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***CHAPTER- 1***

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***DESIGN OF THE STUDY***



# CHAPTER - 1

## DESIGN OF THE STUDY

### 1.1 Introduction

Urbanization is the process of population moving towards towns and cities from rural areas, and taking up the culture and work prevailing in the urban areas. According to the Encyclopedia of Social Sciences (1971); “urbanization is characterized by movement of people from small communities concerned chiefly or solely with agriculture to other communities generally larger, whose activities are primarily centered in Government, trade, manufacture or allied interests”. In simple words, “urbanization usually refers to the process of concentration of people in the densely populated settlements where majority of the people derive their livelihood from non-primary occupations” (Chaudari, 2001). It is treated as an index of modernization and one of the chief ingredients which reflects growth. It is also considered as a process which reveals itself through temporal, sectoral and spatial changes in the demographic, social, economic, technological and environmental aspects of life, in a given society. Urbanization is an inevitable part of economic development as it is intrinsically connected with the development process of countries. The process of urbanization is viewed for taking societies to higher levels of social formation.

The word ‘Environment’ is derived from the French word ‘Eviron’ which means surroundings. The surroundings where we live includes biotic factors like human beings, plants, animals, microbes, etc and abiotic factors such as light, air, water, soil etc. Thus environment is viewed as a complex of many variables, which surrounds man as well as the living organisms. The environment includes water, air, & land and the interrelationships which exist among and between water, air & land and human beings and other living creatures such as plants, animals and micro organisms (Kalavathy, 2004). In short, environment consists of an inseparable whole system constituted by physical, chemical, biological, social and cultural elements, which are interlinked individually and collectively in myriad forms. It is a known fact that, without environment there is no life. But today, the environment is being

polluted massively. All unplanned human activities have the possibility of polluting the environment by contaminating water, air and soil.

Now, urbanization is a worldwide phenomenon in more developed as well as less developed regions. The World Urbanization Prospects in its studies revealed that the rate of urbanization is higher in less developed regions than highly developed regions of the world. Urban issues are becoming of critical importance around the world, and urbanization is expected to continue with close to half of the world's population already living in urban areas and some cities now reaching unprecedented size (United Nations, 2011). It has resulted in increased pollution of land, water, air and other natural resources. Urban population growth in developing countries resulted in soil degradation, pollution and contamination of natural waters, deteriorating air quality and growing dependence on expensive and diminishing fossil fuels become increasing concern (Rattan, et al: 2002).

In India, the percentage of urban population to total population is 31.16 percentage and urban areas account for about 60% of the GNP of the country (Census report, 2011). The urban areas in the country have sufficient infrastructure facilities and employment opportunities than the rural areas and this attracts still more people to urban areas. This results in higher rate of migration to urban areas and more pressure on urban infrastructure. The excessive usage of resources ultimately results in the release of large amounts of wastes and pollutants. Cities of India on a large face many environmental problems like the declining and contaminated water supply, inadequate housing & drainage facilities, severely inadequate sanitation facilities, accelerating air & noise pollution and enormous quantities of solid wastes. The over populated Cities of India are characterized by over population and the related environmental problems which are the main contributors of health risks. Almost all the cities of India are facing severe environmental crisis due to congestion, increasing number of vehicles on roads, dumping wastes on rivers and road sides etc. The over population in cities is one of the major reason for in growing number of slums, and subsequent pollution problems.

In Kerala like other states of India, the urban issues are not apart from city life. About half of the total population of the state is urban population and the cities which are in the higher ranking of urbanization are Ernakulam, Thrissur and Kozhikkode. All the

cities are recorded high density of population and this is the reason for high amount of environmental pollution and associated health hazards. The explosive growth of motor vehicles and resulted congestion in roads, inappropriate drainage and sewage system, increasing amount of municipal solid wastes without proper treatment system etc are the major issues of urbanization in the state. The higher amount of pollution is ultimately resulting in health risks in the form of various diseases and related economic issues in urban areas of the state. Thus, urban areas today faces a grave ecological crisis caused by the pollution of water, air noise and land as there is higher depletion of natural resources. Hence, the linkage between urbanization and environment is needed to be given more emphasis in studies. What we needed to introduce is sustainable urban development rather mere economic growth in cities. For us, sustainable development is both a challenge and an opportunity. The obstacles in context of urbanization and modernization are however great and making the concept of sustainability precise, is difficult. It is not possible to argue that there should be zero use of natural resources for development; successful development will inevitably involve some amount of depletion of natural resources, resulting in environmental damage. Further, policies and programs of accelerating environmentally responsible development will not happen by themselves. It is therefore, important to seize the current opportunity to bring about real if not radical, change in the developmental approaches.

## **1.2 The Study Area**

The present study of the impact of urbanization on sustainable environment in the state of Kerala is an attempt to analyze the devastating effects of environmental degradation in urban areas with special attention to its health impacts on urban households. As per data released by the Government of India for Census 2011, Thrissur is an Urban Agglomeration which exhibits higher percentage of urban population. Hence, the study area which is selected for the purpose is Thrissur urban area. According to the Census report of 2011, in Thrissur district, there are 7 cities which comes under the district administration namely; Thrissur municipal corporation, Kodungallur, Kunnankulam, Chalakkudy, Chavakkad, Irinjalakkuda and Guruvayoor. Among these cities, the major share of urban population is from Thrissur city (Thrissur MC). On the basis of the reports of the State Pollution Control Board and Thrissur City Development Plan, there are severe environmental problems in the

city because of careless usage of environmental goods. Pollution of water resources, increasing levels of air and noise pollution, and problems related with municipal solid wastes are the major problems in the city. Hence, the study about these issues with special attention to their health impacts on households will highlight the problems of environmental pollution in each and every city of Kerala.

### **1.3 Definition of Related Concepts**

The meaning and definition of concepts related with the study are explained as;

#### **1.3. (i) Urbanization**

The term urbanization is defined as the process by which large numbers of people become permanently concentrated in relatively small areas, forming cities. It refers to the population shift from rural areas to urban areas, the gradual increase in the proportion of people living in urban areas, and the way in which each society adapts to this change (United Nations Population Fund, UNFPA).

#### **1.3. (ii) Environment**

The term environment means surroundings and circumstances affecting person's life (Julia Elliot, 2006). It is the sum total of all conditions and influences which affect the development and life of organisms on earth (Anil K De,2004). Thus environment is the surroundings, in which a living being operates, including air, water, natural resources, flora and fauna.

#### **1.3. (iii) Pollution**

Any change or addition in the environment which contributes to its deterioration or is contamination with substances which make it less favorable or harmful for organisms is called pollution. It is caused when a change in physical, chemical or biological conditions in the environment harmfully affects the quality of human life including animals, plants etc. Pollutants, the components of pollution can be either of foreign substances/ energies or naturally occurring contaminants.

### **1.3. (iv) Environmental Pollution**

Environmental pollution refers to the accumulation of materials in the air, water and soil in sufficient concentration to have a direct or indirect negative effect on people and their environment. It is the act of introduction by man, of extraneous substances or energy into the environment that induces unfavorable changes (Kannan Krishnan, 1991).

### **1.3. (v) Environmental degradation**

‘Degradation’ as a concept invokes the ecological concept of ‘carrying capacity’. Carrying capacity is the ability of an environment to sustain the resource demands of a species or a community without losing its ability to regenerate its resources. Degradation usually means that carrying capacity is reduced by some natural or human phenomenon (Nancy Nicholson, 2002)

### **1.3. (vi) Water Pollution**

Water pollution is defined as the presence in ground water of toxic chemicals and biological agents that exceed what is naturally found in the water and may pose a threat to human health and/ or the environment. In other words it refers to hazardous and toxic waste materials disposed into water resources such as dams, lakes, rivers and seas; which then lead to a negative effect on living things found in water and which can also affect human health.

### **1.3. (vii) Air Pollution**

The contamination of the atmosphere, caused by the accidental or deliberate discharge of a wide range of toxic airborne substances is known as air pollution. Air pollution consists of gaseous, liquid, or solid substances that, when present in sufficient concentration, for a sufficient time, and under certain conditions, tend to interfere with human comfort, health or welfare, and cause environmental damage.

### **1.3. (viii) Land Pollution**

It is the deterioration (destruction) of the earth’s land surfaces, often directly or indirectly as a result of man’s activities and their misuse of land resources. Land is polluted by municipal and domestic sewage, industrial effluence, sludge and



fertilizers. Land pollution reduces the fertility of land and destroys the wild life, plants and human.

### **1.3. (ix) Noise Pollution**

Normally sound level about 80 decibels cause noise pollution. Noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms. According to the World Health Organization, sound levels less than 70 dB are not damaging to living organisms, regardless of how long or consistent the exposure is. Exposure for more than 8 hours to constant noise beyond 85 dB may be hazardous.

### **1.3. (x) Sustainable Development**

The term “sustainable development” was brought into common use by the World Commission of Environment and Development (Brundtland Commission) in its seminar report of 1987, named as “Our Common Future”. The Brundtland Commission defined the term as “meeting the needs of the present generation without compromising the needs of the future generation”.

### **1.4 Statement of the Problem**

The present research study is implied to deal with the impact of urbanization on sustainable environment in Kerala - A study based on Thrissur District.

The welfare of the humanity largely depends on the environment he lives through. Man is dependent on the environment for his socio- economic activities. But human beings are reflecting careless attitude towards the usage of environmental goods. Man has been indiscriminately and selfishly exploiting and interfering with nature and as a consequence, the living conditions of the people are in serious threat. The environment where we all live needed to be protected for achieving sustainable environmental conditions in cities. Cities and urban population are the main contributors of environmental degradation. Cities of Kerala also exhibit such careless attitude towards environment. Thrissur district, one of the highly urbanized districts of Kerala, reflects massive environmental pollution in the form of chemical spewing of vehicles, endless dumping of solid wastes along the streets and river, contaminating of water sources etc. Here, the problem of environmental degradation in the context of

growing urbanization based on a detailed study of Thrissur city area specifies the attention on issues of environmental pollution and its impact on health conditions of urban people.

### **1.5 Significance of the study**

Today economics is not mere economic growth or economic development. Infact, the economic thought is more concerned about sustainable development which incorporates economic, social and ecological aspects. Hence, for progressive economic development environmental aspects should be considered into focus. We live in a world wherein natural resources are limited, and the demand for such resources are unlimited. Water, air soil, minerals, etc. are all a part of our life supporting system and without them life itself would be impossible. Hence the economies all over the world are aimed to achieve sustainability in development. The success of sustainable development depends upon the conditions of natural environment and healthy population. Negative impacts on natural environment will adversely influence the human health and sustainable development. The unplanned and unscientific urban growth is considered as the main reason behind the problem of environmental pollution in the form of water contamination, air pollution, noise pollution and solid waste pollution. Many activities related to urban development is aggravating the environmental issues which creates sustainability issues.

Cities in India are growing rapidly with higher urban population. Similarly, Kerala also exhibits high rate of urbanization as about half of the total population of the state is living in cities (Census Report, 2011). Thus environmental degradation is a burning issue especially in cities of Kerala where there is high density of population and hence, the protection of environment today is the concern of the people as well as the authorities. It is emphasized that urbanization and environment are interlinked. The failure to manage the environment will lead to unsustainable urban development which will have serious implications on the present and future generations. Many scholars have acknowledged this issue by conducting studies in varied dimensions. From the available literature on the topic of environment degradation and urban development, it is clear that there is not a single study on this topic related to Kerala cities especially Thrissur district. Thus, this research has its own uniqueness as it is an attempt to examine the effect of environmental pollution on health conditions of

people and tries to suggest remedial measures to have an environmental friendly city life.

### **1.6 Research Questions**

On the basis of the available literature reviews and other information the following research questions are framed.

- 1) What are the main environmental problems due to urbanization in cities?
- 2) What are the detrimental effects of urbanization on natural water, air and noise level in cities?
- 3) What are the problems generated by solid waste pollution in cities?
- 4) What are the impacts of environmental degradation on health status of people in cities?

### **1.7 Objectives of the Study**

The main objectives of the present study are;

- 1) To study the growth of urbanization in India and Kerala.
- 2) To examine the socio- economic conditions of the households in the study area.
- 3) To study the impact of urbanization on the quality of water, land and air in Thrissur district.
- 4) To measure the impact of environmental pollution on health status of the households.
- 5) To estimate the household's willingness to pay for improvement in the quality of environmental goods in Thrissur district.

### **1.8 Hypotheses**

The hypotheses of the study are;

- 1) The higher rate of water and air pollutions, leads to the higher amount of health cost in the sample areas.
- 2) The higher levels of solid waste pollution and noise pollution, lead to the higher amount of health cost in the sample areas.

## **1.9 Methodology**

Present study which is related to the problem of environmental degradation in the context of growing urbanization has been verified and analyzed with the help of primary as well as secondary data, selection of appropriate sample, and the use of statistical and econometric tools. All these components of methodology are explained below.

### **1.9. (i) Sources of data**

For analysis and verification of objectives, both primary and secondary data are used in this study. The necessary secondary data have been collected from census reports of various years, publications of Central as well as State Pollution Control Board, reports of World Urbanization Prospects (U N), publications of Kerala Transport Commissioner and Kerala State Urban Development Plans. Similarly, data from City Development Plans, Kerala Water Authority, City Sanitation Plans and various publications of Thrissur Municipal Corporation are also used.

The objectives of the study have been verified with the help of primary data collected through interview schedules administered to the respondents in selected sample area of Thrissur city. In-depth interviews and direct observation are also used for collecting primary data from the respondents.

### **1.9. (ii) Sampling Design**

The present study on urbanization and environment is based on multi-stage proportionate random sampling method. In the first stage, for making a study about the impact of urbanization on environment, Thrissur district was chosen purposively. The reason behind the selection of Thrissur district is that, the city is in the second position in ranking of urbanization of districts in Kerala (Census, 2011). Similarly, among 55 million plus cities in India, Thrissur occupies the top position in growth rate (894.1%) during 2001-2011 as per the census report of 2011. Hence, the urban areas of the district are not free from severe environmental problems. In the second stage, Among the 7 cities of the district, Thrissur city (Thrissur Municipal Corporation) is selected. This is because; the major share of urban population among the cities of the district is from Thrissur City, as per the census report of 2011. In Thrissur city (TMC) there are 55 corporation wards and they are classified under 6

zones. In the Third stage, among the 6 zones, 3 zones were selected because these zones are having higher number of wards. The names of the zones are The Central zone, Ayyanthole zone and Koorkancheri zone. In the last stage, on the basis of the number of wards, 83, 72 and 70 sample respondents have been randomly selected from the three zones and the total sample size is 225.

### **1.9. (iii) Methods and Models of the study**

**Contingent Valuation Method-** For the purpose of valuation of environmental goods, The Contingent valuation Method (CVM) is used in the study. The usage of this method is based on certain preferences for a proposed change in quality of environmental goods. Generally, environmental economists consider environmental goods as public goods with non- excludability and non- divisibility properties along with strong externalities. The major two approaches for valuation of the environmental goods exist in literature are the direct and indirect approaches. The CVM is a direct method in which people are asked directly to state or reveal their strength of preference for a proposed change.

The first published reference to CVM was made in 1947 by the Berkley Economist, Ciricacy Wantrup and it was designed and implemented in 1963 by Davis, an Environmental economist. The CVM method is a useful technique which can be applied for expressing the 'hidden preferences' of people through surveys. Thus in the area of expressed or stated preferences, CVM is the dominant approach.

The CVM is a direct method that involves questions to sample respondents about their Willingness to Pay (WTP) either for protection of good environment or removal of pollution, or Willingness to Accept (WTA) to compensate for degradation of environment or continuance of pollution. In other words, The WTP is the maximum amount of money which can be paid by the individuals for a higher level of utility. CVM operates the WTP/WTA through surveys and basically there are 4 methods of eliciting the responses through surveys regarding the maximum WTP. These methods are;

- a) The direct- open- ended question method
- b) The bidding game
- c) The payment card

d) The take- it or leave- it method

The sample respondents are directly asked about their WTP for environmental effects in two ways;

- i. The open ended format – and/ or
- ii. The dichotomous choice – yes/ no format

Here, the dichotomous choice which is also known as close ended format questions are used for the study of WTP. The usage of bidding games is aimed to attain the willingness of the household respondents. In this method the respondents are asked to mention a bid amount, he or she is willing to pay for a service described by the interviewee.

Thus, the CVM is used in the present study and for analysis of the responses of the households on the need for protecting environmental goods in the context of growing environmental degradation in the city.

**The Logit Regression and ANOVA Models-**For the purpose of analysis of the collected data along with tables, pictures and graphical representations various tests like chi- square, ANOVA and Logit Regression Model are also used in this study. ANOVA is used to study about the variances in pollution levels in the sample areas.

The Logit Regression is used to analyze the mean willingness to pay of the households for improvements in the quality of various environmental goods. The logit model is based mainly on the cumulative probability function and it deals with a dichotomous dependent variable on a well established theoretical background. Logit regression model is a uni/multivariate technique which allows for estimating the probability that an event will occur or not through prediction of a binary dependent outcome from a set of independent variables (Roopa, 2000).

The logit regression model is specified as;

$$P_i = E \left( y = \frac{1}{x^t} \right) = \frac{1}{1 + e^{-\beta_0 + \beta_1 x_1}}$$

Where;

P<sub>i</sub> = Probability that Y<sub>i</sub> = 1

X<sub>i</sub> = Set of independent variables.

Y= Dependent variable

$\beta_0$  = Intercept which is constant

$\beta_1$  = Coefficient of price that the households are willing to pay for improvement in the quality of environmental goods

The mean willingness to pay of the households is given as;

$$\text{Mean WTP} = \frac{1}{|\beta_1|} \ln(1 + \exp \beta_0)$$

Where  $\beta_1$  and  $\beta_0$  are coefficient estimates obtained from the logistic regression and mean WTP is the mean willingness to pay of households for improvement in environmental goods.

The regression logit model that is specified after identifying the factors which influence the willingness to pay of the households can be expressed as:

$$Y = \frac{1}{1 + \exp Z}$$

Where Y = the response of the household to the willingness to pay question which is either 1 if 'Yes' or 0 if 'No'. The variable Z is defined in equation as;

$$Z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_6 x_6$$

Where  $\beta_0$  is a pure constant and the parameter  $\beta_1, \dots, \beta_6$  are the coefficients of the explanatory variables  $x_1, \dots, x_6$ .

Along with the logit regression analysis the Chi-square and the Pseudo-R square are also used to measure the goodness of fit of the model.

### **1.10 Scope of the Study**

Environmental degradation is expected to have considerable impacts on natural resource systems, and thereby changes in the natural environment can affect human sustenance and economic activities. The present research work focuses on the impact of environmental pollution on the health status of the people. The study is concentrated on the city of Thrissur district, which can be taken as an introductory area to the interested researchers to explore scientific and systematic knowledge regarding the causes and consequences of environmental degradation. The research

also made a modest attempt to suggest remedial measures to improve upon the situation of environmental pollution. Due to the constraints of time and resources, not all the factors of environment are considered. The interdisciplinary nature of the research work acts as a medium to have diversified research work in the pollution analysis especially in the field of urbanization.

### **1.11 Limitations of the Study**

The present research work which shows the relationship between urbanization and environment in Kerala has few limitations. They are;

- i. The study is concentrated on the consequences of environmental degradation on health status of people. But there are other consequences which are not expressed in detailed manner.
- ii. There are considerable changes in population, number of auto vehicles and industrial expansion during the passage of time. These aspects could not be covered properly by the study.
- iii. The sampled respondents are the households only. Other sections of the city like consumers, industrialists, officials etc are not considered for primary data collection.
- iv. Time inconveniences from the part of the sampled households are other limitation of the study.

### **1.12 Chapter Scheme**

This thesis is divided into 7 chapters. **The first chapter** is the introductory chapter which includes statement of the research problem, significance of the study, research questions, subsequent objectives and hypotheses of the study, methodology, sources of data collection and tools of analysis, limitations of the study etc. **The second chapter** deals with the theoretical background of the study and literature reviews.

**The third chapter** deals with the trends and pattern of urbanization and its impact on environmental quality of the country, the state and the district. **The fourth chapter** gives a detailed profile of the sample city (Thrissur City) with special attention to its population statistics, socio- economic profile and other aspects of living conditions.

**The fifth chapter** exhibits the socio- economic profiles and housing characteristics of sample households of Thrissur city which includes educational aspects, income details, expenditure details, housing facilities etc. **The sixth chapter** is an analysis of



the impact of urbanization on environmental conditions of the sample respondents. It gives a detailed picture of different types of pollutions in the city, their impact on health status of people, and statistical and econometric analysis of the data. **The last chapter** gives the summary, findings of the study and suggestions for environmental protection.