CHAPTER - I

URBAN SYSTEM AND THE CHANGING URBAN ENVIRONMENT - A PROFILE

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1.1 INTRODUCTION:

There is a long history of global environmental change. Historically we have been serious minded about environment and the basic philosophy has been one of harmony with nature as against western concept of conflict with nature. We followed the latter during the last 170 years or so (Khoshoo TN. 1987). The natural environment is most essential for the existence of man and it is a primary source of his life and social production. Most of the environmentalists are seriously thinking about what will happen to the environment in near future and after 100 years time. This is mainly because of the growing burden that production is putting on it and rapid changes that are taking place such as, increasing population size, landuse pattern, crop land and grass land, industrialization, urbanization and energy systems etc. About the environment, it is still very difficult to predict that what kind of socio-economic changes will occur, in various countries of the world before 2015 and what effect these changes will have on the environment. This is because man still do not know much about the dynamic cycle of the natural processes or the natural rotation of matter and energy. It is also true that man still knows little about the controlling methods.

Despite the difference in social systems, mankind's present level of development – the size of the population and the tremendous advances in
science and technology which allow him to exploit and change the environment requires that a combined effort be made to control the use of natural resources and to forecast the consequences of their use over the entire planet. When scientific methods are employed the consumed natural resources are eventually restored and the natural potential of the landscape is preserved and often increased (Ryabchikov. A 1975).

As technology increased the human impact on the environment intensified. This is not just in agriculture but in energy consumption, manufacturing industry, transport and communication and so on. Almost all human activities have an impact on environment.

Even in the absence of man, the natural environment undergoes continual change. This may be on a time scale of hundreds of millions of years, on continental drift and mountain building, on a scale of hundreds of years as natural eutrophication and siltation of shallow lakes. Some of these natural changes are irreversible (e.g. eutrophication of a lake), while others are cyclic (e.g. the annual climatic cycle) or transient (i.e. droughts) (R. K. Khitoliya 2004).

Superimposed changes on natural environment are those, which are produced by man. Man’s increasing ‘control’ of his environment often creates conflicts between human goals and natural processes. In order to achieve greater yields man deflects the natural flow of energy, by passes natural processes, severs food chains and simplifies ecosystems.
Perceptions about environmental impact can be rather different in different countries. Where poverty is widespread and large numbers of people do not have adequate food, shelter, health care, education, and old age security the lack of development may constitute a greater degradation to life quality than do the environmental impacts of development. The development can be planned to make best use of environmental resources and to avoid degradation.

As man's knowledge of his environment increased, there has been a desire for more comfortable way of living. As the number of people increased, more and more natural resources were consumed in the process satisfying the rapidly growing needs of the habitat. Every developmental activity has some impact on the environment. Development and Environment both are considered as two sides of the same coin. In the present scenario, the human as it is developed cannot live without the developmental activities for meeting his needs. Consequently, there is a need to harmonize developmental activities in such a way that environment is polluted a least.

The concept of sustainable development has received much recognition after the Stockholm Declaration resulting from the United Nations Conference on Human Environment in 1972. Sustainable development is development that meets the needs of the present without
comprising the ability of the future generations to meet their own needs (Brundtland report in 1987). The Earth Summit held at Rio-de Janeiro in 1992 put the world on the path of sustainable development which aims at meeting the needs of the present without compromising the ability of future generations to meet their needs.

It is observable in all most all parts of the world that the urbanization process has created large urban complexes which have brought about local modifications to the earth’s surface as well as the atmosphere above it that may extend beyond the immediate urban area. The urbanization together with industrialization has continuously transform the urban morphology and local climatic conditions. As a result of it, the environmental conditions in urban areas are comparatively different from the surrounding rural areas. (See, urban environment section 1.4).

1.2 URBAN SETTLEMENTS :

The term ‘urban’ refers to towns or cities having marked secondary and tertiary functions along with a municipality or notified area committee. The term ‘Urban Centre’ has been defined by different scholars and institutions in different ways. On the basis of minimum population size, UNO defines an Urban place as permanent settlement with not less than 20,000 inhabitants (Brian 1979). But in Albania, an
Urban place is a settlement which has about 400 people and 250 inhabitants in Denmark, 2000 in France and 20,000 in the United States of America are considered for an urban place. However, in some countries like Israel, an urban place is regarded as a settlement occupied by people who are not engaged in agricultural activities. The U.S. Bureau of Census defines 'urban' as incorporated municipalities which have reached a population of 2500, with certain densities and socio-economic characteristics (Catanese, 1972).

Urban Geography as a distinct study is a recently developed branch of human geography, dealing with the study of compact non-agricultural settlements mainly towns and cities. It concerns with the spatial dimensions of urban centers i.e. their origin, location, setting, growth, function and relationship with each other within and outside its surrounding areas or zone of influence. As a science of human settlement, urban geography deals with the complex urban areas which posses sharp internal differentiation. It concerns about delineation of urban activities which are expressed in characteristic association of intensive land use and human occupancy features. Urbanization is a process of population increase in urban areas, which indicates the growth of secondary and tertiary activities like manufacturing, trading etc.
Urbanization is characterized by movement of people from small communities concerned solely with agriculture to other larger communities whose activities are primarily centered in government, trade, manufacture and allied interests.

There are great differences among the various countries regarding the relative number of urban units in a specified range of population. In some countries, the number of larger agglomerations is dominant over the small urban places, while in the others the smaller towns are more prevalent than the larger ones.

The cities throughout the world exhibit certain common characteristics which is identified as 'urban'. In the United States, there is a set of criteria by which certain areas are called cities, and are designated by the sovereign power, the nation or state, to carryout certain functions and responsibilities. In most of the British Common Wealth countries a city is related to the population size of the place. Thus, the city in London 'embraces an area which constitutes only a very small portion of what in United States would be considered a part of the Central business district of the metropolitan complex. (Robert Putnam, 1970).

The census organization in India has set up its own criteria for identifying urban places. The specific criteria used by the Census have changed from time to time; 1981 census defined an urban place as any
place with a municipality, corporation or cantonment or notified town area; or any other place which satisfied all the following criteria; a) a minimum population of 5000, b) at least 75% of the male working population non-agricultural, and c) a population density of at least 400/Sq.kms. Again in 1991, the criteria for identifying urban place changed. The criteria of minimum population limit reduced to 4000 but the remaining criteria are same as in the 1981.

An urban agglomeration is a continuous urban spread constituting a town and its adjoining urban outgrowths (OGs) or two or more physically contiguous towns together and only adjoining urban outgrowths of such towns. For example, railway colonies, university campuses, port areas etc., that may come up near a city or statutory town outside its statutory limits but within the revenue limits of village or villages contiguous to the town or city. Each such individual area by itself may not satisfy the minimum population limit to qualify it to be treated as an independent urban unit but may deserve to be clubbed with the town as a continuous urban spread.

The definition of urban area according to census of India 2001 is all the statutory places with a municipality, corporation, cantonmental board, or notified town area committee etc., a place satisfying the criteria as used in the 1981 census.
The following criteria are taken as pre-requisites for the purpose of delineations of urban agglomerations during census of India 2001, a) The core town or at least one of the constituent towns of an urban agglomeration should necessarily be a statutory town and (b) The total population of all the constituents (i.e. town and outgrowths) of an urban agglomeration should not be less than 20,000 (as per the 1991 census). With these two basic criteria having been met, and following are the possible different situations in which urban agglomerations would be constituted i) a city or town with one or more contiguous outgrowths (ii) two or more adjoining towns with their outgrowths and (iii) a city one or more adjoining towns with their outgrowths all of which form a continuous spread.

The towns may be classified in many ways, the most significant and meaningful classification has been made on the basis of the population size, the functional structure and the age.

Town is a place having a municipality or an administration of a notified area committee. The population may range from 2000 to 20,000 and it may have predominance of tertiary functions, eg., shopping, transport, home renting and store house of various items along with a wholesale grain market. It may be centre for headquarter, telephone exchange, college and railway station as well.
City is an urban centre with a population of 100,000 and above (Census of India 2001). It acquires diversified functions such as administrative, business, education, transport, industrial and religious etc., and different modes of business area may be identified and it must be a railway junction or perform a university level service in education. Metropolis is an urban centre having 10,00,000 of population according to census of India. The term millionaire city is self-evident. It is also known as cosmopolitan city. Megalopolis is resulted obviously from the coalesce of chain of metropolitan area each of which grew around a substantial urban nucleus.

In conurbation, cities coalesce with each other due to the expansion of industries and grow together economically. Politically it may be independent viz, Mumbai and Thana constitute an urban cluster, but they are independent from the point of view of administration.

When the whole country is urbanized then it may be called tyranopolis. Ecumonopolis is the stage of world urbanization.

The towns may be classified according to the predominant functions found in them, such as it may be a residential town, political or administrative town, transport or communication town, commercial, industrial or a business mart besides mining, educational and religious town.
1.3 URBAN SYSTEMS:

System denotes different tiers of functioning of different elements of urban environment. It may be related with the systems of physical, economic, social and political in nature.

The Systems of urban places means those who are involved in the production, supply, administration, management and regulation of public goods and services for collective consumption. Those goods and services range from land, roads, sewers, water, electricity, gas etc., through the planning systems, police and fire services to wealth care, education, housing and social welfare.

Urban centers having self centered in a well defined boundary is known as ‘Closed Systems’. The Aryan market centers like ‘swastika’ where all functions are performed inside the settlement in different quarters. The urban centers having wider linkages with its surroundings is known as ‘Open System’. In this system the flow of money, men and material comes to the city from distant places. Almost all urban centers of present day are examples of the open system. In an isolated system, there is no interaction with the surroundings across the boundary. Such systems are encountered only in the laboratory, but they are important in the development of thermodynamic concepts.

Any effective plans for the improvement or rearrangement of the future city must take account of the present pattern of land use within the
city, of the factors which have produced this pattern and of the facilities required by activities localized within particular districts.

Although the internal pattern of each city is unique in its particular combination of details. Most American cities have business industrial and residential districts. The forces underlying the pattern of land use can be appreciated by focusing on three generalizations of arrangement - by concentric zones, sectors and multiple nuclei. These are explained with the models given in fig. 1.1.

Concentric Zones

According to the Concentric-Zone Theory, the pattern of growth of the city can best be understood in terms of five concentric zones. (Ernest W. Burgess 1925).

1. The Central Business District:

This is the focus of commercial, social and civic life and of transportation. Encircling the downtown retail district is the wholesale business district.

2. The Zone in Transition:

Encircling the downtown area is a zone of residential deterioration. Business and light manufacturing encroach on residential area characterized particularly, by rooming houses. In this zone are the principal slums, with their submerged regions of poverty, degradation and disease.
LAND USE MODELS

A. Concentric Zone Model

1. Loop
2. Factory zone
3. Zone in transition
4. Zone of working men's homes
5. Residential zone
6. Commuters zone.

B. Sector Model

1. C.B.D.
2. Wholesale, light manufacturing
3. Low class residential
4. Middle class residential
5. High class residential

C. Multiple Nuclei Model

1. Central business district
2. Wholesale light manufacturing
3. Low class residential
4. Medium class residential
5. High class residential
6. Heavy manufacturing
7. Outhlying business district
8. Residential suburban
9. Industrial suburban
3. The Zone of Independent Working Men’s Homes:

This is inhabited by industrial workers who have escaped from the zone in transition but who desire to live within easy access of their work. In many American cities, second generation immigrants are important segments of the population in this area.

4. The Zone of Better Residences:

This is made up of single-family dwellings of exclusive ‘restricted districts’ and of high class apartment buildings.

5. The ‘Commuters’ Zone:

Often beyond the city limits in suburban areas or in satellite cities, this is a zone of spotty development of high class residences along lines of rapid travel.

Sector Theory:

The theory of axial development, according to which growth takes place along main transportation routes of least resistance to form a star shaped city, is refined by Homer Hoyt in his sector theory. This theory states that growth along a particular axis of transportation usually consists of similar types of land use. The entire city is considered as a circle and the various areas as sectors radiating out from the center of that circle, similar types of land use originate near the centre of the circle and migrate outward toward the periphery. (Homer Hoyt 1939).
Multiple Nuclei Model:

In many cities the land use pattern is built not around a single center but around several discrete nuclei. In some cities, these nuclei have existed from the very origins of the city, in others they have developed as the growth of the city stimulated migration and specialization. An example of the first type is Metropolitan London, in which ‘The city’ and Westminster originated as separate points separated by open country one as the center of finance and commerce, the other as the center of political life. An example of the second type is Chicago, in which heavy industry, at first localized along the Chicago River in the heart of the city, migrated to the Calumet District, where it acted as a nucleus for extensive new urban development (James Johnson 1967).

The initial nucleus of the city may be the retail district in a central place city, the port or rail facilities in a break-of-bulk city or the factory, mine, or beach in a specialized function city.

The rise of separate nuclei and differentiated districts reflects a combination of the factors like certain activities like retail district require specialized facilities. Certain like activities group together became they profit from cohesion for example: Financial and office building districts depend upon facility of communication among offices within the district. Other activities are detrimental to one another and not normally found in close juxtaposition; for example; heavy industry and high class residential
areas are rarely near-neighbors. Certain activities are unable to afford the rents of the most desirable sites; examples are bulk wholesaling and storage activities requiring much room or low class housing. (James Johnson 1967).

In Multiple Nuclei theory too, the history of individual cities is also seen as an important factor shaping the form of urban development whatever the reasons for their origins, once nuclei for various types of activities have been established, the general factors encouraging the sorting out of urban activities into distinctive land use regions confirm and develop the pre-existing patterns.

Both the Concentric and Sector theories assume that a typical city will grow around a single center and even the diagram with which Harris and Ullman illustrated their Multiple Nuclei theory made the same assumption, although obviously their idea is applicable to more complex examples. In large modern cities however, the distribution of retail shopping centers provides a more complicated framework for urban structure. Such as approach is only concerned with retail land use, but residential districts are grouped around these retail sub-centers, so that in the suburban areas of large cities there exists a many-centred pattern which is at least partly independent of the influence of site and history.

The number of nuclei which result from historical development and the operation of localization force varies greatly from city to city. The
larger the city the more numerous and specialized are the nuclei. The central Business district, the wholesale and light manufacturing district, the heavy industrial district, the residential districts however have developed around nuclei in most large American cities.

1.4 URBAN ENVIRONMENT:

Urban Environment is the total effect of air, water, land and biosphere as the human beings whether living in town or cities. Environment in an urban area has three dimensions, the natural setting, a physical infrastructure of houses, transport, water, waste disposal and energy sources and a social infrastructure of political, educational and cultural services. (UNEP 1982).

Environment may be stable or unstable, balanced or unbalanced which has its bearings on health and prosperity of the living organisms of that space. When the balance of environment is disturbed either due to natural calamity or by the action of human beings, it affects the health and life of human beings and other population.

Environmental degradation is the deterioration in the quality of environment and is one of the major current problems and has become a vital issue of investigation and concern at international, national, regional and local levels and it is being considered as a serious threat to the health and life of the people, animals and plants. Environmental problems are the result of rapid population growth and incessant immigration from
villages to urban centers for employment, services, education, medical care facilities and modernization. The misuse, overuse and exploitation of natural resource have also posed land scarcity, housing congestion, overcrowding and traffic congestion problems in cities. Simultaneously, these have created non-availability of fresh air and pure drinking water along with various environmental problems like sewage and garbage disposal, soil pollution etc.

The agglomeration of industry and housing in large urban complexes creates local modifications. The main characteristics of the urban climates are outlined in the table (No. 1.1) as suggested by Landsberg in 1981 which shows the comparative analysis of urban and rural areas. According to this the amount of suspended particles in the urban atmosphere is much higher than in the surrounding suburban and rural areas. The number of hygroscopic nuclei in the air, directly affects the amount of cloud and also of precipitation.

The most notable form of condensation in urban areas has been the urban fog, for which London was well known until the 1956 Clean Air act gradually brought a reduction in air pollution concentrations.

The physical properties of surface of urban area contrast with their rural surroundings. Albedo may be slightly higher, due to the use of larger amounts of highly reflective concrete and glass in construction. In most urban areas, air temperatures recorded near their centers of activity,
(where building density and height are usually greatest) are frequently higher than in the surrounding suburban areas.

**Table 1.1: Modifications in local climate produced by urban areas as suggested by a climatologist Landsberg in 1981 after analyzing the comparative study of urban and rural areas.**

<table>
<thead>
<tr>
<th>Element</th>
<th>Compared to surrounding rural areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contaminants</strong></td>
<td></td>
</tr>
<tr>
<td>Contaminants</td>
<td>10x</td>
</tr>
<tr>
<td>Condensation nuclei</td>
<td>10x</td>
</tr>
<tr>
<td>Particulates</td>
<td>5-25x</td>
</tr>
<tr>
<td>Gaseous admixtures</td>
<td></td>
</tr>
<tr>
<td><strong>Radiation</strong></td>
<td></td>
</tr>
<tr>
<td>Total on a horizontal surface</td>
<td>0.20% less</td>
</tr>
<tr>
<td>Ultra Vtolet</td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>30% less</td>
</tr>
<tr>
<td>Summer</td>
<td>5% less</td>
</tr>
<tr>
<td>Sunshine ducation</td>
<td>5-15% less</td>
</tr>
<tr>
<td><strong>Cloudiness</strong></td>
<td></td>
</tr>
<tr>
<td>Clouds</td>
<td>5-10% more</td>
</tr>
<tr>
<td>Fog</td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>100% more</td>
</tr>
<tr>
<td>Summer</td>
<td>30% more</td>
</tr>
<tr>
<td><strong>Precipitation</strong></td>
<td></td>
</tr>
<tr>
<td>amounts</td>
<td>5-15% more</td>
</tr>
<tr>
<td>Snowfall</td>
<td></td>
</tr>
<tr>
<td>Innercity</td>
<td>5-15% less</td>
</tr>
<tr>
<td>Ice of city</td>
<td>10% more</td>
</tr>
<tr>
<td>Thunder storms</td>
<td>10-15% more</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
</tr>
<tr>
<td>Annual mean</td>
<td>0.5 – 3.0°C greater</td>
</tr>
<tr>
<td>Winter maximum (avg)</td>
<td>1-2°C greater</td>
</tr>
<tr>
<td>Summer maximum</td>
<td>1-3°C greater</td>
</tr>
<tr>
<td>No.of heating days</td>
<td>10% less</td>
</tr>
<tr>
<td><strong>Relative Humidity</strong></td>
<td></td>
</tr>
<tr>
<td>Annual mean</td>
<td>6% less</td>
</tr>
<tr>
<td>Winter</td>
<td>2% less</td>
</tr>
<tr>
<td>summer</td>
<td>8% less</td>
</tr>
</tbody>
</table>
Causes for Changing Urban Environment:

Nature had provided for a perfect ecological balance and also for natural recharge of the natural resource base in due course of time. Both remained in perfect order as long as the man’s intervention with nature was limited. With increasing population and modernization, man’s interventions with nature increased manifold. His requirements for space for human occupance and food production increased tremendously; and his needs and wants also multiplied necessitating a varied use of land resource base. All these led to increased exploitation of the natural wealth. As long as the utilization of natural resource base by man, remained below the level at which the nature could recharge it, the ecological balance was maintained. But once the utilization of natural resources exceeded the recharging capacity of the nature, it led to many environmental problems and finally to serious environmental degradation. (R.C. Chandna 2003).

The micro-level problems have serious impact upon quality of life and pose serious health hazards. These make the environment unhealthy.

Each inhabitant of the earth has a right to live in a healthy environment. In fact, an individual’s right to healthy environment needs to be included in the list of fundamental human rights of the world community. A healthy environment is the one which permits the highest quality of life with minimum of environmental problems. The main environmental problems are related to (a) air quality, (b) water quality
and sanitation (c) solid waste disposal (d) degradation of common
natural resource base, etc. causes for the degradation of air quality, water
quality, sanitation etc.

All these problems impose an unlimited cost on the society. The
degradation of environment poses a serious burden not only on the
present generation of the world community but also on the future
generation.

Consequences of Urban Environment Degradation:

Human population tends to grow geometrically, while the
resources available to support it tend to grow arithmetically. Under these
conditions the population most inevitably outgrow the supply of food that
is available to fulfill it needs. Several developments have dramatically
reduced infant child mortality throughout the world; the use of DDT to
eliminate mosquito-borne malaria; childhood immunization programs
against cholera, diphtheria and other often-fatal diseases & antibiotics.
The Green Revolution greatly boosted food output through the cultivation
of new disease resistant rice and other food crops, the use of fertilizers
and more effective farming methods. These changes have contributed to
a dramatic increase in human population growth rates.

Obviously the earth cannot continue indefinitely to sustain
population growth at the current rate. In the sustainability of the world’s
vast resources population growth & distribution have significant roles. Not only the number of people but also the lifestyle, consumption patterns and regions people inhabit and use directly affect the environment. The relationship between population growth and environmental degradation may appear to be rather straightforward. More people demand more resources and generate more waste. Population growth is solely responsible for all environmental ills and the view that more people means the development of new technologies to overcome any environmental problems. High levels of consumption and industrialization, inequality in wealth and land distribution, inappropriate government policies, poverty and inefficient technologies all contribute to environmental decline.

Two specific areas illustrate the challenges of understanding the complex influence of population dynamics on the environment;

1) Global Climate Change and Landuse Pattern:

Fulfilling the resource requirements of a growing population ultimately requires some form of land-use change to provide for the expansion of food production through forest clearing, to intensify production on already cultivated land or to develop the infrastructure necessary to support increasing human numbers. Converting land to agricultural use can lead to soil erosion, and the chemicals often used in
fertilizers can also degrade soil. Deforestation is associated with soil erosion and can lesson the ability of soil to hold water, thereby increasing the frequency and severity of floods.

The demographic influence appears primarily in three areas. First, contributions related to industrial production and energy consumption lead to carbon dioxide emissions from fossil fuel use, second land use changes such as deforestation, affect the exchange of carbon dioxide between the earth and the atmosphere and third, some agricultural processes such as paddy-rice cultivation and livestock production are responsible for green home gas release into the atmosphere, especially methane.

According to one estimate, population growth will account for 35% of the global increase in Co₂ emissions between 1985 and 2000 and 48% of the increase in developing nations during that period.

2) Global Climate Change and Human Health:

Climate change poses a major and largely unfamiliar challenge. Today human kind’s activities are altering the world’s climate. We are increasing the atmospheric concentration of energy trapping gases, thereby amplifying the natural ‘green house effect’ that makes the earth habitable. During the 20th Century, world average surface temperature increased by approximately 0.6°C. Climatologists forecasts further
warming, along with changes in precipitation and climatic variability, during the coming century and beyond.

Change in world climate would influence the functioning of many ecosystems and their member species. Likewise, there would be impacts on human health. Most of the health impacts of climate change would be adverse. The World Health Organization estimated, in its “World Health Report 2002”, that climate change was responsible in 2000 for approximately 2.4% of worldwide diarrhoea and 6% of malaria in some middle-income countries.

Technologies, Policies and Cultural Factors:

Current technology, policies and culture influence the relationship between human population dynamics and the natural environment. The technological changes that have most affected environmental conditions relate to energy use. Industrialization in the newly developing nations has resulted in greater reliance on resource-intensive and highly polluting production processes.

Policy actions can ameliorate environmental decline—as in the case of emissions standards—or exacerbate degradations in the case in Central Asia’s Aral Sea basis, which has shrunk 40% since 1960 and has become increasingly contaminated, in large part because of the irrigation policies of the former Soviet Union.
Cultural factors also influence how populations affect the environment. Cultural variations in attitudes towards wildlife and conservation influence environmental conservation strategies, because public support for various policy interventions will reflect societal values.

1.5 SELECTION OF THE PROBLEM AND ITS RELEVANCE:

No doubt that man has brought about rootless changes in the environment during the recent decades. In so doing he has disturbed his balance with the nature for his comfortable living. However it is noticed that the rate of change in the environment is faster than the rate of man’s adaptation to the changing environment. In all most all countries of the world the scholars have been studying the environmental quality and problems there too, in order to conserve the balance between man and nature. It is our duty to understand, enjoy and conserve the environment in which we are living. Amongst all the environmental systems the urban environmental systems are changing fastly consuming large amount of energy and releasing large quantity of pollutions. It is in view of this the researches has chosen the present problem that is, Changing Urban Environment for an indepth study and research. The present study has a great relevance in view of controlling the environmental degradation particularly in urban centers.
1.6 SELECTION OF THE STUDY AREA:

In the present study, the Hubli-Dharwad Twin cities have been selected for an indepth study of their changing environment. The Hubli-Dharwad twin cities have been growing at a faster rate and this twin city system is the second largest urban agglomeration located in North Karnataka only next to the Bangalore, the capital city of Karnataka State. Particularly during the last five decades these twin cities have been experienced an areal expansion in terms of residential, commercial and industrial areas. The intra-urban transport network, public and semi-public functional zones within the city and changes in the number of parks and play grounds and also the formation of slums altogether have been led to many environmental problems. The researches has made an attempt to trace out the factors responsible for the environmental problems and analysed the changing scenario of cities environment along with possible remedial measures.

1.7 LIMITATIONS OF THE STUDY:

The present research work has been carried out within the following limitations. The concept of environment is highly complex and many sided. The study of environment is multy dimensional and involves the experts of all the physical sciences as well as the subjects that deal with socio-economic aspects. But, in the present research work, the
analysis is being made considering the spatial dimensions in other words geographical dimensions. In fact, the relationships and interaction between man and environment constitute the major focus in all geographical studies. The theoretical or empirical studies in geography show that three themes are dominant. The spatial dimensions cover the spatial analysis, ecological analysis and regional analysis. The researcher has analysed the Changing Environment of Hubli-Dharwad Twin Cities by employing these three types of analysis. Since, the geographers generally deal with meso-level aspects the researcher has not dealt with very micro level environmental aspects. Thus the present study has been carried out within the above said limitations.

1.8 OBJECTIVES OF THE STUDY:

The present study purports to cover the following objectives-

(i) To know the environs of Hubli-Dharwad twin cities.

(ii) To trace out the site and situation factors of Hubli-Dharwad twin cities.

(iii) To analyse the changes in the morphological units of Hubli-Dharwad twin cities, such as residential, commercial, industrial and other features.

(iv) To analyse the changes in the demographic structure of Hubli-Dharwad twin cities.

(v) To analyse the changes in the weather/climatic conditions of Hubli-Dharwad twin cities covering temperature rainfall, humidity etc.
(vi) To quantify the magnitude of Hubli-Dharwad as heat island.
(vii) To analyse the levels of air pollution, water pollution, soil pollution and sound pollution.
(viii) To analyse the changes in the infrastructural facilities in Hubli-Dharwad twin cities.
(ix) To trace out the slum areas and their problems.
(x) To analyse the impact of environmental changes on Hubli-Dharwad region.

1.9 HYPOTHESIS:

The following hypotheses are being framed to be tested in the field.

1) The trend of urbanization process and the changes in the general environment of Hubli-Dharwad twin cities are positively correlated.

2) The in-migration of people and the changes in the residential areas and households are positively correlated.

3) The increasing magnitude of urbanization process has its impact on the industrial scenario of Hubli-Dharwad twin cities.

4) The development of intra-urban transport network and other infrastructural facilities are directly dependent upon the demographic structure of the twin cities.

5) The continuous in-migration and scarcity of space are resulted in the formation of slums.

6) The areal expansion of the twin cities is positively associated with the population size.

7) The large scale energy flow within the twin city system has its impact on the weather conditions.
8) The magnitude of air pollution and noise levels are directly dependent on the complex economic activities existing in the twin city system.

1.10 METHODOLOGY AND DATA BASE:

As far as the methodology is concern the present work is based on the primary and secondary sources of information and largely supplemented by field investigation. In order to collect the primary information / data a questionnaire was prepared as per which direct interviews were conducted with the public, government officials and semi-government officials. This was also supplemented by the work done by NGO's functioning in the twin city system. The secondary data was collected from the government and semi-government offices or departments. The present study or research work is being carried out with the help of survey of India topographical maps and the maps supplied by town planning, urban development authority and municipal corporation. The data collected in the field has been analysed with the help of recent statistical research techniques and graphs, diagrams, field photos and cartographic methods. The landuse study has been made on the basis of the urban landuse models. The environmental impact assessment has been made through checklists, overlays and matrices. The results have been presented by the maps, charts, graphs, field photos and models. The analysis has also been made through computer and GIS applications.
1.11 LITERATURE:

Geography and Environment are truly inseparable and are too intimately related with each other. Geography is a spatial science. Environment is an integral part of space. Hence, Environmental Geography is a part of geography which studies the man and environment relationship. A large number of studies covering the spatio-temporal aspects of environment and urban centers were made in the recent past but the present study is unique in terms of its analysis, scope and content.

The present study is an attempt to investigate the urban growth and their morphological development, impact on environment has attracted increasing attention from geographers, planners and environmentalists all over the world and also in India, in the past three decades. It is in this context, that the present study seeks to examine and study the urban growth, changes in morphological units, changes in the weather conditions etc. and their impact on urban environment of Hubli-Dharwad twin cities system.

A good number of studies on various aspects of urban centers and environment of different town, cities have been made by various scholars of different disciplines in India and abroad, a few of them have been reviewed in the present study.
Geography and Environment are inseparable to each other. Geography since long has been considered an Environmental Science. (R.C. Chandna 2003). If we go into the historical development of the discipline of geography, the earliest conceptualisation of geography projected it as the study of places. Environment being an integral part of places, soon geography came to be known as the study of environment. The term 'Urban' refers to towns or cities having marked secondary and tertiary functions along with a municipality or notified area committee. On the basis of minimum population size, UNO defines an urban place as permanent settlement with not less than 20,000 inhabitants (Brian 1979). However, in some countries like Israel, an urban place is regarded as a settlement occupied by people who are not engaged in agricultural activities.

Environment in an urban area has three dimensions. The natural setting, a physical infrastructure of houses, transport, water, waste disposal and energy sources, and a social infrastructure of political, educational and cultural services. (UNEP 1982). Urban Environment is the total effect of air, water, land and biosphere as the human beings whether living in town or cities.

Environment may be stable or unstable, balanced or unbalanced which has its bearing on health and prosperity of living organisations of
Environmental degradation is the deterioration in the quality of environment and is one of the major current problems (R.C. Chandna, 2003).

T.N. Khoshoo writes in his book Environmental priorities in India and sustainable development that historically we have been serious minded about environment and the basic philosophy has been one of harmony with nature as against Western concept of conflict with nature.

Dickinson. R.E. in his book “The West European city” explains the situation of a town and its different roles. It reveals town’s connectivity with its surrounding areas – regional, national or even international. It is important to know the situation of a settlement to transportation linkages, markets and major industrial, trade, administrative and cultural centers. Dickinson also distinguishes between the concepts of a site and of a situation.

Chapin. F.S. has illustrated in his book entitled “Urban Landuse Planning” that dynamics of human behaviour changes the urban landuse pattern. J.F.C. Turner favours the proposals for redevelopments of slum-dwellers and squatter settlements.

Criticizing the policy and programme of the million cities, Misra pointed out in his book “Million cities in India” that the cities serve only a few well-to-do immigrants....the poor are left to do fend for themselves. As a result squatter slums tend to multiply in big cities.
1.12 DESIGN OF THE STUDY:

The whole study has been divided into nine chapters and accomplished systematically.

The First Chapter is devoted to study the urban systems and the changing urban environment. In this chapter different urban systems and their environmental aspects and problems have been discussed to length with examples. The objectives of the study, its limitations, hypothesis, the methodology and the data base have been clearly stated in this chapter.

The Second Chapter deals with the environs of Hubli-Dharwad twin cities where in an explanation about location, site and situation, status of the twin cities, urban field, its historical growth have been given.

The Third Chapter examines the morphological changes such as residential, industrial and commercial areas. This chapter gives a clear idea about the areal expansion of the twin cities.

The Fourth chapter analyses the changing demographic aspects including population size, density, literacy, birth and death rates, sex ratio and occupational structure etc. It also sheds light on population pressure on the land and population projection of twin cities.

The Fifth Chapter traces out the changing scenario of infrastructural facilities and their impact on the human life in the twin cities.
The Sixth Chapter aims at analyzing the changes in the weather conditions such as temperature, rainfall, humidity, wind etc.

The Seventh Chapter analysis the emerging problems of twin cities such as air pollution, noise pollution and water pollution.

The Eighth Chapter traces out the solid waste collection and disposal, sewerage system, formation of slums and their impact on urban environment of twin cities.

The Ninth or last Chapter summerises the whole study. The major findings of the study have been given in this chapter. Further the suggestions to overcome the problems prevailing in the twin cities have been given in this chapter.

The work cited and Bibliography have been given at the end of all chapters.