CHAPTER IX

SUMMARY AND CONCLUSION
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This study is on the urban growth and emerging environmental problems of Coimbatore city. It is felt that, it will be ideal to take an area which has undergone rapid urban growth and has shown resultant problems. Coimbatore has become an industrial town in Tamil Nadu, next to Madras, within thirty five years. Hence Coimbatore city has been taken for the purpose.

Though a considerable amount of work has been done on the various growth problems, industrial problems, transport problems and pollutions of various nature, very little work has been done on urban growth leading to emerging environmental problems. Hence the problem chosen for the study was the urban growth and emerging environmental problems in Coimbatore city. Coimbatore is located between 10°58' and 11°2' North latitude and 75°56' and 77°10' East longitude at the western margin of Tamilnadu. The city is located on the northern banks of Noyil river, the tributary of Bhavani river. It has a central position well linked by roads and railway lines. Coimbatore when compared with the other urban landscapes of Tamilnadu, shows a rapid growth, next to Madras. The striking growth factors are population, educational centres, health centres, commercial centres, industries, transport and residential areas. There are various steps taken to increase facilities, to meet the demand. Hence within the city area the
nature of growth and emerging environmental problems are worth analysing. In view of this, Coimbatore has been taken for such study.

The study has been limited to nature of growth and the resultant environmental problems. Secondary data and field observations have been used for this purpose. The data have been analysed through simple cartographic techniques and quantitative techniques.

The study on the historical background gives a volume of information regarding the name of the city. On the whole the urban growth could be recognized in four stages. In the first stage, the place started as a centre of mono nucleus. From 1805 to 1901 Coimbatore town was the only nucleus and all the activities were confined to the node. In the second stage, industrialisation took place leading to multi-functional growth. Approximately after 1920 industries were started. The extension of electricity facilities by Pykara, brought various modes of functions. Still Coimbatore centre continued to be the nucleus for all activities. In the third stage, the aggregation by migration took place by filling in the vacant lands. The inflow of people was from the rural area and from Kerala. The main migration was by seeking job. This has given rise to more area being occupied by housing zones. In the fourth stage, the growth and spatial expansion could be noted. Starting with further industrialization, the ancillary industries have been established. The industrialisation has lead to migration, from outside Coimbatore. All these have resulted in the spatial expansion of the city. These factors have influenced each other
and acted as feed back of increase in the growth rate, giving a change to the dimension of the city. The newly constituted corporation limit has included six urban neighbourhood and given rise to the spatial expansion of the city. In 1921 the area was 10.9 sq.kms, and in 1981 it has increased to 105.60 sq.kms.

The study on the changes in the land use from 1961 to 1981 show the rapidity with which the area got filled with various functions. In 1961 no particular land use dominated any area. All were in small patches with plenty of open space even at the middle of the central city area. In 1971 all the open space in the central city area got filled by residential land use and others like commercial, industrial and educational land use. In 1981 the central area got filled and park lands have to be maintained. The newly added areas have space only along the fringes.

The CBD is bound on the south by poor quality shops and services associated with multiple activities like lorry booking office, godowns, small shops and printing press etc. At present even the residential buildings have been converted into shops, godown and sheds. Stalls and cheap lodging houses are also found here. Eastern limit has a number of public buildings. The overall growth of the city, including the CBD has increased the congestion at the core area. The rapid structural changes in the urban landscape has created pressure on land and urban amenities. This has given rise to urban environmental problems such as congestion etc.
Right from 1971 there has been a sharp increase in the growth of population in the city. The percentage of increase is less between 1971 and 1981 than the previous years because the area has been expanded. Still the percentage of increase is as high as 159.47 per cent. The early growth has been influenced by the growth of Industries. The increase of population lead to the alteration of wards. In 1961 there were 30 wards. In 1981 it was altered into 56 wards. The reorganisation of wards is a reflection of constant pressure due to increase of population. The wards are the basis for providing amenities and services to the town.

Coimbatore urban agglomeration gives three periods of high growth rate. The first in 1921 with 60.6 per cent. This may be due to the considerable reduction of population in 1911 by plague. In 1931 the rate is less than 1921 but as high as 43.1 per cent. In 1941 it has recorded the maximum growth rate of 75.5 per cent. Again in 1971 the growth rate was as high as 64.3 per cent. The fast population growth rate indicates the influence of the industrial growth leading to migration of population into the city from neighbourhood, other districts of Tamilnadu and from other parts of the country. Of these the migrants from other parts of Coimbatore district suggest that the fast growth and industrialization of the town attracted large population from the neighbourhood.

By 1991, the magnitude of total population pressure could easily be imagined, if all the rural areas with in Coimbatore standard urban area develop into urban ranks. The population estimated for 2001 AD is 10 lakhs males and 9 lakhs
females. This suggests that the population is anticipated to double in twenty years time. If this is the trend, then there will be complex urban environmental problems in the years to come.

The distribution of population analysed for 1961, 1971 and 1981 show a trend towards high increase in the old part of the city. In the fringe areas it is considerably less dense. The more the area added the central city area gets congested. Even in these areas a denser distribution is found towards the interior or according to the industrial importance of the area. Similarly the analysis on the density of population shows a high density in the central part of the city than along the fringes. But the comparative study for 1961, 1971 and 1981 show that under each ward there has been a trend towards higher density from 1971 to 1981. The population density study of the city and the neighbourhood towns show an interesting result. On the west most of the immediate neighbourhood were in the rank of villages in 1961. By 1971 they all became towns each having their own industrial importance. But, for all facilities they are dependant on the city. The reorganisation of the administrative boundary included six neighbourhood towns which are industrially important. When these were merged into the city the pressure by density on the city has increased.

The educational landscape also shows a great deal of change. The city which was much backward in education now offers
educational facilities in Arts and Science and also for all professional courses. A major concentration of educational centres are on the east which has increased the demand for Transport and other facilities. The growth of population in the city has created a demand for more educational facilities, which in turn has brought pressure on urban landscape. In the residential areas a number of private schools have come up simultaneously. Many houses have been slightly modified to accommodate the children in the beginning and later extended to accommodate higher classes. Such features are common in Diwan Bahadur Road in R.S. Puram.

Like any other city the commercial activities are, concentrated at the centre of the city near the fort. The concentration of specific type of shop in each side is noteworthy. The rapid expansion has resulted in the growth and development of several commercial and market areas in different parts of the city of Coimbatore. New Commercial areas have also sprung up along important roads. These are mostly retail centres or secondary shopping centres. Such new areas are found along the Diwan Bahadur road in R.S.Puram, the cross cut road, extending from north Coimbatore Station area to Gandhi park, on the east along Sathyamangalam road, and from Uppili- palayam junction to Chidambaram park. 19.1 per cent of the total extent of the city is occupied by commercial activity centres. 54.5 per cent of the total shopping area is occupied by hotels, restaurants, cloth shops, provision stores, fuel
depots and hardware shops. The super market in R.S.puram has developed in such a way that the whole floor area has been occupied and the shops are extended along the adjoining roads. Those along Diwan Bahadur road, Avanashi Road, Jail Road, Cross cut road could be called as Highway shopping area, as they are easily accessible by automobiles. Thus the growth of the area reflects varieties of landscape. The CBD is getting congested, hence there is a proposal to shift some units to the west, into a large vacant area. Nearly 10.38 sq.kms. area has been reserved for this purpose, so that this area could be used for other purposes. It has also been proposed to locate shopping centres at convenient places. Proper spacing and accessibility are given importance in this. On the whole it is found that CBD is the major commercial area. The growth of commercial area and shopping centres are sporadic and fast in almost all parts of the city. This has resulted in the traffic problem, unhygienic crowding, creating hazardous dumps of solid waste and garbage in the city area. In every residential area the open areas are being congested by hospital buildings. On the whole the changes in the various social and cultural landscape due to urban growth has resulted in serious environmental problems.

The study on emerging industrial landscape has given a good result. Most of the industries are located to the east of the railway line. A number of light engineering, automobile and machinery units were started from 1956 to 1969. It is interesting to observe that all these have occupied the area
on the east. That is, spatially, they are located along Avanashi road, Trichy road and Ganapathy. A number of units were started after 1960 along Mettupalayam road and R.S.Puram area. There are also proposals to start more units at Puliakulam and Papanneickenpalayam on the east. The chemical and fertilizer units started functioning from 1950. Most of them are found in Ramnagar, R.S.Puram, Peelamedu, Perur and Kuniamuthur areas. It is prominent in the central city.

On the whole in Coimbatore, textile mills formed the nucleus of the origin, followed by foundry and general engineering industries. The cotton ginning and weaving mills were the backbone of the city, which started occupying an area on either side of the railway line and later had an expansion towards the east, in the sub-urban areas also. All the other industries have developed in the city and the sub-urban area, along the textile industrial areas. On the whole spatial spread is more towards the east and north. These have made the city and the sub-urban areas, industrially important. The survey done at the beginning of 1970s showed that nearly 35 per cent of the industrial units were established between 1956 and 1960 in the north along Ganapathy and the east along Pappanaickenpalayam, Peelamedu, Puliakulam, Singanallur and Ondipudur. In the South Kuniamuthur gets the major share.

The pattern of industries have changed from 1970 to 1980. In 1970 there was a haphazard distribution of industrial establishments. The metal industry and the miscellaneous industries were spread all over the city with no area of concentration. On the whole more industries are found on the east than
west. The noteworthy cluster is found over Singanallur and Ganapathy. In 1975 there were more electric and electronic industries in and around the eastern part of the central area and on the east. There are visible clusters of industries in the city area. In 1980 due to the increase of residential occupation in the centre the industrial concentration is less in the centre except the miscellaneous industries. At Singanallur there was more concentration of metal industries. Ganapathy had more plastic industries. Sanganur and Telungupalayam had cement based products manufacturing industries. It is clear that till 1975 there was no zone that could be recognised with specific area of concentration.

Major concentration of industries, among the six regions, is found in the central part and Ganapathy. Ganapathy though gained industrial importance much later, is now equally important next to central city area. Singanallur and Sanganur come next in importance. The last is Telungupalayam and Kumara-palayam. More concentration of metal industry and steel furniture are at Singanallur and central city area. Cement products Industries are found in Sanganur and Telungupalayam. Kumara-palayam has good concentration of steel furniture manufacturing industries. The textile industries are concentrated on the east. They were scattered in the beginning and later got established. There is an absence of Textile mills in the west.

Engineering and automobile industries show yet another pattern of spatial spread. Highly industrialized central area
and the south-west do not have much concentration of these industries. Noteworthy concentration is in Ganapathy and Singanallur. Food, Coffee and Tea industries are concentrated in the north, closer to the transportation line leading to Mettupalayam. Another concentration is found in the west.

These suggest the accessibility to raw materials. The basic material industries are concentrated on the east of central area, along the Trichy road and in the north. Apart from this, in other areas, it is scattered. Printing and publishing and service industries are scattered but more noteworthy along the western part of the central area.

The continuous increase of industries have given rise to industrial supply units and service units. In 1984, total industrial manufacturing units have gone upto 1,119. Out of these, engineering goods manufacture has about 50 per cent share. The next is the machinery manufacturing unit with a share of 30 per cent. The supply units prepare the basic materials needed for the manufacturing industries. On the whole there are 909 such units. Out of these except chemicals, other units have a high percentage of share. The largest is machinery supply unit. All the service units like financing banking, consultancy and transport services have increased.

It is interesting to find that they are all concentrated in the centre of the city. The CBD and the central areas of the town have the location of maximum units. The next largest concentration is along Uppilipalayam, Avanashi Road, Race course
and Puliyakulam area. The third concentration is along Tatabad area. This is followed by R.S.Puram in the west and Papanickepalayam in the East. About 5 per cent of the service units are found in the industrial area. These indicate the concentration in areas which are in the city area but are accessible to the adjoining industrial areas. The transport services units are, at the CBD and the area around it, R.S.Puram, Avanashi Road, Uppillipalayam, Ramnagar, and Saibaba Colony.

The industrial growth has brought pressure for electric power. The regulatory measures taken to conserve electricity affected the functioning of the industries. Singanallur developed as an industrial township but still faces problem of dependence on central area for water supply. Transport and also for proper drainage facility for industrial effluent. In the other industrial division the growth is recent, still due to want of space, they are getting filled with new industrial units.

Though the fast urban expansion stimulated the fast urban growth, uncontrolled industries have created environmental problems. It is found that the expansion around the city is at a fast rate. But the space available is used for throwing the waste. Similarly the industrial wastes occupy open areas near each industrial unit. The open spaces are getting filled with urban functions. So a stage may reach when the unplanned dumping, unchecked smoke and other careless dumping of wastes near the industrial units will become the potential hazardous areas in future.
The road, railway and air-way transportation facilities have been studied to get an overall picture on the dimensions of the growth. The city has been well linked to the adjoining towns by road and railway. The lines of communication from north, north-east, east and south-east converged over Coimbatore. They also radiated in all other directions. Madras to Cochin line passes through Coimbatore. There has been constant increase of passenger and goods load due to industrial and urban growth. Hence even now the re-modelling of the main railway junction is going on, to accommodate the increased traffic. In order to reduce crowding in the town, a mass transit circular railway has been proposed. This could also reduce the congestion on the road.

The network of road and railway give an overall picture on the pattern of the network. In the west only primary roads are more. The secondary and tertiary roads are less. In the east also the secondary and tertiary roads are less but main roads are more. When compared with these in the central city area, the roads are well developed. The southern part gives a haphazard pattern. There are three important railway lines running north to south, west to east and from south to east. There is no local train service.

The analysis of the bus route network has indicated a well connected network but has not got a completed network as the ends along the margins are separate with no connection.
The spatial pattern of network shows that the Fort area and Selvapuram area have haphazard formation. In the CBD and at Pappaneickenpalayam they are closely spaced with narrow roads giving a congested pattern. Saihaba colony, Sivanandha colony, Tatabad areas have organized pattern of development. The rest show a sparse pattern. There has been a steady progress in the development of connection to places in the neighbourhood.

There is an increase in the buses serving the area. In 1960 there were hardly 40 city routes. By 1970 it increased to 55 routes. After 1975 there has been a tremendous change in the number of buses plying in the city. In 1977 there were 91 routes which were helping the extension areas. On the whole there were 121 city routes. By 1985 it has increased to 259. The area along the margin have developed multiple functions, hence the commuters from the city centre, commute daily. This has resulted in the increase of routes.

These routes over burden some places with flow loads. Gandhipuram in the north-east has about 150 buses passing through it. The next highest is town hall in the south. Railway station has 100 routes passing through it. Ukkadam has 95 routes passing through it. But along with these the other south bound buses also pass through, creating a high load at Ukkadam. North Coimbatore has 85 routes while the others like Uppilipalayam, Singanallur, general hospital has less than 80 bus routes. The route load at the destinations which are within city limit give an interesting picture. There were 11 points
as destination points in 1975. These have moderate route load. But in 1985 it has gone up by 15 points. Gandhipuram records the maximum of 65 routes. Town hall has 28 routes, Ukkadam has 27 routes. The railway station has 25 routes. Sai Baba colony has 22 routes followed by Ondipudur. The others have less than 14 routes. The increase of load at the already existing termini is very prominent. Due to the formation of Corporation the area has increased and four more termini have come under city limit. While north Coimbatore point and Agricultural points ceased to be termini. The city limit has gone beyond this, that, they are no more the farthest point in the west and north. The Lakshmi mills terminus has the minimum, Gandhipuram has the maximum. Ukkadam, railway station and town hall have the next higher load. Sai Baba colony developed into a residential and industrial area only after 1970, still it has 20 routes starting from here. This shows the fast growth and rapid crowding of the areas. Ondipudur which lies on the east extreme has 20 routes. The road network is not close, hence the flow road along Trichy road is bound to be heavy. Singanallur though a very important industrial township, but merged into Coimbatore Corporation, has a number of routes passing through, it but does not act as terminus. The others like ESI hospital, Central bus stand, Polytechnic College and Ramanathapuram have bus routes between 5 to 10 routes terminating here. Thus it is understood that there is striking growth of the city, which has augmented the buses, which have given rise to problem of congestion by flow load. As per schedule,
each route has to do 16 trips per day as minimum. If the total
distance per day is less than 300 kms, they do upto 22 trips
per day. On the whole it is clear that there is heavy load by
taking number of bus routes passing through each point. If
each route makes 16 trips which is the minimum, the congestion
by load will be very high.

Certain parts of the city alone take up the whole
burden of the transport load. Out of the total city routes
62.8 per cent pass through Town hall at CBD. Next highest
is Gandhipuram (56 per cent) followed by Railway Station
(46 per cent). The fleet augmentation to meet the mounting
demand, has resulted in the urban environmental problem such
as air pollution, noise pollution etc. due to high flow
load in areas of Ukkadam, Trichy road, Gandhipuram, North
Coimbatore etc.

Apart from this the road is loaded with fast moving,
slow moving vehicles and cycles. The random survey has revealed
that there are more fast moving vehicles than slow moving.
East Sukravarpet road and goodshed have the maximum fast
moving vehicles. This is followed by Avanashi road and Big
Bazaar Street. The reading at Parry and Co., has the least
which may be due to the path restrictions. The maximum slow
moving vehicles are found along goodshed road. Next is along
Big Bazaar street. Trichy road and Oppanakara Street have
less than 200 vehicles. On the whole it is understood that
Sukravarpet, goodshed road and Big Bazaar street have the
maximum flow of both fast moving and slow moving vehicles.
The traffic circulation in the CBD gives a clear picture on the congestion of traffic by composite traffic. There is no terminus except the bus stop at Town hall, acting as terminus. There are traffic regulations. No traffic is allowed along Big Bazaar street after a limit, near Oppanakara street. Raja street near clock tower is made as one way route. The 'Parking lot' has been introduced. Still the careless parking creates problem to regular traffic of the place.

Nearly three lakhs to four lakhs of people use the bus per day. Nearly 60 per cent of the traffic enter Coimbatore through Avanashi road and Trichy road and proceed towards Palghat without transacting any business at Coimbatore. 45 per cent pass through Coimbatore from Palghat. There are proposals to lay a by-pass link, linking Avanashi road, Trichy road and Palghat road. In many parts of the city the width of the road varies between 3.7 metres to 7.6 metres. These are insufficient to carry the increased load. It is also not possible to broaden the road as the buildings along the roads in many parts are well established. The congestion could be reduced by proper land use.

The private operators have their own terminus in the city. Apart from these the city routes do not have proper terminus within the city. There is one in Ukkadam and another at Central bus stand which is meant for all buses. All the city buses have only road side bus stop as terminus. At Gandhipuram the space between the outer wall and inner wall of the central
jail has been acquired and the road has been broadened as terminus. But this has the maximum buses either terminating or starting from here. So the bus stop terminus in the heavy traffic areas create urban environmental problems of congestion, resulting in bottleneck, accidents and hinderance to pedestrian movement. By reclaiming the Valankulam area near Ukkadam a lorry stand is proposed to be constructed. The traffic flow load increase has resulted in congestion, delay in travel times bottlenecks, accidents and noise. The noise measured in 1979 was 85 DBA which is said to give 'annoyance'. In 1985, the traffic has increased three times, hence the traffic noise will have harmful effect on the people of the area.

On the whole the study shows a steady growth of transport, change of road network, increase in load at destinations, increase of flow load, problems of maintenance, bottlenecks, crowding and ultimately the inevitable problem of noise. Thus the urban growth of Coimbatore has lead to demand for more transport facilities, which have resulted in the urban environmental problem of the city.

The growth of residential area in the city and the neighbourhood have created environmental problems. The migrated communities were responsible for the early development of residential areas. The Brahmin extension at Park Town was the largest. The next largest was R.S.Puram area, The Cox street and gray town connecting Avanashi Road, near Uppili-palayam are private extensions and the local authorities approved the plans.
Some neighbouring towns, which are important as Industrial, Religious or Transport Centres, exert pressure on Coimbatore for all the facilities and requirements. There were only two noteworthy housing areas. The town planning authorities controlled the residential area growth from 1927. But as the space available was plenty, they did not effectively prevent the residential area growth, hence haphazard growth is found in the old residential areas. Kattoor, Devanga-pet, Annupparpalayam, Sukravarpet, Ukkadam, Bazaar area, Kempatty colony, Peelamedu and Pappanaickenpalayam come under old residential areas. While Tatabad, R.S.Puram, Gandhipuram Saibaba colony, Biochapurudur, Gounデンpalayam, and Ganapathy come under new residential areas. Except Peelamedu and Pappa - naickenpalayam all the old residential areas are in and around the CBD. Here along with residential growth other functions also developed. But in the new residential area only residential development took place.

The residential area occupied 54.9 per cent of the total area of the town in 1961. But in 1981 it has doubled, in this, only 22 per cent have pucca houses, while 64 per cent are semi pucca and Katcha houses. In 1981 about 28 per cent are single family houses and 72 per cent are multi family dwellings. A number of housing complexes have come up. The new houses are built to accommodate more than one tenant. The old houses are remodelled into multistoreyed ones.
The housing density of the city in 1961 was 2091.3 per sq.kms. In 1971 it has gone up as 2512.13 per sq.kms. In 1981 it is 1351.2 sq.kms. This fall in the density is due to more neighbourhood areas being added to the city area. The ward wise analysis of the housing density in 1961 and 1971 give an interesting information. The wards in the heart of the city have the maximum density in 1961 with more than 400 houses per sq.kms. Next higher density is in the Bazaar area and the adjoining places. The western extreme of the city has the least density. The Race Course area, Red field area have less density as they are spacious houses with vast garden space around them. On the whole the highest density is to the north of the CBD with closely spaced street with no garden space. In 1971 due to availability of space there is an increase in the density. Almost all the wards have gained higher density in 1971.

The household density analysis also strengthens the findings. In 1961 the Devangapet area and the Sukravarpet area had the maximum household density of more than 400 household per sq.kms. The next highest of 200 to 320 household is found in the mill area along variety hall road. The household density of 160 to 200 have been found along Kattoor area, Market area and Kempatty colony. The fort area also comes in to this category. The area to the South of Big Bazaar street, East R.S.Puram, Ramnagar, Oppankara Street area have 80 to 120. Sivapuram, Race Course, Central Jail area, Red fields and Puliakulam have the least density of less than 40 household per sq.km.
In 1971 also the same highest density areas continued. More areas have come into the higher density of 200 to 320, such as Oppanakara Street area, Telungu Brahmin Street, Karuppa- gounder street area, and Subri Street area. The increase is from 120 to 160 density to 160 to 200 household. Similarly only western half of Raja Street and eastern extension of Oppanakara Street it has gained a density of 120 to 160 from 80 to 120 density. The least density of less than 40 household continues.

On the whole it is understood that the growth has given rise to increase of housing and household density which exerts pressure on the existing space of the city. The household density pattern from 1961 to 1981 have given interesting results. Among the neighbourhood towns except Ganapathy, Singanallur, Vellalore, Kurichi, Kuniamuthur and Madukkarai all the others were villages in 1961. Even among the towns, most of them were on the east and south, hence the impact is from these directions. Coimbatore city had the maximum household density of more than 1600 per sq.kms. There is a vast difference between this and the next category. Ganapathy, Singanallur, Kurichi and Sulur have 200 to 400 household per sq.km Vellalore, Kuniamuthur and Madukkarai have 100 to 200 per sq.km.

In 1971 more categories of density is seen. Those which are close to the city have gained higher density. For example Ganapathy which had a household density of 200 to 400 in 1961 has gone upto 600 to 800 in 1971. But got merged into
the city in 1981. Similarly Singanallur and Kurichi have gained a density from 200-400 to 400-600 household per sq.km. Thus almost all the places have gained household density from 1961 to 1971. Kumarapalayam was a village in 1961. In 1971 it had a household density of 400 to 600 sq.km. and in 1981 it got merged into Coimbatore city.

In 1981, the formation of corporation led to the inclusion of six towns. These in a natural course should have brought plenty of open space to reduce the pressure. But each had high household density, hence it has not reduced the pressure. On the whole the city household density appears to be less than 1971 due to increase in the city area. The household density of the city and neighbourhood varies between 800-1600 category to more than 100 per sq.km. The steady increase of the household density indicates the possible impact on the urban environmental landscape.

Slums are found in the heart of the city and at the newly developed neighbourhood. The municipal council has taken seven slums and rehabilitated them. The improvement scheme has been planned and entrusted to the State Housing Board. The Board has rehabilitated 1,119 families. Still the slums are prominent along the kulas, railway line and along the margins of the city. Whenever there is heavy rain these places are given immediate attention to prevent flood affect as most of them have occupied low lying areas. But this is not a solution
to the problem. Under slum clearance scheme 30,000 people have been aided. There are further schemes to provide amenities like street lights etc. to these slum areas.

Precautionary steps have been taken to stop encroachment towards Perur and the remodelling of the single houses into multistoreyed houses. On the whole the study shows that the residential area development is recent. The various schemes suggest, the pressure for facilities and periodical revision of facilities, which became essential. The residential growth of the neighbourhood has also increased. The fast increase in the occupation of open space indicates that by 2001 AD it will also have vertical growth to provide for the mounting demand. The provision of living space alone will not be enough, hence along with living space other infrastructural facilities have to be increased. This will lead to constant indulgence in the urban environment. After a certain stage the solution to the environmental problem is bound to become beyond control.

The growing city demands water supply, drainage, facilities and waste removal as part of the amenities needed by the city. The city suffered a lot from shortage of drinking water. Only a few wells in the Raja street area helped in the beginning. The river Noyil is the only available river which is fed by south-west monsoon. There are tanks and jungle streams which are fed by north-east monsoon rains. These tanks
do not help cultivation. There are also problems like silt- ing, strengthening, of the bunds etc. Desilting has been found to be costly. The failure of the rains lead to these tank beds being cultivated, hence the run off is reduced.

The prolonged water scarcity had hampered the economic growth of the town for nearly two decades. The surrounding towns could not be helped. Out of the water connections given, 90 per cent of the houses had taps fixed below the ground level, passing threat to public health. The continuous increase in demand lead to the quicker execution of the Siruvani project. By 1984, the fullfledged supply with, the modification of the capacity of the reservoir, gave rise to abundant supply of water to the city. But still the demand is more than the facility made, hence staggering systems of alternate day supply etc. had to be introduced to satisfy the demand.

The supply to the city was in stages. In the early stages the water was drawn through gravitation main and a reservoir was built at bharathi park in the north. Later another reservoir was constructed near Gandhipark to localize the distribution. This was mainly designed to serve the old city only. But the demand from the new residential and industrial extension areas, lead to the remodelling of the existing pattern. As the immediate augmentation was not possible, the hour of supply was reduced and steps were taken to supply water by lorries and handcarts. The storage capacity alteration
suggests the increased demand for drinking water. All the possible sources are being used to meet the demand. Even after the increase a deficit of 400 mhd has been found. All possible sources have been tapped hence it is difficult to find any more source, which is economically feasible.

On the whole to meet the requirement, water from Siruvani, Obiyar, Patiar and Pambar will be stored in the new masonry dam of 650 million cubic feet capacity, which is constructed at a distance of 2 km, down stream of the already existing old dam. In order to supply water easily and efficiently, a number of storage reservoirs have been constructed in and around the city. The location is almost along the fringes of the central city area, which indicates that, each reservoir could supply water to both residential and industrial area on either side of them. The ground water has not got much water, to meet the demand. Hence in order to prevent further urban environmental problem, the supply of water for various uses has to be carefully regulated by many measures.

The flow in the sewage and storm drain have increased due to the increase of activities in the city. This has lead to the increase of solid waste as well as sewage discharges. If a proper provision is not there, the stagnation, foul smell, increase of other problems could be the result. It is essential to find a proper solution for the collection and disposal.
The anticipated industrial complex and their uses have to be estimated. There should be proper device for the discharges otherwise it will become an environmental hazard. For example at Singanallur, which is an industrial centre has created a pond of industrial effluent. In the beginning as the open space was more, it did not affect much. Now the space around this pond has developed with shops and houses which experience bad odour from this.

Coimbatore city has underground sewage system which covers roughly about 20.7 sq.kms, which is divided into five block. The early sewage was planned only for a population of 76,000. The municipal sewage farm is 38 hectare in extent and lies south of Valankulam tank. The farm has been laid out underground carrier and subcarrier for discharge of the effluent water. The deep drainage carrying the industrial discharge from Mettupalayam, road, had also been connected to this. In the sewage farm, in the south, grass is grown in 28.8 hectares. The farm has also been utilized for economic benefit.

It is interesting to note that the industries outside the old municipal limit, do not have underground sewage connections. There are proposals to extend the facility to these areas. Even in the areas where underground sewage connections are given, the growth has given rise to more discharge than its holding capacity. That is, most of the houses
have been remodelled that, the pipes which are supposed to
carry single house discharge has to carry multi houses dis-
charges. Thus a number of problems crop up. Unless the sewage
system is altered in par with the increase of waste, there is
bound to be urban environmental problem by sewage waste. At
the new residential colonies on the east and west, septic tanks
are provided. This leads to the problem of periodical cleaning
and disposal of the sullage water. Unless there are numerous
vehicles to do this and there are plenty of open area to drain
them, it will be creating management problem.

The existing system is not enough. A proper scheme
has to be drawn to lay proper storm drainage for the whole
metropolitan area. With proper linkage they could be drained
into Noyil river in the south and Sanganur pallam in the north.
These are the two natural drainage system available in the
metropolitan area. The tanks with in and around the city could
help in the collection of storm rains.

The solid waste accumulation in a growing urban centre
is another environmental problem. The discarded materials
after use and by demolition, are almost great, that the local
administrators find it a problem to increase the means to
remove these and there is delay, hence the environmental
problem would occur. The wastes include perishable as well
as non-perishable things.
Today the problems are created by the movement of people into a rapidly organized community system and by advances in industrial technology. The most significant change has occurred with the introduction of sewer systems, to collect domestic wastes and the transport of 'night soil' and disposal of this, in a large amount into water. The rubbish in modern city contains more and more bulky materials. Abandoned household materials constitute an increasing portion of solid domestic waste. Less kitchen wastes are produced because of improvement in food processing. There is also an increase of paper and packing material, plastic, building materials and broken furniture. The solid waste is so great and has become less portable, hence they are burnt in the land fills. The smoke is so thick that it regularly hinders the easy traffic movement in Ukkadam. Though the burning at landfill is forbidden, as it creates harmful air pollution, still effective steps have not been taken to stop this. The municipality does not take the responsibility of recycling, as there is seldom profit. The disposal is done into places outside the city, which are nearer the town. In Coimbatore the collection is more than the quantity disposed. That is the paper collected is 3.58 per cent of the total collection but only 0.35 per cent alone is disposed. 3.68 per cent rags, 2.05 per cent of bones are collected but the disposal is less than 1 per cent. Similarly 1.92 per cent of wood materials are collected but the disposal is less than 1 per cent. The disposal of building debris is negligible. On the whole, it is understood that collection
is more than disposal, hence in the areas where they are collected and stored for disposal through various methods, problems are sure to be seen, like rodent menace, fly breeding etc.

The municipality converts the rubbish into manures and sells them to agriculturists. Due to the availability of chemical fertilizers and others the consumption of this is less. The recycling is a good method. Garbage grinding is a good method which reduces the garbage to refuse. This could be easily disposed. Out of the three methods of solid waste disposal such as indiscriminate dumping, sanitary land fill and basic principles; indiscriminate dumping is found in Coimbatore. The Valankulam is being filled with the waste dump to be used in future for slum clearance flats.

The city authorities find it very difficult to collect and clean the area as the waste accumulation is more than the available means. The lack of finance does not permit the increase of vehicles or man power. Almost 70 per cent of the total cost of garbage disposal is used in the transportation of the waste. Even though the time of collection has been scheduled the carelessness in handling the garbage while transporting gets spilt all over the city. In Coimbatore Sanganurpallam was used to dump 'night soil' etc. But now the city limit has gone beyond this and the area is filled with urban activities. Most of the compost yards are in the north and north-east outside the city. Whatever be the method the
of the environment is essential.

On the whole the study on water supply, drainage facility and solid waste management show that the rapid growth of the city, has given rise to varied management problems. All sources have been considered even for the future need. Hence any further demand will be a problem to the city water supply. The planning authorities have suggested the discouraging of new housing complex in the city, in future, and to encourage the growth of the satellite towns.

Any structural increase, change the residential area hence an excess output of sewage is found. Hence proper drainage should be provided simultaneously to avoid damage to storm drainage.

Solid waste is yet another major hazard on urban environmental landscape and hence faster removal is essential. As the finance is found to be the basic drawback, a proper allocation of funds for cleaning is essential. If adequate steps are not taken on the lines suggested, there is bound to be severe environmental problem leading to health hazard.

Every component of the environment in the city of Coimbatore has shown rapid growth. Rapid structural changes in the urban landscape has created pressure on land and urban amenities. Though there are schemes to reorganise to reduce the problems, the problems and issues are bound to exist, because
controlled development and growth have not taken deep roots in the spatial process.

The commercial activities are confined to the city especially to old part of the city. The streets are narrow and the area has other urban functions also. Hence the area is crowded with people, traffic, bottlenecks, increased accidents and dumping of garbages in the drainage etc. The industries have increased and have created congestion and space problem. The careless dumping on nearby open spaces have added to the solid waste accumulation in the industrial areas. The unplanned dumping, unchecked smoke and other wastes will become the potential hazardous area of the city, in future.

Coimbatore is throbbing with activity. The roads are not uniformly well developed to help the transport movement. The city was formed from the early historical time, hence the roads are narrow and haphazardly developed. They are not able to carry the full load. The intersections are badly aligned. All vehicles whether slow moving or fast moving use the same path. The city bus routes have increased to 259 routes. These have ended in delay in travel time, accidents, bottlenecks, air pollution, noise pollution and parking problems. There is no organized traffic hence problems have increased.

The growth has given rise to more demand for transport facility. The increase of transport has created traffic congestion, increase of flow load, bottlenecks and noise.
Residential areas have grown without check. This has resulted in the pressure on land.

The growth has given rise to mounting demand for amenities like drinking water, sewage facility and solid waste management.

On the whole it is understood that in the fast growing urban area, the growth leads to problem of growth management and provision of amenities. Each has its own dimension of growth and limitations.

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