night soil from these areas end up in the storm water drains and the water courses furthering the pollution. With regard to sanitation in densely populated localities the facilities are not adequate and in slum colonies majority of the toilets are in disuse not only because lack of water to flush resulting in the blockage of the pipes but also due to lack of maintenance. Also the above groups were mostly not used to the urban sanitation system. And in those localities where the corporation has provided pay and use toilets about 750 of them, the majority of them are unusable again due to shortage of water and lack of maintenance. Due to blockage of drainage, clogged sewers and defecation in the open space the whole environment is polluted leading to ecological problems.

Improper Solid Waste Management: In Chennai, as population and housing density is increasing there is also a corresponding increase

in generation of waste material. While comparing to other metropolitan cities like Mumbai and Delhi, in Chennai more than 3000 tonnes of garbage is low on an average basis still the garbage generated in Chennai has a high organic and moisture content thus not suitable for energy recovery through combustion. With the increase in population and housing density the number of transfer stations and dumping sites and number of conservancy workers have not increased as the present number of transfer stations are only ten, dumping sites are two and the conservancy workers are 7300 for the whole of the five million population residing in the city. More over the method followed by conservancy workers in handling the solid wastes is not advanced and it is very traditional. As a result the conservancy workers do not report to the job regularly and garbage remains unattended for days near the buildings. In these areas and in other localities where high rise buildings having apartments have been built in place of single houses to provide housing, the handling of solid waste is a problem. Also in slums both vertical and horizontal the heaps of garbage and rubbish remains unattended for days and as a consequence has the potential of polluting both surface and ground water particularly if the soil is soft in that area then the seepage is quick and the rate of contamination is more. Moreover flies, mosquitoes, rodents, pigs and other vectors of diseases find these areas to be a breeding ground of diseases thus emitting an offensive odour over a wide area. Also it has been found that uncollected garbage is often thrown in storm water drains or in sewers or on the streets which in one way or another enters the waterway after heavy rainfall thus polluting the waterways.

Air Pollution: Another problem that affects equally the environment of Chennai is the air pollution. A graphic example of the lack of planning is the exponential growth in the number of housing density particularly high rise buildings having apartments in the same area where it is not meant for residential purpose. As a result of increase in the population and housing density there is growth in the number of vehicles both private and public, a direct consequence of rapid urbanisation and growing prosperity in the cities. Above all the emissions of carbon from

increasing number of vehicles in the city is reaching crisis proportions. And Chennai being a mega city at present faces the problem of clogged roads and unbearable level of air pollution which in turn leads to a drastic rise in the incidence of respiratory diseases (The Hindu Survey of the Environment, 1992). Apart from the emissions from the transport, industrial and commercial sectors which have equally grown along with the housing density, an equally large percentage of carbon flow emitted from the household sector. This includes the food consumed by human beings and the waste products discharged as sewage, night soil and garbage and exhaled as carbon dioxide into the atmosphere. Moreover fuels such as fuel wood, bio mass, kerosene and cooking gas (LPG) consumed by households and the waste products that are largely gaseous emissions (carbon-dioxide, carbon-monoxide, methane and hydrocarbons) emitted into the atmosphere has a serious impact on the health of human beings. According to a survey conducted in Chennai in 1993, of the 2300 tons per day of carbon consumed by the household sector, 1460 tons are transmitted into the air, 660 tons are transmitted in the land and water, while the rest accumulates as animal, human and plant growth.

Correspondingly to the above problem is the living in new pattern of residential dwellings which are hardly spacious and have little or no ventilation in the apartments and there is no open space between the high rise buildings for the air to flow freely. The problem of air pollution is more for those living in narrow streets with sewage overflowing and congested localities in small tenements with little or no ventilation. The situation becomes worse particularly in slums where dwellings are erected closely in a haphazard manner. The residents living in such housing conditions are exposed to allergies, respiratory problems, other infectious diseases like bronchial asthma, recurrent lung infection, chronic bronchitis and emphysema.

Noise Pollution: Like the problem of air pollution, the levels of noise pollution in mega city like Chennai are far in excess of the standards recommended by the World Health Organization. As a result of road urbanisation in the city overcrowding has taken place along with in-

crease in housing density, which has led to changes in residential patterns, increase in commercial activities, industrialization and transport. The change in residential pattern has led to number of dwellings in a single building which in turn has many people living under the same roof. The cluster of dwellings in a single block along with increase noise pollution.

Changing residential pattern due to increasing urbanisation has been held as an important factor for the ecological problems that are mushrooming in the city. Increasing pressure of population, along with housing density particularly the skewedness of distribution of urban population in mega cities like Chennai and the escalating per capita cost of providing urban services, account for the deterioration of infrastructure services and amenities.

The government's failure in implementing the land use plans and in controlling the urban land owning structure has led to the construction of high rise apartments in residential and in non residential areas to provide housing to the increasing population. This in turn has created a stress on the already inadequate infrastructural services in the city thus resulting in ecological problems having an impact on the health of both human beings as well as on the animals.

Thus environmental issues need to be taken into consideration when planning for sustainable development of the urban environment. When these issues are neglected ecological problems arise and pose a serious threat to the sustainability of the cities. So it is of paramount importance not only for local governments to enhance their capacity in environmental and economic planning but also environmental management either it be at the urban or rural level requires collective action involving various agencies both governmental and non governmental and also public participation from all sections of the society.

KEY WORDS Chennai. Rapid Growth. High Cost of Land and Buildings. Substandard Housing. Ecological Problems.

ABSTRACT Being one of the four metropolises in India, extending over 174 sq km, Chennai (Madras) has a population of nearly four million and a floating population of nearly one million. In the last ten years the city's population has

grown at the rate of ten per cent per year as a large influx of migrants from different districts in Tamil Nadu as well as from different parts of India come to the city mainly in search of employment and also for other social reasons. And in spite of setting up of CMDA (Chennai Metropolitan development Authority) as an ad hoc body in 1972 for an integrated development of Chennai and its neighbourhood still the city faces an acute shortage of housing. Taking advantage of the situation many agencies both private and public have gone on a land buying spree to construct multi-storey apartments even on a small patch of land where a single house stood. Apart from the above buildings constructed by different agencies, among the migrants who come to the city to earn living a majority of them encroach on government or private lands to put up huts for their dwellings. As a result a large number of residents are compelled to live in substandard housing as the quality of available housing stock is very poor. Over crowding in dwelling units along with lack of minimum basic amenities with the houses built in the close proximity not allowing free air to get in causes health problems. Relative poverty, rapid growth of population, high cost of land and buildings affordability for housing but the changing residential patterns have created ecological problems in the city.

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