Chapter 1
Introduction

1.0 Background of the study

Modern day cities and towns have evolved over a period of time. As time progressed, human civilization evolved into more organized and complex habitations and the modern day city stands at the top. Hunting and gathering were replaced by villages which further evolved into cities. The early part of the 19th century saw a rapid growth of cities (Hurriot and Thisse, 2000). The speed with which our planet was urbanized was spectacular. In 1950, the world urban population was 734 million out of which 448 million was in the developing countries. By the end of the 20th century the world urban population increased to more than 5 billion with 2 billion in the developed countries and the rest in the developing countries (U.N 1990).

In recent years, the world economy has achieved considerable economic and social development. The adoption of market oriented policies and the active participation of the private sector has contributed immensely to this development process. Although significant economic and social progress has been made, this has resulted in the widespread degradation and depletion of our natural environment[1]. The analysis of long term consequences of economic growth was shown in the form of natural resource limits in Malthusian scarcity (1798), Ricardian scarcity (1817), Mill's stationary state (1857) and Jevons's coal question. The essence of the environmental problem is the economy-producer behaviour and consumer desires. Without the economy, most environmental issues are simply research questions of concern with no policy significance.

[1]This came into focus from the mid sixties with the writings of Rachel Carson ("The Silent Spring"), Barry Commoner ("The Closing Circle") and The Club of Rome ("The Limits to Growth).

1.1 Major concepts

i) Environment

Environment provides the resources to satisfy the basic needs of human life. Apart from this it plays an important role in the ethical, religious, social and cultural values of societies. Palmer (1998) adds political, economic, technological, moral, aesthetic, and spiritual aspects to the environment. Human beings are dependent for their living, health, and enjoyment of life on the basic biological systems. Ecosystems provide many services to mankind such as recreation, tourism, etc. This multiplicity in nature indicates the complexity of the issues concerning natural resource management. Benefits derived from the sustainable use of natural and environmental resources are generally categorized into three groups: ecosystem services, biological benefits and socio-economic benefits. Ecosystem services include the protection of water resources, soil formation and protection, nutrient storage and cycling, pollution breakdown and absorption, contribution to climate stability, maintenance of ecosystems and recovery from unpredictable events. Ecological diversity is essential in the maintenance of ecosystems. Any degradation in ecosystems will not only affect production of plants and animals but also represent real threats to human life on the planet. Biological benefits represent the bulk of human consumption, whether direct consumptive use (i.e., food consumption, medicinal resources, wood products, breeding stocks, etc.) or indirect consumptive use (i.e., recreation, bird watching, ecotourism, etc.).Socio-economic benefits that can be generated from sustainable and efficient use of environmental resources include recreation and ecotourism.

ii) Economics and environmental economics

Economics being a science of choice analyses how people choose to employ scarce resources that could have alternative uses in order to produce goods and services and to distribute them for consumption, in the present or in

the future, among various persons and groups in society. This definition of economics when applied to environmental resources, becoming scarce due to their overuse around the world, we are at the center of environmental economics, which seeks the optimal use of environmental resources in order to sustain and maintain environmental quality. During the last four decades a number of important human problems have been explained and analysed in the subject which have enlarged its frontiers.

iii) Tragedy of the Commons

In traditional economic thinking, privately held resources will not be mismanaged or depleted, since depletion would not be in the interests of the owner of the resource. Certain resources like grazing land, ground water basin and forests are considered as common property resources that are often jointly owned by local communities. These resources have two characteristics (a) non-excludability and (b) non-rivalry in the sense that one member uses more, less will remain for others. These features make it prone to depletion or degradation as its use is pushed beyond the limit of sustainable yield. This process, by which a common property resource is depleted because no individual has an incentive to conserve, was first outlined by biologist Garrett Hardin in 1968 as 'The Tragedy of the Commons' while dealing with the problem of over exploitation of grazing land with open access. It is a tragedy, as it would be in the interest of all if everyone were to conserve, without access or restrictions, however, this will not happen.

iv) Market failure

Environmental problems are considered as problems of non-optimal pricing and misallocation of resources. For many environmental goods there is either the complete absence of markets or they are incomplete. The presence of complete markets for each good is essential for the optimal distribution of

resources in the economy and the lack of it will result in the inefficient distribution of resources. Environmental degradation and pollution occur when the market fails to take into account the true value of environmental quality to the society. The absence of a market has led to the unregulated use of the environment and its wide spread degradation.

v) Paretian optimality

According to Pareto, an optimal distribution of resources is reached if it is impossible to redistribute resources in the economy in such a way that it benefits one individual without harming another. Pollution and environmental degradation are cases of market failure that results in the non-optimal distribution of resources. This is the result of externalities and incomplete markets. Externalities are one of the main causes of market failure (Arrow 1969). The presence of externalities creates Marginal Social Costs (MSC), which even a competitive economy fails to consider during pricing. In general economic theory, the price fixing is done by considering the marginal private cost (labour. rent. etc.). The exclusion of the externality induced social costs will result in non-optimal production of goods. (Samuelson P.A.1954, Bator 1958, Akerlof.G 1970).The market is incapable of controlling environmental degradation due to the public good character of environment (non-exclusion and non-rivalry in consumption). The presence of incomplete markets makes it difficult to fix a price for the environment that will reflect its true value and hence alternative methods have to be used to find out the value of environmental quality.

vi) Waste

Waste can be simply defined as useless remains or byproducts. Solid waste can be defined as the non-liquid waste materials arising from domestic, trade, commercial, industrial, agricultural and mining activities and from the

public services (WHO, 1976). Although waste can be generally defined as worthless and useless byproduct (Webster's 1984), a more specific and precise definition is given by environmental literature. Gilpin (1976) gave a comprehensive definition for waste and defined waste as a matter, liquid, solid, gaseous or radioactive which is discharged or emitted or deposited in the environment in such a volume, constituency or manner as to cause alteration of the environment. Allaby (1977), extended the definition by adding the disposal component of waste and defined waste as any substance, solid liquid or gaseous for which no use can be found by the organism or system that produces it and for which a disposal method has to be devised. Hoornweg et al (1999), defined waste as an unwanted material intentionally thrown away for disposal.

vii) Solid waste

The issue of solid waste emerged in the literature mainly due the environmental awareness created by the publication of 'Silent Spring' by Rachel Carson in the early seventies. One of the earlier definitions for solid waste was given by World Health Organisation (W.H.O) in 1971 defining solid waste as waste arising out of man's activity which is not free flowing. Another important definition was given by Gilpin (1976, 1996), defining solid waste as all material of solid and semi solid character that the possessor no longer considers of sufficient value to retain. Solid waste is broadly defined as including non-hazardous industrial, commercial and domestic refuse including household organic trash, street sweepings, hospital and institutional garbage, and construction wastes; generally sludge and human wastes are regarded as a liquid waste problem outside the scope of MSW (Olar Zorbeck et al 2003). Cointreau (1982) defined solid waste as organic and inorganic waste materials produced by households, commercial, institutional and industrial activities, which have lost their value in the eyes of the first owner. Sinha (1997) defined solid waste as a heterogeneous mass of useless material, which may originate from homes or commercial or industrial activities. The Municipal solid wastes

(Management and Handling) Rules (2000) by the Central Pollution Control Board, India defines solid waste as commercial and residential wastes generated either in solid or semi solid form, excluding industrial hazardous wastes but including treated biomedical wastes. The Ecological Solid Waste Management Act of The Republic of Philippines (2000) defines solid waste as all discarded household, commercial waste, non-hazardous institutional and industrial waste, street sweepings, construction debris, agricultural waste and other non-hazardous/non-toxic solid waste.

viii) Municipal solid waste

Solid wastes are now classified in different ways. On the basis of sources of origin it is classified into industrial, hospital and Municipal Solid Waste (MSW). It is also classified into hazardous and non-hazardous categories on the basis of the toxicity of materials in the waste. Municipal solid waste can be generally defined as wastes generated by residential, commercial, industrial, institutional, construction, demolition, process and municipal services. But this definition is not strictly followed by studies and in most of the studies wastes generated by industrial, construction and demolition and municipal services are excluded. Schübeler (1996) points out that although certain contaminated medical wastes and hazardous industrial wastes are not included by definition, in many nations these are in fact part of the municipal waste stream. Municipal solid waste has been defined by The Ecological Solid Waste Management Act of the Republic of Philippines (2000) as the wastes produced from activities within local government units which include a combination of domestic, commercial, institutional and industrial wastes and street litters.

ix) Solid waste management

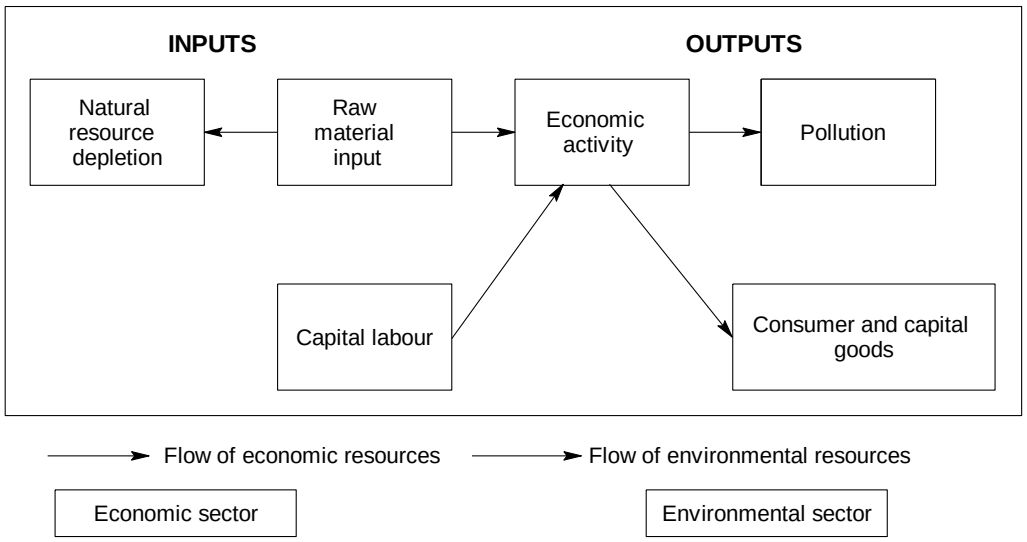
Solid Waste Management (SWM) as a concept has evolved over a period of time. The earlier definitions gave importance to the operational

aspects of solid waste management starting from the generation of waste to its final disposal. Gilpin (1976) defined solid waste management as a planned system of effectively controlling the production, storage collection, transportation, processing and disposal or utilization of solid waste in a sanitary, aesthetically acceptable and economic manner. It includes all the administrative, financial, legal and planning functions as well as the physical aspects of solid waste handling. The Ecological Solid Waste Management Act 2000 of the Philippines considers solid waste management as a discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics engineering, conservation, aesthetics, and other environmental considerations, and that is also responsive to public attitudes. Babu Ambat (2000) defines solid waste management as the process associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner to public attitudes. In its scope, solid waste management includes all administrative, financial, legal planning and engineering functions inorder to counter the problems raised by solid wastes.

1.2 Environment-economy interaction

There exists a close relation between economy and environment. Figure: 1.1 shows the interrelationship between the economy and the environment

Figure: 1.1



Source: Prabha Panth (2005).

Input used in the economic activity not only includes labour and capital but also raw materials. As economic activity increases, exploitation of natural resources also goes up, leading to its depletion. On the output side, along with the conventional economic goods, pollution is also an output. Economic activity which includes production and consumption requires inputs of natural resources and releases pollution, which imposes environmental costs. Environmental costs include natural resource depletion, pollution and the break down of the life support system of our planet.

1.3 Economic growth, urbanisation and environmental degradation.

Rising population, rapid urbanization and increased use of natural resources have given rise to a number of serious environmental problems like loss of bio diversity and habitat destruction, depletion and degradation of forest resources, marine resources, air and water pollution, waste disposal.etc. According to World Development Report (1999-00), Economic growth and urbanisation are closely related trends. Urbanisation stimulates severe

environmental problems which mean that a higher rate of economic growth and urbanisation results in increased environmental problems. So there exists a close link between economic growth, urbanisation and environmental degradation. Loss of crops and grazing land, depletion of the world's tropical forests, species extinction, rapid human population growth, shortages of freshwater resources, over fishing, habitat destruction, pollution, threats to human health, global climate change, acid rain and pressures on energy resources are the ten main threats to environment. There are now about 6 billion people in the world and the global population is currently increasing by about 78 million people per year Population is rapidly consuming the once vast supply of natural capital, especially the resources of deep and rich agricultural soils, natural sources of groundwater, and biodiversity (Nancy Kanbar 1999).Environmental pollution is a problem faced by both developed and developing countries. But unlike the developing world, the developed world has already started taking measures to tackle environmental pollution. The task of dealing with pollution is quite challenging for the developing countries due to so many constraints.

The increase in urban solid waste produced by society is becoming a huge problem all over the world, leading to high levels of pollution and destruction of natural resources. In most urban areas, waste is collected either by a government agency or private contractors, which is considered as a basic government function in the developed countries. Most cities do not collect the totality of wastes generated and only a fraction of the waste collected receives proper disposal. The insufficient collection and inappropriate disposal of solid wastes represent a source of water, land and air pollution, and pose risks to human health and the environment. Around 30-50% of populations in many developing countries are urban (Thomas-Hope 1998). In many African countries the growth rate of urban areas exceeds 4% (Senkoro 2003). Globally, in 1985, 41% of world population lived in urban areas and 2015 it will be around 60% (Schertenleib 1992). Developing nations spend between 20% and 40% of their municipal revenues on waste management (Thomas-Hope 1998, Schübeler 1996, Bartone 2000), but this is not enough to keep pace with the

magnitude and scope of the problem. It is projected that the total expenditure on solid waste management activities in Asia may double from an estimated $25 billion in 1999 to $50 billion in 2025(World Bank 1999). African countries while prioritizing their environmental concerns has rated solid waste as the second most important problem after water quality since less than 30% of urban populations have some access to proper and regular garbage removal (Senkoro 2003).

1.4 Statement of the problem.

The Urban Solid Waste Management (USWM) is one of the challenges faced by modern urban societies in the world. The issue of USWM has been widely addressed by researchers. The global burden of MSW amounted to 1.3 billion metric tons in1990 and is estimated to increase at an annual rate of 2.7 % by the year 2010 (David.N.Beede et al 1995). The issue of waste and pollution are inseparable, when defined in a narrow sense. Solid wastes are the most visible form of pollution. It is argued that the source of most of the environmental problems lies in the inability of the economic system to take account of the valuable services the natural environment provides us. The provision of waste sinks to receive and assimilate all types of wastes from the economic system is such a service. Solid waste pollution occurs when the ecosystem functioning is hampered by an over load in the carrying capacity of the natural environment due to the sheer bulk and complexity of waste (David Pearce et al 2000). The changing economic trends and rapid urbanisation complicate solid waste management in developing countries. As a result solid waste is not only changing in quantity but also changing in composition from organic to non-biodegradable wastes like paper, packing waste, plastics, glass, metal wastes among other wastes which lead to the low collection rates (Bartone et al 1993).The quantities and characteristics of solid waste produced vary from country to country and the factors that influence it are the average level of income, the sources, the population, social behavior, climate, industrial production and the market for waste materials (Baldisimo 1988). Unplanned

human settlements, rapid resource use and improper waste disposal worsen the situation and affect the life of the present and future generations.SWM in most cities of developing countries is highly unsatisfactory. The social task of waste management has always been to get rid of it (Murray 1999).

Improper solid waste management causes all types of pollution. The main impacts created by solid waste pollution are health impacts, environmental impacts like contamination of surface and ground water due to indiscriminate dumping of wastes and the formation of leachate, economic impacts like land price decrease and social impacts like disamenity effects. The major problems due to solid waste in developing countries are i) health hazards from uncollected waste ii) health hazards from collected but poorly disposed of waste iii) the economic burden of waste disposal on towns and cities (David Pearce et al 1994).

Although human health risks associated with solid waste handling and disposal are present in all countries, the problems in underdeveloped nations are more acute and widespread. The health risks are classified into four main categories: i) presence of human fecal matter ii) presence of potentially hazardous industrial waste iii) the decomposition of solids into constituent chemicals which contaminate air and water systems and iv) the air pollution caused by consistently burning dumps and methane release (Cointreau, 1982). Insects and rodents breed on solid wastes and can spread diseases like cholera and dengue fever. The U.S Public Health Services have identified twenty two human diseases that are linked to improper solid waste management. The health risks from waste are caused by many factors, including: The nature of raw waste, its composition (e.g. toxic, allergenic and infectious substances), and its components (e.g. gases, dusts, leachate, sharps); The nature of waste as it decomposes (e.g. gases, dusts, leachate, particle sizes) and their change in ability to cause a toxic, allergenic or infectious health response; The handling of waste (e.g. working in traffic, shoveling, lifting, equipment vibrations, accidents); The processing of wastes (e.g. odor, noise, vibration, accidents, air

and water emissions, residuals, explosions, fires); The disposal of wastes (e.g. odor, noise, vibration, stability of waste piles, air and water emissions, explosions, fires) (Cointreau,2005).

Human fecal matter is present in every solid waste system in developing nations and the intensity of the problem varies with the prevalence of proper sanitary disposal systems such as municipal sewerage or on-site septic systems, outhouses, etc. This presents a potential health problem to waste workers, scavengers, other users of the same municipal drop-off point, and small children who play in or around waste containers. The disease pathways include placing contaminated hands in the mouth or eating food, through vector insects such as cockroaches or mosquitoes, or by directly inhaling airborne dust particles contaminated with pollutants. In Indian landfills, roundworms (Ascaris spp.) and whipworm (Trichuris spp.) were commonly found, especially in those landfills located near lower-income neighborhoods and slums (Cointreau 1982).

Kerala has achieved high health standards in areas like birth rate, death rate, Infant Mortality Rate (IMR), Life Expectancy, control of infectious diseases, etc. but the state now faces problems like high morbidity rate, reemergence of infectious diseases, life style diseases etc.(Economic Review ,2004). The table1.1 shows the occurrence of major infectious diseases in Kerala.

Table1.1: **occurrence of infectious diseases**

Disease	2003	2004	2005	2006	2007	2008
Leptospirosis	1569	1082	1366	1811	1220	1288
Dengue	3546	686	1028	1011	677	734
Chicken guinea	-	-	-	70731	24052	24683
Cholera	61	91	27	12	4	6
Malaria	2586	1584	1322	1805	1203	1481

Source: Directorate of Health Services, Kerala (2008)

The table: 1.1 shows that the occurrence of Leptospirosis and Malaria are quite prevalent in the state. The emergence of Chicken guinea is another disturbing trend. The occurrence of dengue and cholera has shown a declining trend. Statement showing the sex-wise break up of cases and death due to communicable diseases in Alappuzha district is given in the appendix.

Solid wastes are generally disposed by incineration, land filling, and composting. Land filling is the most popular and commonly used method of solid waste disposal. It is found that land fills causes serious health and environmental risks in the form of externalities like formation of leachate and landfill gas leading to water and air pollution and disamenity effects like increased population of pests, flies, vermin, and visual impacts. (Lee and Jones-Lee 1993, UNEP 1999, CPCB 2000). The decomposition of waste into its constituent chemicals is a common source of local environmental pollution. The problem is acute in developing nations since those countries could not meet the high environmental standards accepted in developed countries. With rapid urbanization human settlements encroach upon landfill space for living. Landfills present long-term threats to groundwater and surface water that are hydrologically connected. Major concern is about leachate or "garbage soup," the watery solution that result after water passes through a landfill. Leachate presents several risks to human health and the environment as it affects the current and future quality of groundwater. Leachate composition varies relative to the amount of precipitation and the quantity and type of wastes disposed. In addition to numerous hazardous constituents, leachate generally contains nonhazardous parameters that are also found in most groundwater systems. These constituents include dissolved metals (e.g., iron and manganese), salts (e.g., sodium and chloride), and an abundance of common anions and cations (e.g., bicarbonate and sulfate). These constituents in leachate are found at greater concentrations than concentrations present in natural groundwater systems. Leachate from MSW landfills has high values for total dissolved solids and chemical oxygen demand, and a slightly low to moderately low pH.

MSW leachate contains hazardous constituents, such as volatile organic compounds and heavy metals. Wood-waste leachate contains typically high amounts of iron, manganese, and tannin and lignin. Leachate from ash landfills is likely to have elevated Ph and to contain more salts and metals than other leachate. The alkaline nature of the solid waste is responsible for the increase in the soil pH (Goswami et al 2008). For safe application of the solid waste compost for growing food crops, the pH value of the compost should be in the range 5.5-8.5(Giasquini et al 1988). A typical leachate quality of municipal solid waste is given in the appendix.

Another major environmental concern is release of methane gas and carbon dioxide by decomposing garbage. Methane is a by-product of the anaerobic respiration of bacteria, and these bacteria thrive in landfills with high amounts of moisture. Methane concentrations can reach up to 50% of the composition of landfill gas at maximum anaerobic decomposition (Cointreau-Levine, 1996). In developing countries few landfills have the facility for methane recovery as the required capital for methane recovery installations is lacking. The methane gas seeps into porous soil surrounding the waste and eventually migrates into basements and homes, posing an explosion risk. Carbon dioxide buildup in nearby homes could be a cause of asphyxiation. Carbon dioxide is readily absorbed for use in photosynthesis but methane is less easily broken down, and is considered 20 times more potent as a green house gas. For every metric ton of unsorted municipal solid waste (containing 0.3 Mt carbon), 0.2 Mt are converted to landfill gasses. Of this gas, carbon dioxide and methane each comprise 0.09 Mt. it is believed that landfill gasses supply 50% of human-caused methane emissions and 2-4% of all worldwide greenhouse gasses, this is clearly an area of concern in global environmental issues (Hoornweg, et al 1999 and Johannessen 1999).

One of the important economic impacts created by the solid waste is the impact on residential property values. Residential property values are affected

by factors like good road network, infrastructure facilities (water, electricity, drainage, etc) accessibility (in terms of traffic flow) and demand, location and distance. Apart from this, residential property values are affected by the generation and management of solid waste (Ogedengbe et al 2006). The social impacts created by MSW include the unpleasant odour when garbage is left uncollected and the unpleasant odour due to landfill site, the dirty surroundings, breeding of mosquito, worms, insects and flies due to the landfill site and the uncollected garbage and the release of smoke and poisonous gases giving rise to safety problems. These impacts are also refered to as disamenities due to MSW (Blore .I et al 1996).

The present study has focused on the MSWM and the health, socio, economic and environment impacts due to improper SWM in Alappuzha municipality. Alappuzha district with an area of around 1400 Sq.Km and a population of about 21 lakh is one of the most densely populated districts in the state of Kerala. The Alappuzha municipality with an area of 46.77 sq kms is divided into 50 wards and has a population of 177029 with 37595 households as per 2001 census (Panchayat Level Statistics 2006). The place, surrounded by backwaters has become a major tourist spot. Wastes are disposed by households, industries, hotels, hospitals, slaughter houses etc. The two canals, the commercial canal and the vadaicanal which was one of the main attractions of the town is now a dumping place for wastes. Against this background the study is carried out with the following hypotheses and objectives.

1. 5 Hypotheses

1) Solid waste management of Alappuzha municipality has created health, environmental, economic and social impacts on the population.

2) Willingness to Pay (WTP) for an improved solid waste management system depends on income, education, children, house ownership, gender and environment ethic.
3) WTP has a positive relation with income, education, children, house ownership and a negative relation with gender.

1.6 Objectives

1. To examine the origin and nature of the urban solid wastes.
2. To analyse the existing SWM practices
3. To study the health, environment, socio-economic impacts of solid waste management.
4. To study the nexus between WTP and improved solid waste management system.
5. To examine the factors that influence the WTP for the improved solid waste management system.
6. Suggestions.

1.7 Data and methodology

Both primary and secondary data were used for the study. Primary data was collected using a questionnaire survey. Details can be seen in the approach to the study chapter. Secondary data were collected from various sources such as economic survey, economic review, pollution control board, municipal office, socio-economic unit foundation, Alappuzha and the office of health officer, Alappuzha.

1.8 Limitations

This study has the following limitations. Statistics relating to the MSW are scattered and inadequate. Municipalities don't keep adequate data and

quantifiable treatment of the environmental issue is hardly possible. Within the constraints, tools that are popularly used to analyse environmental issues are used based on a sample study. The limitations applicable to any sample study will be applicable to the present study also.

1. 9 Structure of the study

Chapter 1 deals with the introduction to the study. It includes the statement of the problem, the hypotheses and the objectives of the study. Chapter 2 gives the review of literature. Chapter 3 deals with approach to the study and includes the statistical tools used for analysis. The following chapter gives a brief overview of the generation rates, nature and composition of USW at a global level. The next chapter deals with urban solid waste management approaches. Chapter 6 outlines the salient features of the study area, solid waste generation, composition of solid waste, financial aspects and the administrative set up of the solid waste management system. Chapter 7 deals with the micro analysis of the impacts of USW management. The penultimate chapter deals with the statistical treatment and the final chapter gives the important conclusions of the study and suggestions.

References

Akerlof.G (1970), "The Market for Lemons: Quality Uncertainty and the Market Mechanism", Quarterly Journal of Economics, 89, 488-500.

Allaby, M. (1977), Dictionary of Environment, Macmillan Press Ltd, pp-512.

Anne Jones-Lee and G. Fred Lee (1993), "Ground Water Pollution by Landfills: Leachate Composition, Detection and Water Quality Significance", Sardinia 19931V International Landfill Symposiums. Margherita di Pula, Italy, 11-15 October 1993.

Arrow, Kenneth (1969) "The organization of economic activity: issues pertinent to the choice of market vs. non-market allocation", The Analysis and Evaluation of Public Expenditures: The PPB System. Washington DC: Joint Economic Committee, 91st Congress, 47-64.

Babu Ambat (2000), "Preparation of action plan for solid waste management of Thiruvananthapuram city and establishment of an environmental information system", Kerala Research Programme on Local Level Development, C.D.S, Trivandrum.

Baldisimo, J.M. (Eds), 1988, "Scavenging of Municipal Solid Waste in Bangkok, Jakarta and Manila", Environmental Sanitation Reviews, December.no.26, Asian Institute of Technology, Bangkok.

Bartone, C. (2000), "Strategies for Improving Municipal Solid Waste Management: Lessons from World Bank Lending and CWG Activities", Workshop on Planning for Sustainable and Integrated Solid Waste Management, Manila, 18-22 September 2000. Washington, DC: Urban Management Division, World Bank.

Bartone, C.L and Bernstein, J.D (1993), “Improving Municipal Solid Waste Management in Third World Countries”, Resources, Conservation and Recycling; 8; 43-45.

Bator.F.M (1958), 'The Anatomy of Market Failure”, Quarterly Journal of Economics, 72,351-79.

Bhide.A.D. (1990), “Regional Overview on Solid Waste Management in South East Asia Region”, New Delhi: World Health Organisation.

Blore .I and F. Nuan (1996), “Living with Waste: Public Valuation of Solid Waste Impacts in Bangkok”, Papers in the Administration of Development, 57, Development Administration Group, University of Birmingham.

Central Pollution Control Board (CPCB) (2000), “Management of Municipal Solid Waste”, Delhi.

Cointreau, S. (1982), “Environmental Management of Solid Wastes in Developing Countries”, Washington DC: The World Bank.

Cointreau, S. (2005), “Occupational and Environmental Health Issues of Solid Waste Management: Special Emphasis on Middle and Lower-Income Countries”, unpublished, USA

Cointreau-Levine, S. (1996), “Sanitary landfill siting and criteria”, Washington DC: World Bank Infrastructure Notes, Urban No. UE-12.

David Pearce and Kerry Turner.R (1994), Economics and Solid Waste Management in the Developing World, CSRGE Working Paper WM 94-05.

David. N. Beede and David. E. Bloom (1995), “The Economics of Municipal Solid Waste”, The World Bank Research Observer, vol.10, no.2 (August 1995), pp.113-50.

Economic Review (2004), Kerala State Planning Board.

Field, Barry (1995), "Economía Ambiental", Ed.McGraw-Hill, Colombia.

Giasquini P.L, Maracchini C and B.Usinelli, M (1988), "Chemical Properties of Soils Amended with Compost of Urban Waste", Plant and Soil 109:73-78.

Gilpin, A (1976), Dictionary of Environmental Terms, London: Routledge and Kegan Paul Ltd, pp-169.

Gilpin, A (1996), Dictionary of Environmental and Sustainable Development, Sussex: John Willey and sons, pp-201.

Government of India (1998), "Launching a Clean City Campaign in the States in the 50th Year of Independence". A Brochure Published by the Ministry of Urban Affairs and Employment (Department of Urban Development) in the Quarterly Journal of the All India Institute of Local Self Governance, LXIX (2): 96-105.

Hoornweg, D., Thomas, L. and Otten, L. (1999), "Composting and Its Applicability in Developing Countries", Urban Waste Management Working Paper Series 8. Washington, DC: World Bank.http://www.skat.ch/sf-web/activities/ws/cwg/pdf/cwg-01.pdf.

Hurriot.M.J and Thisse (Eds) (2000), "Economics of Cities: Theoretical Perspectives", Cambridge University Press.

Johannessen, L.M. (1999), "Observations of solid waste landfills in developing countries: Africa, Asia and Latin America", Urban and Local Government Working Paper Series No. 3, The World Bank, Washington, DC.

Kanbar, N. (1999), "An Environmental Economic Approach to Assess the Sustainability of Managing protected Areas: The Case of the Palm Islands of

Lebanon", Agricultural Economics and Development, American University of Beirut, Beirut.

Murray, Robin (1999), "Creating Wealth from Waste", London: Demos and Ecologika publication.

Nancy Kanbar (2003), "An Environmental Economic Approach to Assess the Sustainability of Managing a Protected Area in Lebanon", George Mason University, Beirut.

Olar Zerbeck and M.S. Candidate (2003), "Urban Solid Waste Management: Waste Reduction in Developing Nations", Michigan Technological University.

P. S. Ogedengbe and J. B. Oyedele (2006), "Effect of Waste Management on Property Values in Ibadan, Nigeria", Journal of Land Use and Development Studies Vol.2, No. 1, 2006.

Palmer, J. (1998). "Environmental Education in the 21st Century: theory, Practice, Progress and Promise", Routledge.

Panchayat Level Statistics (2006), Department of Economics and Statistics, Government of Kerala.

Pearce, D, W, and Edward B Babier(2000), "Blue Print for a Sustainable Economy", Earth Scan Publication Ltd. London.

Prabha Panth (2005), "Economic Measures of Environmental Damage Costs", in Dimensions of Environmental and Ecological Economics by Nirmal Chandra Sahu and Amita Kumari Choudhury(Ed),Universities Press, Hyderabad.

Republic Act 9003(2000), "The Ecological Solid Waste Management Act of 2000", National Solid Waste Management Commission, Phillipines.

Samuelson P.A. (1954), "The Pure Theory of Public Expenditure", Review of Economics and Statistics, 64,387-90

Schertenleib, R, Meyer, W, (1992), "Municipal Solid waste Management in DC's: Problems and issues; Need for future research", IRCWD News (No.26) Dubendrof, Switzerland.

Schübeler, Peter (1996), "Conceptual framework for municipal solid waste management in Low-income countries", United Nations Development Program, UMP Working Paper Series no. 9. St. Gallen, Switzerland: SKAT.

Senkoro, Hawa. (2003), "Solid Waste Management in Africa: A WHO / AFRO Perspective", Paper 1, presented in Dar Es Salaam at the CWG Workshop, March 2003.

Sinha, Chabi, (1997), "Open Burning of Urban Municipal Solid Waste: A State Level Analysis", New Delhi.

Thomas-Hope, Elizabeth, ed. (1998), "Solid Waste Management: Critical Issues for Developing Countries", Kingston: Canoe Press.

U.N (1990), "World Urbanisation Prospects".

UNEP (1999), "Global Environmental Outlook", GEO-2000, UNEP.

Utpal Goswami and Sharma H.P (2008), "Study of the Impact of Municipal Solid Waste Dumping on Soil Quality in Guwahati City", Pollution Research, Vol.27(2),2008.

WHO (1991), "Regional Overview of Solid Waste Management in South East Asian Region", New Delhi: World Health Organisation.

World Bank (1999), “What a Waste: Solid Waste Management in Asia”, Urban Development Sector Unit, East Asia and Pacific Division, Working Paper SeriesNo.1.

World Health Organization (1976), “Management of Solid Wastes in Developed Countries”, WHO Regional Publications Southeast Asia Series No.1.