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Urban Environmental Problems of Anantapur Municipal Corporation, Andhra Pradesh, India

S. Lakshiminarayana* and Y. V. Krishnaiah**

*Department of Geography, Sri Krishnadevaraya University, Anantapur, Andhra Pradesh.
**Corresponding Author, Department of Geography, Nagaland University
(A Central University), LUMAMI, Mokokchung – 798 601, Nagaland. India,

E-mail: yvkrishna09@gmail.com

ABSTRACT

The Anantapur Municipal Corporation covers an area of about 2683 hectares. The Anantapur Municipal Corporation is geographically located at $16^{0}.41^{1}$ North latitude and $77^{0}.36^{1}$ East longitude. It is the district head quarter of the Anantapur district. The major urban problems of the Anantapur municipality are unbalanced development of the Municipal Corporation, pollution (air, noise, water and dust pollution) development of urban slums, shortage of housing, highly congested central business area of the Anantapur Municipal Corporation, high intensity of residential concentration in the old town, absence of organized commercial areas and shopping centres with sufficient parking and storage facility, in adequate city services like water supply, drainage, traffic and transportation, narrow circulation pattern of roads in the old town area, development of slums, encroachment of tanks and solid waste disposals. An analysis is found the quality urban life is poor and moderate. The environmental impact assessment index is low.

Keywords: Air Pollution; Noise Pollution; Water Pollution; Dust Pollution; Urban Slums; Quality of Urban Life; Environmental Impact Assessment (E.I.A)

INTRODUCTION

Rapid growth of population, urbanization [1-3] and industrialization has put great pressure on the use of land, water and vegetation. Concentration of human population in limited space in urban

areas has resulted in the increase of buildings, roads, surface area, vehicles, population, factories, urban sewage [4] and storm drains, urban wastes, smoke and dusts and garbage hazards. Air pollution is caused due to release of carbon monoxide, carbon dioxide from auto mobile exhaust in the major cities [5-8]. Similarly the industrial pollutants released into air are causing disastrous air pollution in the urban areas. The increase in settlements and population has resulted into water pollution due to discharge of sewage coming out of domestic uses of water. The industrial expansions development in urban areas on one hand made the country to become self reliant in industrial produce and enable the country to earn foreign exchange on export of manufactured goods and has also created environmental problems by polluting air, land and water. Chemicals, electricity, mining, non metallic minerals, transport equipment and other industries, non electrical machinery, food products, basic metals, cotton textiles, sugar, pharmaceutical industry, distillery, cement, fertilizers, thermal power plants, pulp paper, pesticides, leather and dye industries have registered rapid growth during the 20^{th} century. All these industries emit gaseous and particulate pollutants and discharge industrial wastes effluents. The industrial effluents pollute the ground water and river water. The major air pollutants are sulphur dioxide, nitrogen oxide, suspended particulate matter, carbon monoxide, benzene, lead, hydro-carbons etc.

The noise levels in India are rising with the industrial growth and automobile increase. Noise levels in commercial areas of almost all major cities exceed the acceptable level of 65 decibels during day time and 55 decibels in the night time [9]. Noise level has become very high due to increase in automobiles. Noise pollution may be defined as the state of discomfort and recklessness caused to human beings by unwanted high intensity of sound known as noise. In urban areas the main sources of noise pollution are automobile, air craft's, rockets, defence experiments, hawkers, vegetable and fruit markers, children playing, electioneering, religious propaganda, cultural programming, musical nights, festivals, worships, advertisements and loud speakers. Industrial source of noise pollution increase noise pollution from factories. Noise pollution is measured through decibels.

Water pollution is defined as alteration in physical, chemical and biological characteristics of water which may cause harmful effects on human, animal and aquatic features. It also refers to deterioration in chemical, physical and biological properties of water. It is a natural and intruded change in quality of water and unsuitable to human, plants and animals, urban centres contribute water pollutants through sewage water, domestic garbages and industrial effluents. These wastes are discharged into the streams, ponds, lakes, rivers and reservoirs and costal water directly. The water pollution is assessed on the basis of physical, chemical and biological parameters. The physical parameters are temperature, colour, odor, turbidity, conductivity, density, suspended sediments and dissolved solids. The chemical parameters are soluble salts, hardness of water, acidity, alkality, dissolved oxygen, biological oxygen demand, chemical oxygen demand, concentration of hydrogen ion, amount of ammonia nitrate and nitrates, amount of heavy metals like mercury, lead, chromium, chlorides, pesticides, insecticides and detergents. Biological parameters are bacteria, coliforms, algae and viruses. The biological oxygen demand (BOD), chemical oxygen demand (COD), dissolved oxygen and pH value are important indicators of water pollution. Ground water in urban areas is polluted through leaching and down ward movement of pollutants from industrial wastes, urban garbages, earthen septic tank and polluted ponds and tanks. The main controlling factors of ground water pollution are ecological characteristics of sub-soils and subsurface materials, depth of water table, nature of aquifer, amount and nature of rainfall, infiltration of rain water and stagnant ponds and tank water and

above all the nature and amount of pollutants. Solid waste substances are those materials which become useless. They are news papers of different types, canes, bottles, broken glass wears, plastic containers, polythene bags, ash and domestic garbages.

Solid waste management is one of the essential obligatory functions of the urban local bodies because most of the urban areas in the country are plagued by acute problem [10-12]. Majority of the urban local bodies are resorting to open dumping of municipal solid waste and fill up of low lying area in an open unscientific and unplanned and haphazard resulting in problems of health and sanitation and environmental degradation. Due to lack of serious efforts by Municipal and Corporation authorities' garbage management has become tenacious problem and is creating environmental pollution and health hazards. Slums in urban areas are characterized by deteriorating and unsanitary housing, poverty and social disorganization. They refer to an area or locality in urban centres which conspicuously identify due to absence of basic civil facilities. The prevalence of slums is very common in all the urban areas due to rapid growth of population and migration of people from rural to urban areas. The rapid growth of slums in urban areas is creating bottlenecks for urban planners as well as administrators. The improvement of environment of urban slums can be achieved meaningfully only by providing basic urban services and through proper monitoring and management.

Due to rapid migration of rural people to urban centres in search of employment the slums [13, 14] are developed along the canal banks, tank bunds, railway lines, partially filled in tanks, government land etc. The migrated people are occupying the unauthorized lands and building temporary houses with bamboo sticks. There are no urban amenities like lighting, sanitation ventilation, drainage and water supply in these areas. The urban poor living in these slum areas are also subjected to health problems. Most of the air and water born diseases originated in urban areas from these locations. Perceptional studies to conclude environmental quality is very poor in the slum dwellers [15], and also express the environmental degradation [16] is high, and described the problems and eco-development [17]. Some studies have explained the recent aspects of urbanization and urban warming [18]. A study on green infrastructure for environment enhancement in Durgapur Municipal Corporation carried out [19].

The major objectives of this study includes (i) to study the urban environmental problems like air, noise, water and dust pollution of the Anantapur Municipal Corporation, (ii) to find out the urban slums and solid waste disposals and (iii) to analyse the quality of urban life and environmental impact assessment.

MATERIALS AND METHODS

Description of the study area: The Anantapur Corporation covers an area of about 2683hectares (Fig.1). It possess a population of 2,30,212 (according to 2001 census). The urban areais upgraded as Corporation on 1-4-2005. The Corporation is geographically located at $16^{0}.41^{1}$ North latitude and $77^{0}.36^{1}$ East longitude. The Corporation receives an average annual rainfall on about 539 mm and it experiences dry sub humid type of climate.

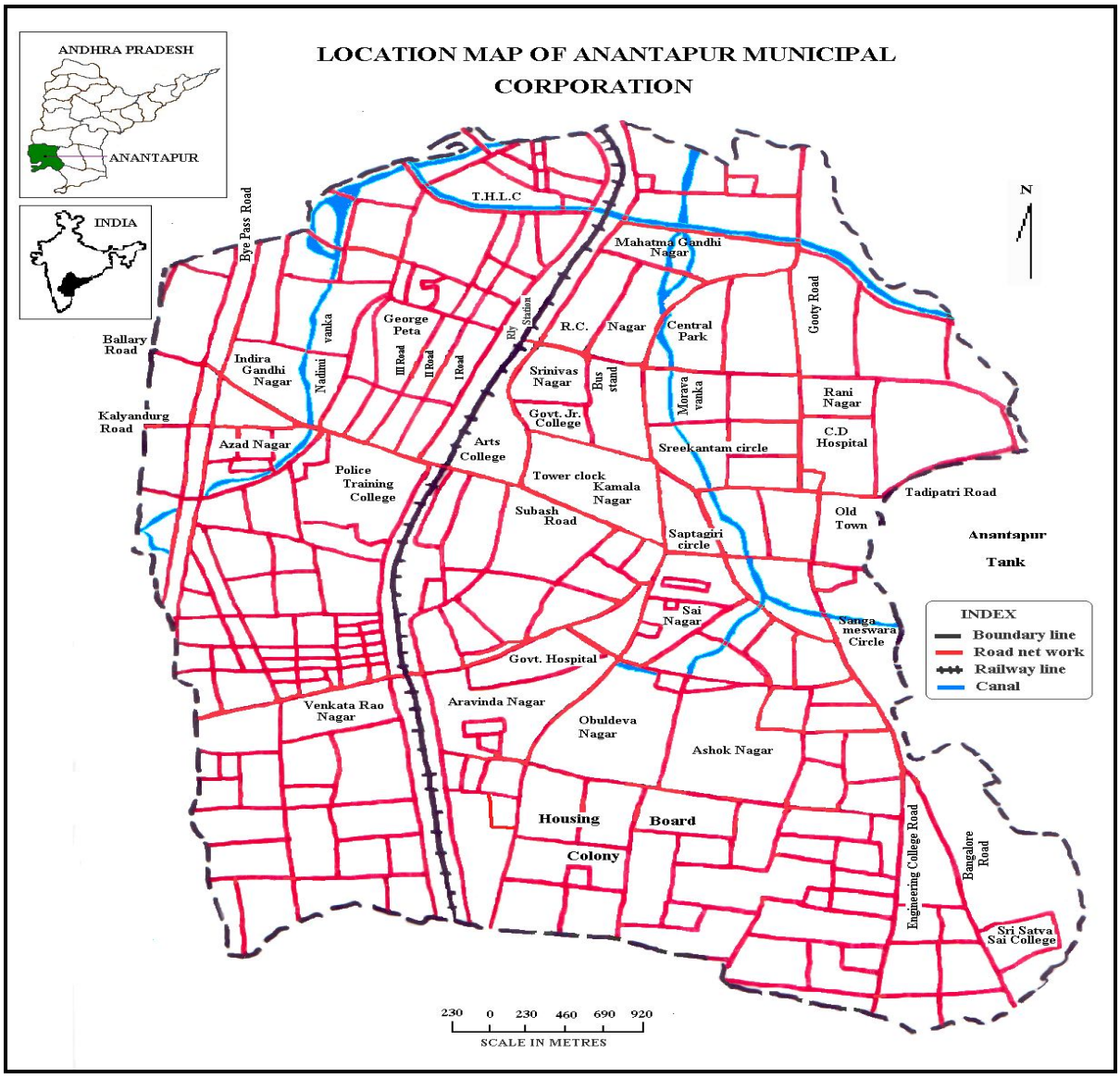

Fig.1 Location map of the Anantapur Municipal Corporation

The major environmental problems relating to urban sewage, solid waste disposals, congested roads, urban slums and pollution has been collected through primary data and from Anantapur Municipal Corporation. The environmental problems of the Anantapur town are studied, based on data collected on existing housing demand and deficit, water supply, water demand and water deficit, sewage disposal, solid waste disposal, urban transportation, urban congestion, urban pollution (air, noise and water) and distribution of slums. The data was collected ward-wise and identified the ecologically deteriorated zones. The data pertaining to slums, the distribution, population, occupation, income, infrastructural facilities, health conditions, nutrition and the occurrence of the diseases was collected ward wise, through a questionnaire from about 1% of the total slum population. The quality of life and Environmental Impact Assessment of the Anantapur Corporation are carried out ward-wise taking the occurrence of environmental

problems and ecologically deteriorated zones adopting Smith [20] method. Finally a few suggestions are made for a better quality of life in Anantapur Municipal Corporation.

RESULTS AND DISCUSSION

The major urban problems of the Anantapur municipality are unbalanced development of the Municipal Corporation, pollution (air, noise, water and dust pollution) development of urban slums, shortage of housing, highly congested central business area of the Anantapur Municipal Corporation, high intensity of residential concentration in the old town, absence of organized commercial areas and shopping centres with sufficient parking and storage facility, in adequate city services like water supply, drainage, traffic and transportation, narrow circulation pattern of roads in the old town area, development of slums, encroachment of tanks and solid waste disposals.

Air pollution: The air pollution in the Anantapur municipality has been noticed very high due to discharge of automobile exhaust in the Subash road, Raju road, Railway feeder road, R.T.C. Bus stand road, Sreekantam circle, old town market road and old town market to Sngameshwara circle road. In these roads the average flow of two wheelers, three wheelers, and four wheelers are above 8,000 per a day (Fig. 2). The carbon monoxide, deadly organic vapour, sulphur compounds and toxic substances released from these vehicles are creating air pollution. In the roads leading to Govt. Hospital, Sainagar, Revenue colony, Kalyandurgam road, bypass road, Gooty road and Bangalore road, the number of vehicles flowing is less than 4,000. The air pollution in these roads is moderate due to release of carbon monoxide, deadly organic vapours, sulphur compounds and toxic substances from automobile exhaust. In other roads of the Anantapur municipality the air pollution is low.

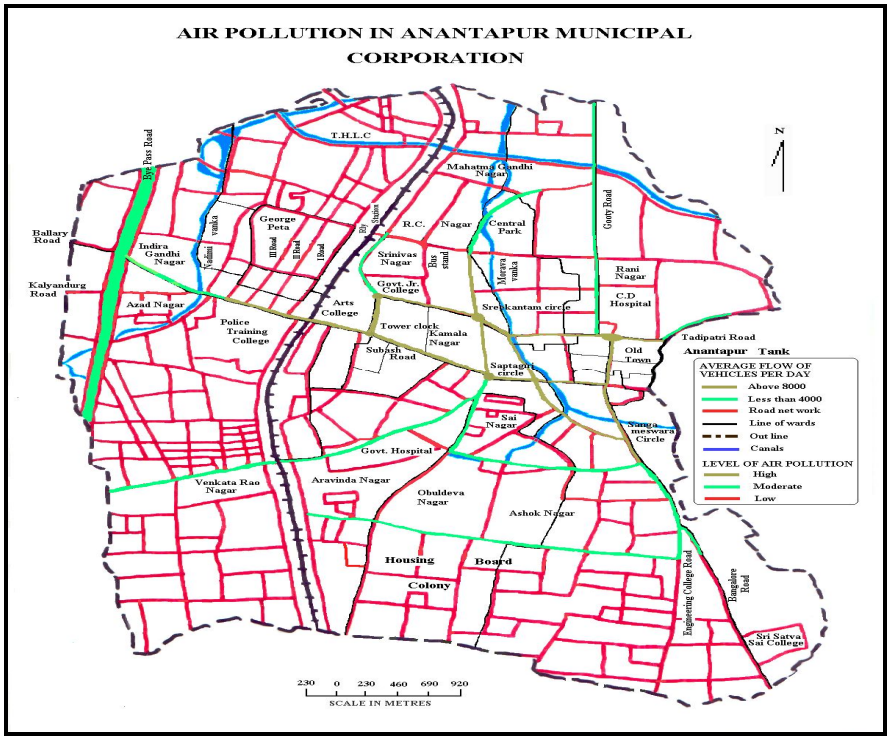

Fig. 2 Air pollution of Anantapur Municipal Corporation

Noise pollution: The noise pollution is generated in the Anantapur Municipal Corporation due to vibrations and horning of vehicles and public micro phones, along the major roads like Subash road, Railway feeder road, Raju road, Tadipatri road, R.T.C. Bus stand road and Old town road. The noise levels vary from 70 to 90 decibels during peak hours (Fig. 3). During non peak hours the noise levels are less than 50 decibels. Along the Kalyandurgam road, bypass road, Govt. Hospital road, Sainagar road, Bangalore road, and Gooty road the noise pollution varies from 50 to 70 decibels during peak hours. During non peak hours the noise pollution is low.

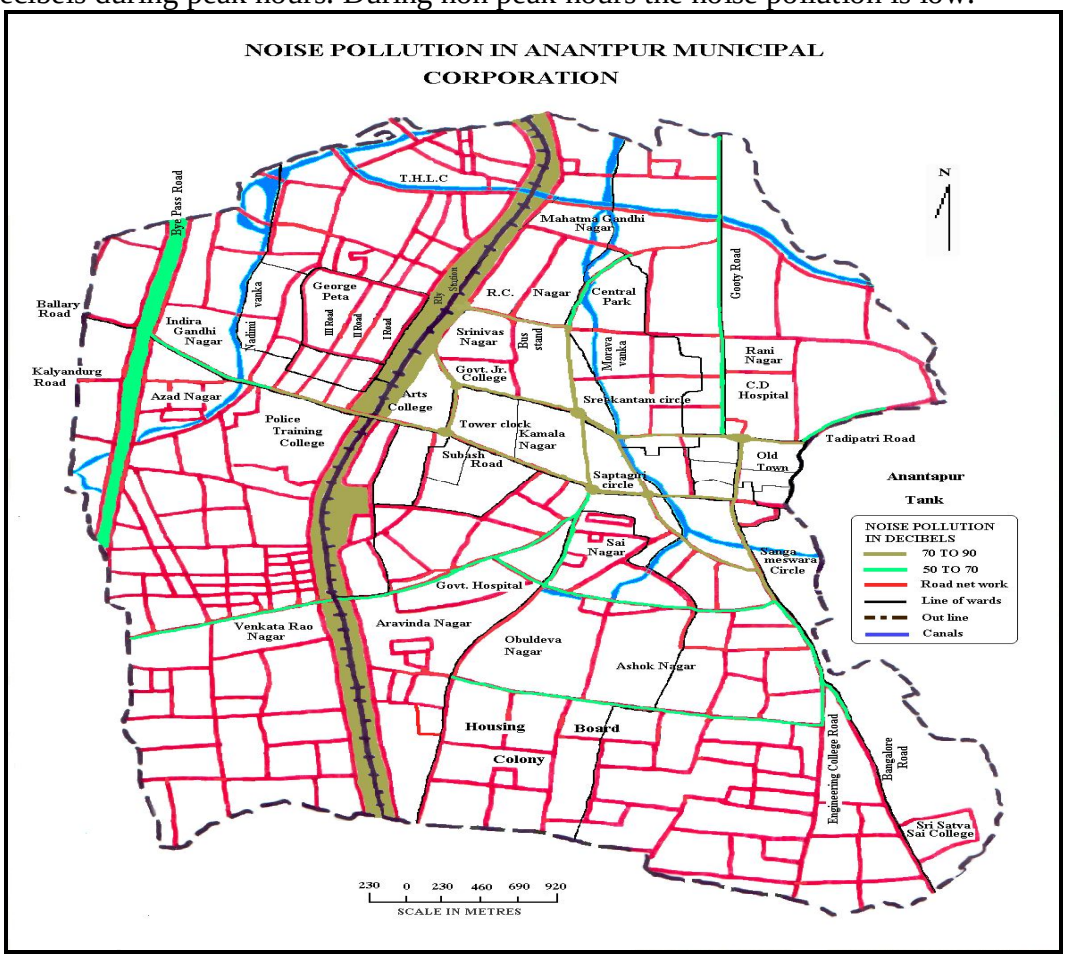

Fig. 3 Noise pollution of Anantapur Municipal Corporation

Water pollution: The water pollution in the Anantapur Municipal Corporation is due to discharge of sewage water and hospital effluents in the two major streams in the Municipal Corporation (Fig. 4). On an average about 2.5 lakhs litres of sewage water is discharged into each stream of the Municipal Corporation. The analysis of water samples from these two streams revealed very high concentration of B.O.D. solids, organic and chemical compounds, coli forms and faecal coli forms. The water pollution is also found in the Ananthasagar tank where the sewage water is discharged directly in to the tank.

Dust pollution: The dust pollution is noticed in the Anantapur Municipal Corporation in the months of June, July and August due to heavy winds exceeding 20 km/hour. Almost all the major roads in the Municipal Corporation are affected by dust pollution due to dust collected on the either side of the roads.

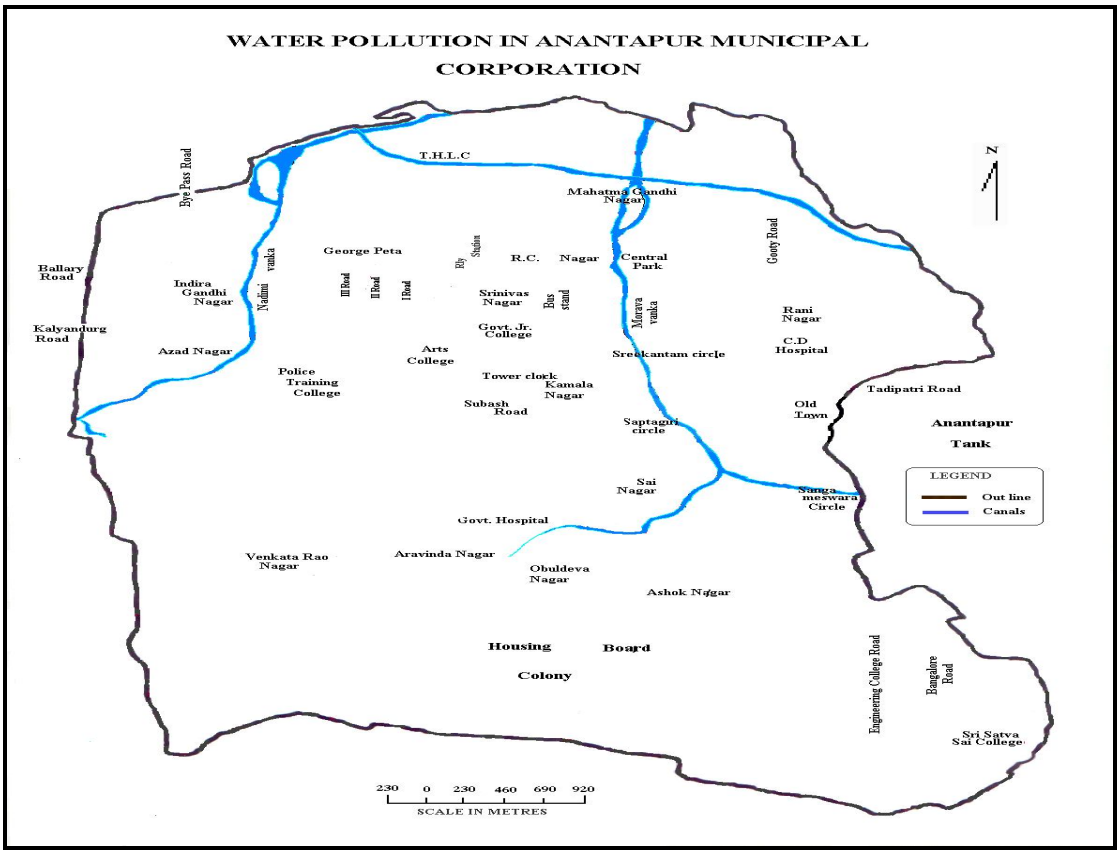

Fig. 4 Water pollution of Anantapur Municipal Corporation

Urban slums: There are about 51 slums of the Anantapur Municipal Corporation distributed along the major drainage streams, railway lines and high level canal (Fig. 5). The total area covered by the slums is about 120.75 hectares and it accounts for 4.50% of the total area. The total population living in the urban slums during 2001 is about 60,820. It amounts to 26.40% of the total population during 2001. The number of residential houses is 10,336. The density of population is about 504 persons per hectare. The number of households is 12,655. The family size varies from 4 to 6 members. About 40% of the slum people are illiterates. About 30% of the slum people possess primary education, 25% possess secondary education and 5% higher education. The occupational structure of the Anantapur slum dwellers show that about 30% are the daily labour, 25% are auto drivers, 15 % are sweepers cum scavengers, 10% are the masons and 20% are the others. The annual income of slum dwellers varies from Rs. 3,000 to 15,000 annum. It is less than Rs. 5,000 per annum in about 25% of slum population, Rs. 5,000 to 10,000 per annum in about 25% of slum population and more than Rs. 10,000 per annum about 60% of the slum population. The sanitary facilities are very poor in the slums areas. The ventilation is very low due to congested houses. The health facilities are also poor. The drainage and solid waste disposal conditions are very bad. The major diseases prevailing in the slum dwellers are diarrhoea, typhoid, malaria, viral fevers, venereal diseases, skin diseases and others. The quality urban life is very poor in the slum dwellers.

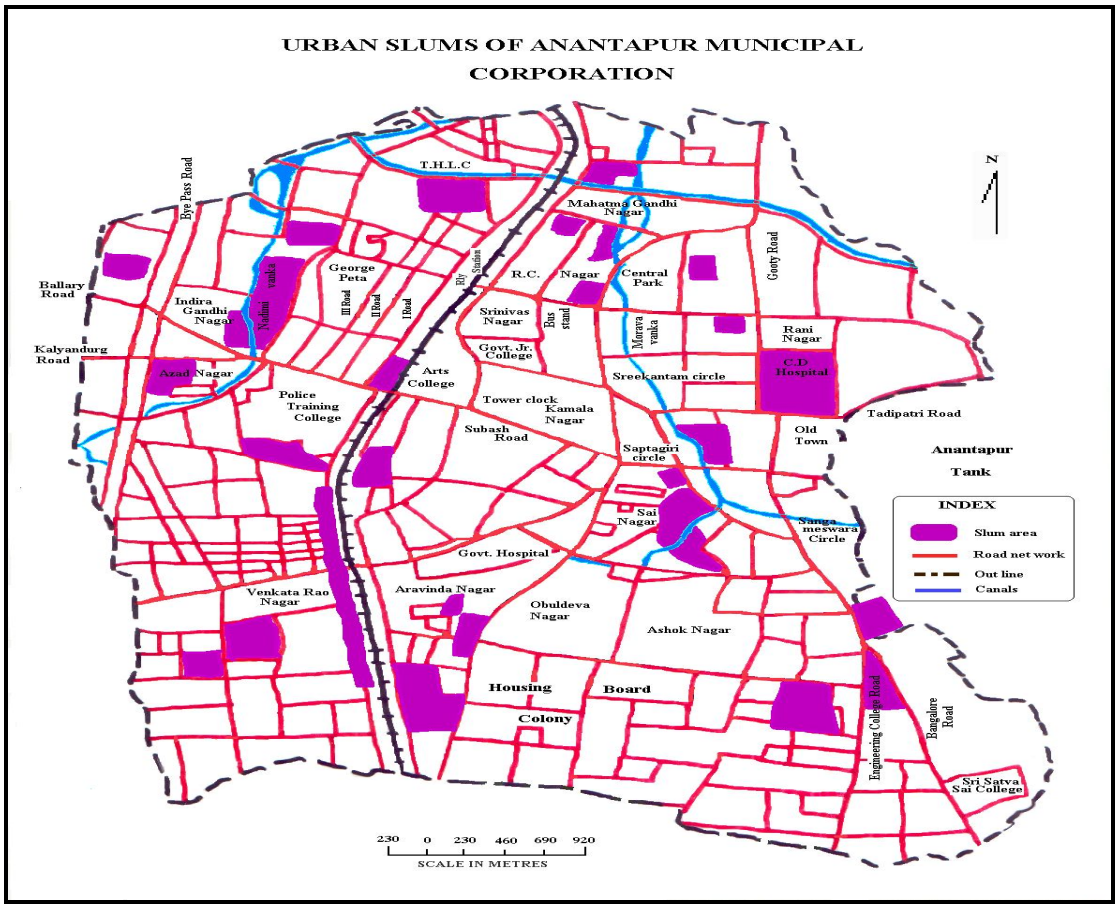

Fig. 5 Urban slums of Anantapur Municipal Corporation

Traffic problems: The major congested roads identified in the Anantapur municipality basing on movement on light and heavy vehicles, three wheelers and two wheelers are Subash road, Railway feeder road, Raju road, R.T.C. bus stand road, Sreekantam circle to old town market road and old town market to Sangameswara circle road (Fig. 6). On these roads an average more than 8,000 vehicles flow daily. These roads are prone to accidents during peak hours. A study of number of accidents occurred in the Anantapur Municipal Corporation reveal that there is an increase in the number of accidents from 55 in 1991 to 165 in 2001. The three fold increase in the accidents are due to inadequate traffic police, over speeding, rash driving , joy walking by pedestrians without following traffic rules and increase in vehicular traffic particularly two and three wheelers. To overcome the traffic congestion the major roads should be widened, the corridors shall be developed, proper circular planning development, development of pedestrial sub ways, construction of over bridges at the major circles, development of the parking structure and providing required traffic police.

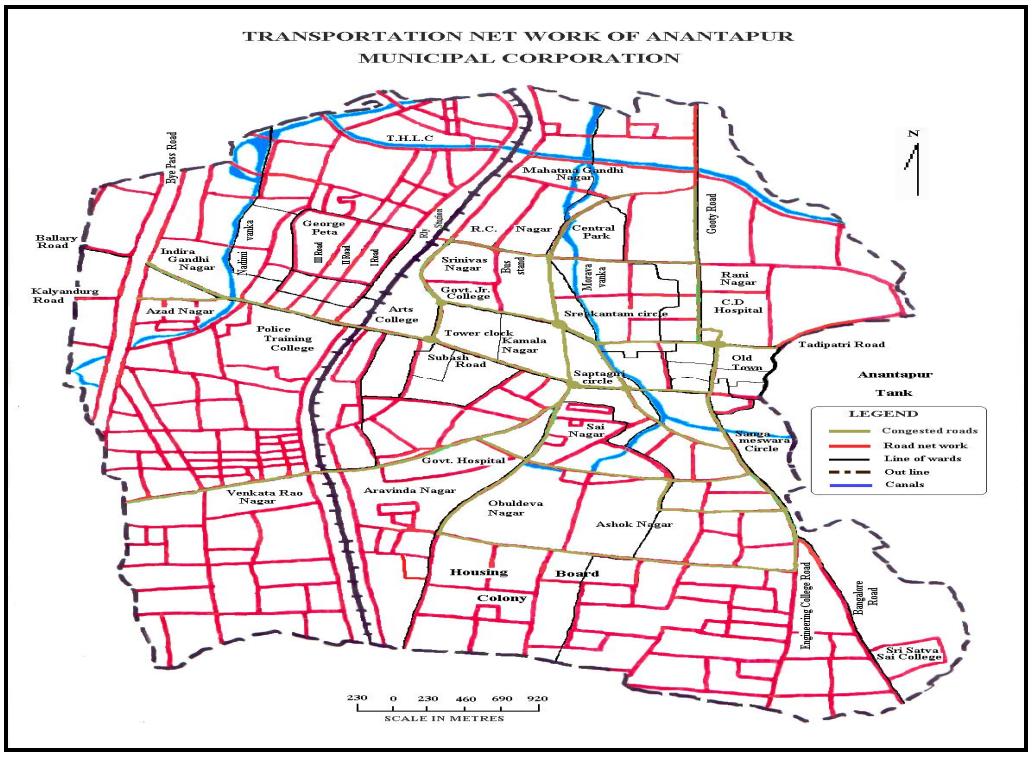

Fig. 6 Trafic problems of Anantapur Municipal Corporation

Migration: The rural urban migration to Anantapur town was 2,223 in 1971. It has increased to 3,743 in 1981, 4,101 in 1991 and 6,574 in 2001. The rural-urban migration has been increasing from 1971 to 2001. The birth rate in Anantapur town was 39/1000 in 1971, 20/1000 in 1981, 33/1000 in 1991 and 23/1000 in 2001. The death rate was 10/1000 in 1971, 9/1000 in 1981, 1991 and 2001. Due to natural birth rate, decrease in death rate and increase in rural urban migration the population of Anantapur Municipal Corporation is increasing decade after decade.

Water problem: The required water per a person is about 50 liters/a day. The available water is 28 liters / a day per person. The water deficit is 22 liters/a day per person. Due to geographical location of Anantapur Municipal Corporation in a chronic drought prone area the problem of water is increasing year after year. The Pandameru River and Thadakaleru River beds are major sources of water along with Tungabadra High Level canal. There are about 11,130 shallow wells and deep bores in the Anantapur Municipal Corporation drawing about 200 liters / day from each well. The total water drawn by the bore wells is about 2,226,000 liters of water. Due to continuous droughts in Anantapur district about 80% of the bores are dried up. The total required water of Anantapur Municipal Corporation is 8,842,080 liters/day. The available water resources for Anantapur Municipal Corporation from all sources are about 6,189,438liters/day. The water deficit per day in Anantapur Municipal Corporation is 2,790,894 liters. The problem of water is increasing day after day. Due to low recharge in the Pandameru and Tadakaleru river beds and failure of majority of the bore wells, the water supplied through Tungabadra high level canal has to be properly managed to distribute the water throughout the year. A new water scheme is proposed by the Anantapur Municipal Corporation to bring water through pipe lines from Mid Pennar dam which is fed by Tungabhadra water.

Solid waste management: Solid waste management is the one of the essential obligatory functions of the urban local bodies. Most of the urban local bodies are resorting to open dumping of municipal solid waste and fill up the low lying areas in an unscientific, unplanned and haphazard manner. This way of solid waste disposal is leading to problems of health, sanitation and environmental degradation. Majority of municipalities in India do not posses adequate expertise and experience in the management of solid waste. They lack technical, managerial, administrative, financial resources and adequate institutional arrangements. The dumping grounds are frequented by the rag pickers who earned their livelihood by picking and selling recyclable material such as plastic papers and metals. A number of animals graze regularly in the dumping areas. Over a long period the municipal solid waste leaches into the ground and pollute the ground water. There is no system of segregation of organic, inorganic and recyclable waste at house hold level. Door to door collection of solid waste is not practiced in most of the municipalities. Hardly any attention is given to scientific and safe disposal of solid waste. It is therefore, necessary for the urban local bodies to provide proper guidance for insulation, operation, and demonstration of solid waste management.

The purpose of demonstration model project is to create practical understanding of various systems available for collection, transportation, recycling, resource recovery and disposal of solid waste. The demonstration model project is used to create realistic approach, and preparing an eco-friendly municipal solid waste management and to provide sustainable, operational and guidelines for efficient municipal solid waste management. The eco-friendly municipal solid waste management is meant for the study of quantification and characterization of municipal solid waste planning and design of a bin system for institutions, markets, hospitals and Public offices, to study the existing storage and transportation system, to plan and design of composting, land filling, segregation system and to assess the purpose of recycling composting and land filling.

In Anantapur Municipal Corporation there are about 20 garbage houses with a storage capacity 4 to 6 tonnes. Out of them at present 12 garbage houses are in working condition. The Anantapur Municipal Corporation posses 40 tricycles, 3 tractors, 3 tallies and 6 private tractors for disposal of solid waste at the disposal site. The present disposal site is located in about 5.06 hectares plot of land near Gooty Highway. The land is owned by Municipal Corporation. It is estimated that about 107 million tonnes of solid waste is generated for a day and the total waste is being disposed to the dumping yard. About Rs.168.92 lakhs / year are being spent by the Anantapur Municipal Corporation towards solid waste management to meet the cost of supervisors, labour, fuel, repair of vehicles, material cost and amount to private tractors. About 314 man powers are involved in the disposal of solid waste in Anantapur Municipal Corporation. The total expenditure towards payment of salaries is about Rs.140.74 lakhs / year. The major sources of solid waste in Anantapur Municipal Corporation are industries, households, slum areas, the silt generated from open drainage system, markets, hotels and canteens, slaughter houses and biomedical waste generated from hospitals and clinics.

The analysis of 75 Kg of samples collected at the disposable site revealed that the composition of sand, dust and skeleton bones. is about 87.74%, plastics is 8.10%, the paper is 4.05%, glasses are about 0.08%, metals are about 0.03% and cotton, lather and rubber are about less than 0.01%. It summarizes that the waste is primarily segregated with an average organic waste of 40%, recyclable 10% and other inert waste 50%. There is a good market demand for end products of

Anantapur municipal solid waste management after treatment. The compost, recyclable material and building material generated will be 27 tonnes / a day. After treatment of organic waste, there is a good demand for compost because of development of horticulture which is used as bio-fertilizers in mango, orange, lemon, guava, banana and sapota crops. The total demand for compost as bio- fertilizer in Anantapur district is approximately 53,855 tonnes per year. The horticulture farmers are paid Rs.1.42 per kilogram of bio-fertilizer. The total compost generated per annum is about 9855 tonnes. There is a deficiency of 44,000 tonnes of bio-fertilizer. This manure is being procured from the neighbouring states.

Recyclable materials are plastic, cotton, paper, rubber, metal and glasses. There are about 25 number of recyclable waste collection in Anantapur town. There are about 300 to 400 rag pickers who are collecting the recyclable waste from open dump yards, house hold, hospitals and garbage station. Each rag picker is earning about Rs. 100/- to 300/- per day. The recyclable waste dealers are purchasing 20 to 40 recyclable wastes from rag pickers. The building materials such as pavement blocks, bricks, files are manufactured from inert materials of the solid waste. They are being sold to government agencies such as central and state where housing corporations, public work departments and municipalities.

Quality of urban life: The quality of urban life in Anantapur Municipal Corporation has been worked out taking the criteria of economic status, environmental status, health status, education status and social disorganization. The criteria used are income, employment, social welfare, housing , water, sanitation, sewage, pollution, congestion, slums, mortality, chronic diseases, infectious diseases, disabled persons, accessibility to health centers, literates, illiterates, personal pathologies, family background, overcrowding, public order and safety, delinquency, demographic, participation and equality. Based on analysis is found the quality urban life is poor in the central wards of the Anantapur Municipal Corporation which cover about 15 wards. The quality of urban life is moderate in three wards. The quality of urban life is good in 10 wards. They are located in the peripheral zones of the Anantapur Municipal Corporation (Fig. 7).

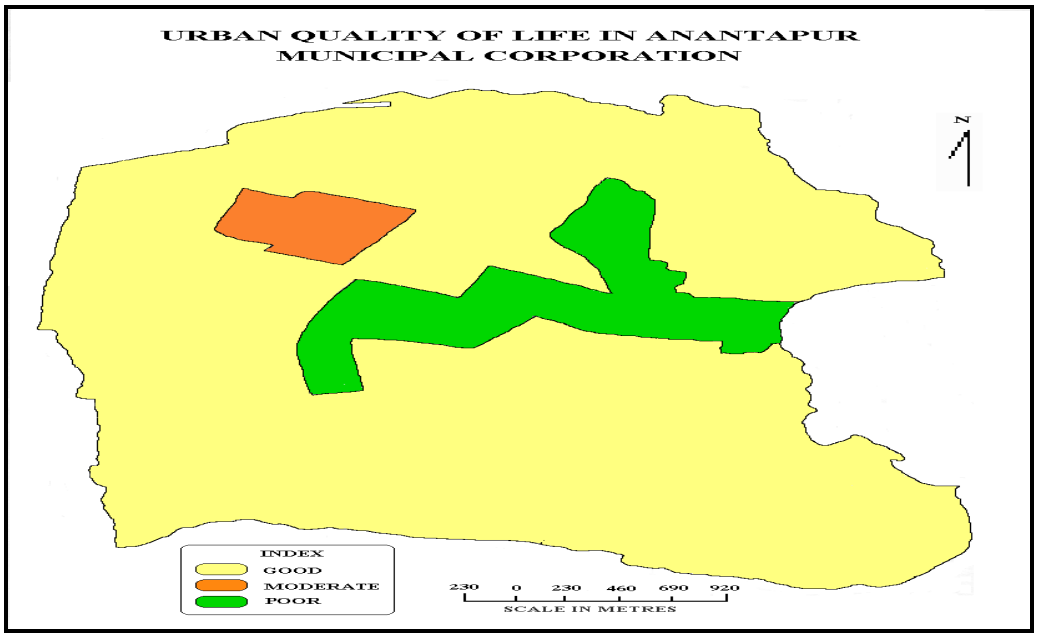

Fig. 7 Urban quality of life of Anantapur Municipal Corporation

Environmental impact assessment: The environment impact assessment of Anantapur Municipal Corporation has been worked out at ward level taking 15 criteria and adopting Jenkin's (1992) method of evaluation matrices of environmental impact. The criteria used are ward wise density population, density of housing, land use, ward wise amount of water required, distribution of slums, traffic congestion, solid waste disposal, sewage disposal, air pollution, noise pollution, water pollution, dust pollution, density of vegetation, distribution of chronic diseases and infectious diseases. From the analysis it is found that in about 8 wards located in the old town E.I.A. index is very high. E.I.A. index is moderate in about 10 wards bordering the old town. The E.I.A. index is low in 10 wards. They are located in the peripheral regions of the Anantapur Municipal Corporation (Fig. 8).

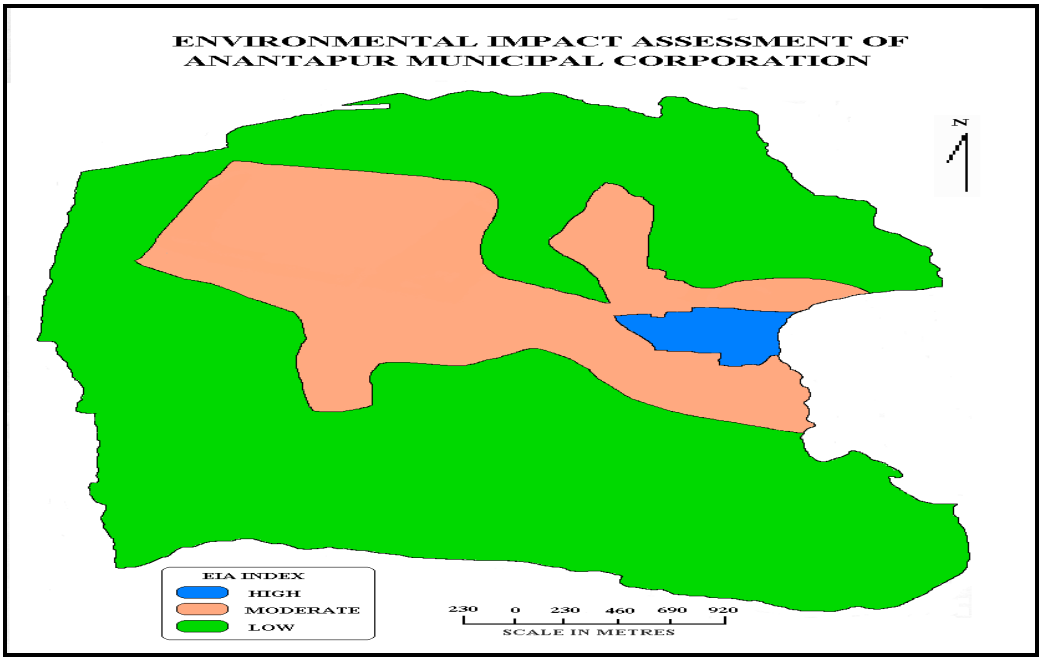

Fig. 8 Environmental impact assessment of Anantapur Municipal Corporation

APPLICATIONS

The Municipal Corporation has proposed commercial centres to make available marketing facilities to the residents in the newly developed colonies. The Municipal Corporation has proposed development of commercial centres, development of parks and play grounds, development of new roads and widening, to improve the traffic linkages, clearance of slums and development of green belts. The Municipal Corporation has take appropriate measures for upgrading the housing, water, lighting, sanitation, drainage and waste disposals to the urban slum dwellers. The Municipal Corporation should immediately take measures for massive

afforestation along this part of the tank, so that the slum growth could be controlled and green belt could be developed.

CONCLUSION

The major urban problems of the Anantapur municipality are unbalanced development of the Municipal Corporation, pollution (air, noise, water and dust pollution) development of urban slums, shortage of housing, highly congested central business area of the Anantapur Municipal Corporation, high intensity of residential concentration in the old town, absence of organized commercial areas and shopping centres with sufficient parking and storage facility, in adequate city services like water supply, drainage, traffic and transportation, narrow circulation pattern of roads in the old town area, development of slums, encroachment of tanks and solid waste disposals. Based on analysis is found the quality urban life is poor in the central wards of the Anantapur Municipal Corporation which cover about 15 wards. The quality of urban life is moderate in three wards. The quality of urban life is good in 10 wards. They are located in the peripheral zones of the Anantapur Municipal Corporation. From the analysis it is found that in about 8 wards located in the old town E.I.A. index is very high. E.I.A. index is moderate in about 10 wards bordering the old town. The E.I.A. index is low in 10 wards. They are located in the peripheral regions of the Anantapur Municipal Corporation.

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