

Chapter 7

Environmental Degradation and Impact Assessment of Domestic Waste Disposal

Modernisation of society and increasing population leads to increase domestic waste and its uncontrolled, improper disposal is leading to havoc and towards unknown dangers. We have heard about the attack of many new viruses causing new diseases like chicken guinea, dengue, and mysterious fever over the recent year. In spite of several governmental plans and policies the condition in the city is deteriorating fast. Even after the working of private agencies like A to Z Infrastructure Ltd and NGO like Kanpur Parivartan Forum in the city, the pollution is increasing day by day and showing its drastic consequences on environment and health of people in Kanpur. Ugly and unhygienic dumps are sheltering disease vectors and spoiling the carrying capacity of air, water and soil. People feel tired, weak and fatigued. Respiratory and digestive disorders are the synonyms of routine life. The consequences have reached the underground water level also. All these issues need to be highlighted, so that common man becomes aware and gives his fullest contribution to impair the losses. As per state pollution control board domestic fuel contributes 10% of the total air pollution whereas garbage and dust contribute 40% in the air pollution. Rest 50% air pollution is caused by industrial and vehicular sources.

This chapter deals with environmental degradation and impact assessment of domestic waste disposal in Kanpur Metropolis which include impact of domestic waste disposal on environment with its aspect of Air pollution, Soil pollution, Water pollution, Green house effect and increased growth of micro organisms and insects, impact on health and landscape spoilage. All these issues are analyzed and discussed separately along with facts and spatial analysis in Kanpur Metropolis. To analyze the comprehensive impact of improper disposal on the environment of the study area, this chapter is divided into three sub sections. The impact of improper domestic waste

disposal on environment is dealt in 7.1 while the sub sections 7.2 represent impact of environmental degradation on health. The last sub-section 7.3 represents landscape spoilage in Kanpur Metropolis.

7.1 Impact on Environment :

Decay and decomposition of domestic waste that are thrown here and there degrades and affects every component of environment. Mankind is facing the consequences, still waiting for disaster. Government agencies are also neglecting the deteriorating state of environment till now at central, state and district level. Research done is an eye opening effort that how the environment is going in the clutches of degradation day by day where environment has already given a sign of disturbance by outbreak of new and unknown diseases. The municipal solid waste (management and handling) rules 2000 was framed by the central govt. (under the power conferred upon it by environment protection act 1986), came into force from 2007. Even after passing 7 yrs of the rules there is tremendous lack of literacy programs on waste management and disposal techniques which keep most of the people ignorant about waste management. This lack of awareness among people increases the problem. The apathetic governmental attitude towards the disposal of waste is a problem that has lead to difficulties in implementation of the municipal solid waste (management and handling) rules 2000, as it has lead to ignorance towards uncollected domestic waste. The waste processing and disposal facility has to be set up by the municipal authority on their own or through the operator of facility as well as they have to follow the standards as specified under the rules of 2000. Even in recent judgment of Rajasthan High court in the Suo Motu, action taken against the administration of Jaipur city Justice D.V. Singh held that right to life includes the right to food, clothing, shelter, right to reasonable accommodation to live in, right to decent environment and also right to live in clean city. Judgment and decisions of the Judiciary have proved that pollution free environment and clean city is facet of right to live.

This is a burning problem concerned with environment that needs to be carefully studied and researched, as on every street waste is lying uncollected, scattered around local bins and dumped around locality. Consequently there is occurrence of bad smell as

well as hazard to the human health and to the passer by. This is such a delicate problem that even judiciary has taken a note of the same. The waste is generated as a consequence of house hold activities such as cleaning, cooking, repairing empty containers, packaging and huge use of plastic carry bags. Many times these wastes get mixed with biomedical waste from hospitals and clinics. There is no system of segregation of organic, inorganic and recyclable waste at the house hold level. Even if door to door collection is practiced, community collection bins are poorly managed and are usually no more than open dumps on the road side. The improper handling and management of domestic waste from households are causing adverse effects on the public at large and this deteriorates the environment leaving fossils effect on environment, creates green house gases and becomes breeding ground for micro-organism. Improper disposal of waste which is mostly disposed in polythene bags that clogs sewer and drain, and causes collection of water in open, vacant land, and roadsides. Wind blown litters spoils aesthetics, encroaches land and diminish civic pride and loss of property value.

The detailed repercussions of improper waste disposals on air, soil and water are discussed in sub sections 7.1.1, 7.1.2, 7.1.3, sub section 7.1.4 explains that domestic waste causes green house gases and increase growth of micro-organisms due to degradation of domestic waste in and around residential areas, is discussed in sub- section 7.1.5.

7.1.1 Air Pollution :

Pollution Control Board, Uttar Pradesh declares a very critical state of environment in the city. The Board assessed the city's environment not very sound. Respiratory suspended particulate matter (RSPM) is much more than the ambient standard and suspended particulate matter (SPM) is also more than average Suspended Particle Matter settle down after some time but Respiratory Suspended Particulate Matter remain suspended in the atmosphere. Although the above mentioned pollution level parameter is concerned not only with the pollution caused by industries and transport vehicles but also air pollution due to improper waste disposal. Waste disposal also contribute to some extent where as we are mainly concern with the air pollution caused by waste disposal. According to the data collected from the state pollution control board

U P, the level of Respirable Suspended Particulate Matter and Suspended Particulate Matter in the city is given in Table No 7.1

**Table No. 7.1
Level of RSPM and SPM in Kanpur Metropolis**

Year	Kidwai Nagar		Dipty Padaw Darshanprwa		Panki Site- 5		Shastri Nagar		Awasi Vikas/ Kalyanpur	
	RSPM	SPM	RSPM	SPM	RSPM	SPM	RSPM	SPM	RSPM	SPM
2005	203	456	191	191	177	177	199	199	184	184
2006	171	395	185	185	230	230	187	187	194	194
2007	193	436	201	201	204	204	188	188	198	198
2008	199	463	215	215	225	225	210	210	211	211
2009	205	474	225	225	236	236	209	209	201	201
2010	213	564.13	217	608	229	616.12	207	584.30	198	608.59

Air pollution level of Kanpur city can be examined with the help of air pollution data collected at 5 stations by the State Pollution Control Board. The Pollution level is higher in Panki area due to industries and lower in Awasi Vikas/Kalyanpur on the basis of Respirable Suspended Particulate Matter whereas on the basis of Suspended Particulate Matter also Panki stands on the first rank while Kidwai nagar is lowest. The growth and spatial air pollution level can be seen in Table No 7.1. The above table shows that the level of Respiratory Suspended Particulate Matter and Suspended Particulate Matter is high throughout the Kanpur city. It is not only high in city but also increasing every year. The standard recommended level of Respiratory Suspended Particulate Matter in residential area is 200 microgram/sq meter while Suspended Particulate Matter level is only 100 microgram/sq/meter.

Air component of environment is the second victim of degrading waste. The most obvious air quality problem associated with waste collection and disposal are dust, odor and smoke. According to state pollution control board the role of industries and vehicles in air pollution is 25%, domestic fuel contributes 10% and garbage and dust share maximum ratio of 40%. The air quality problem mostly associated with solid waste

collection is dust created during loading operation. Improper solid waste disposal adds 4% particulates, 3% Nitrogen dioxide, 5% hydrocarbon and 8% Carbon monoxide. Dust is a nuisance and eye irritant. However it may also carry pathogenic micro-organisms which could be inhaled. There is typically a putrid smell from hydrogen sulphide gas and other gases created by anaerobic biodegradation of waste within dumps or landfills which can also pollute the air. There are number of biodegradable substances which continuously lose molecules to the atmosphere that is odorous or volatile. Such substances are known as 'Osmogen' and the study of the odors or smells is termed as osmics. Decay and decomposition of organic matter is probably the most important source of odorous material in the atmosphere. The process of bio degradation involves decomposition of large molecules into simple components in gradual steps. It requires a series of microbes and favorable conditions for the activities of these organisms. Some of the microbes or the conditions under which they act may not be available and this disturbs the entire chain of biodegradable reactions. Undesirable intermediate products collect and cause problems. Majority of hetero trophic microbes require oxygen to respire. In its absence their growth is suppressed. Those microbes which are capable of growing under oxygen deficient conditions thrive. Aerobic process is replaced by anaerobic decomposition. Instead of carbon dioxide and water which are end products of aerobic degradation various acids, alcohols, methane, hydrogen sulphide, ammonia and a number of organic compounds are produced due to anaerobic activity. These escape into atmosphere and cause odor pollution. This often happens when solids or semi solids decompose. Oxygen is usually in short supply or absent all together under the surface layers or the crust. In still water contain plenty of organic matters a similar layer of froth and particulate form on the surface preventing gaseous exchange from air above. Inside this layer oxygen deficient conditions develop and anaerobic decomposition quickly replaces aerobic activity. Foul smelling gases and vapors are emitted causing odor pollution. Rising concentration of gases like Carbon dioxide, Carbon monoxide, Methane, Ethene, in the atmosphere shall have far reaching consequences such as global warming, stratospheric ozone depletion etc. Not only this very often the heaps of waste which contain lot of plastics are burnt in almost every street and roadside. Banking of

such waste produces dioxins and furons like disastrous and hazardous gases. A large number of odorous substances are used in modern domestic establishment. Waste from these units contains hydrogen sulphide, ammonia, amine, alcohols, aldehydes, phenols, mercaptans, eaters, chlorine, chlorinated organic compounds etc which are released into the atmosphere and create problem of air pollution.

Dust and smoke is additional problem. Dr. Arti Lalchandani of medicine department, medical college said that due to increasing dust and smoke 70% and 30% heart patients have increased. Other than this environment also affects lung, eye reproductive system and brain.

7.1.2 Soil Pollution :

Soil may be defined as 'upper loose layer of the earth crust suitable for plant growth'. The process of soil formation is very slow and governed by geological, biological and climatic factors. The first and the foremost victim of improper waste disposal is soil. Dumping of solid waste creates both aesthetic and public health problem. Pathogenic organism surviving in polluted soil cause diseases like depending, diarrhoea, cholera, typhoid and plague. Outbreak of Surat plague in 1994 is one of the prominent issues caused due to improper waste disposal.

Most of the land is deteriorated due to urban encroachment and improper disposal of daily waste. It is one of the biggest sources of environment pollution. Land is polluted with the waste dumped upon it which makes soil infertile. The natural and synthetic material present in domestic waste affect physical, chemical and biological properties of soil. The most obvious contamination is caused by windblown litter and clandestine dumping in open area along road sides. This contamination causes aesthetic impact which can result in diminished civic pride and loss of property value.

Soil supports plant life which in turn supports animal life. Hence, soil pollution affects all organisms. The process of soil formation is so slow that the soil may be regarded a non renewable resource. There are number of factors causing soil pollution but in our studies such sources are considered which are added by man and include waste food, paper, clothes, leather, bottles, cans, plastics, carcasses. These are called domestic

discards. A wide variety of toxic products are also discarded from houses like batteries, insect repellent cans, insecticides etc. This can make soil toxic, which enter in food chain and prove harmful in later trophic levels. Excreta may contain pathogens that contaminate the soil. Vegetables crops, grown get contaminated and affect the health of man and domestic animals depending on it. However, biological pollutant, play a minor role in changing soil composition. Domestic wastes carry toxicity and its improper waste disposal leads to soil pollution. Most of the land is either cemented in and around houses, roadsides and open areas in of households exposed area is too less still it plays very important role in supporting vegetation in the area which is already too less. (Only 1% against 33%) vegetation cover helps soil to recover from the damages by absorbing toxic constituents.

7.1.3. Water Pollution :

Man is the main cause of water pollution out of all the sources of pollution. Organic waste leads in causing water pollution. Solid waste when improperly disposed off can be an environmental hazard in that surrounding environment. Maharashtra Pollution Control Board member secretary Radhey Shyam Mopalwar stated that 70% of the water pollution is due to domestic sewage.

The composition of waste water includes- suspended solids (e.g. sand, silt and clay) colloidal materials (e.g. faecal matter, bacteria, cloth and paper fibres), Dissolved materials (e.g. nutrients, such as nitrate, ammonia, phosphates, sodium, calcium). Domestic sewage introduces pathogenic organisms in dividing bacteria, protozoans, helminthes etc. Toxic waste material if consumed by water organisms shall be very dangerous. The improper management and lack of disposal techniques of domestic waste pollutes the environment. It affects the water bodies. It also changes the physical, chemical and biological properties of water. Uncollected waste dumped everywhere reaches water bodies through runoff, as well as it percolates to underground water. The toxic contents in the waste contaminates water hence affects aquatic life. Through food chain the toxicity reaches to the human beings. The infiltration of rain fall or surface water in solid waste dumps or land fill can produce leachates. If these leachates enter surface or ground water it will cause severe water pollution. Bathroom water contains

detergents. Phosphorus and nitrates are major pollutants. Nitrates are reduced to nitrate in stomach, which combines with haemoglobin and reduces the oxygen carrying capacity of blood. Household detergents release phosphates, nitrates, ammonium compounds, alkyl benzene sulphonate in water. Domestic sewage contains decomposable matter which exerts oxygen demand in receiving waters. Besides several pathogenic organisms these waste contain putrescible material which are responsible for obnoxious conditions and cause irreparable damage.

7.1.4 Green House Effect :

Some of the waste especially organic waste can also be harmful to the atmosphere. This waste when improperly dumped produce green house gases on decaying which can lead to the destruction of ozone layer and may cause diseases such as cancer. As a result there is a problem in global warming. Solid waste reduction and recycling help to stop global climate change by decreasing the amount of heat trapping green house gases that are linked to every day trash. Some source reduction and recycling can reduce Green House Gases (GHG) emissions at the manufacturing state increase forest carbon and avoid landfill methane emissions. Land fill methane emission can be reduced by gas recovery system and by diverting organic materials from the landfills. In the city 0.5 % and in district 1.52 % of vegetation cover is present instead of 33% of land area. Kanpur metropolis is changing into cement and concrete jungle rapidly. Vegetation is shrinking at the same rate. Unplanned development is leading into a threat for not only man but for other species also. Instead of ideally 33 % vegetation cover in the city it is only 0.5% and in the whole districts it is only 1.52 %. According to Dr. Anirudha Dubey (Climatology, CSA) trees not only absorbs pollution but also reduce noise. Due to lade of greenery, green house effect is produced which is increasing temperature and carbon dioxide and making the city a graveyard for diseases like asthma and Heart problem. Dr. Arti Lalchandani of medicine dept., medical college said that due to increasing desert and smoke 70% asthma and 30% heart patient, have increased. Other than this environment also affects lungs, eyes, reproductive system and brain.

Like people are using water purifier RO system for getting pure and safe water in the same way very soon people would require some device for oxygen also. In urban

areas due to insufficient oxygen people are becoming sick along with decreasing efficiency. Due to shrinking vegetation green house effect is increasing and so increasing Carbon dioxide level in air. An IIT research declares that in U.P. monsoon will become weak if carbon increases at the present rate. Environment is critical, fog increasing and overall affecting climate.

7.1.5 Increased Growth of Micro-Organisms and Insects :

Organic waste, sewage effluent, excreta, exudates and faecal matter etc support a rich population of microbes. Numerous viruses, bacteria, algae, fungi, protozoans, helmines, annelids, larval stages of various insects, pest etc thrive on the organic matter. Variety of pathogens and disease carrying vectors are sheltered in polluted soil and water. Some of these are responsible for causing dangerous diseases of man and animals. The survival time of various pathogenic microbes in sewage effluent and organic waste depends upon a large number of factors. These include the nature of microbial species, conditions of temperature, pH etc, and the chemical nature of the environment and the composition of microbial species in the medium. The capacity of the pathogenic organism to form highly resistant, encapsulated stages, spores play an important part in their prolonged survival. The problem of infectious microbes which arises because of accumulation of large amount of bio degradable waste has two important aspects. These are –

1. Contamination of water supplies, food and edible material caused by direct contact - Contamination of water supplies food and other edible material with sewage effluent and organic waste is often responsible for the outbreak of number of diseases. Typhoid, caused by *Salmonella Typhi* and Cholera caused by *Vibrio Cholera* mainly spread through contaminated water. Violent air current may form a virus, bacteria bearing aerosols. Resistant spores and cyst of many pathogens persist even when sewage effluent dry out completely. Wind blows them around as dust. With air currents disease causing organism are carried to distant places.
2. Development of population of vectors or carriers of serious diseases – Dead and decaying organic matter is starting of the detritus food chain. A series of microbes, insect, pest and rodents feed on organic waste or organisms which live on these waste.

Abundance of bio degradable waste therefore causes a substantial rise in population of aphids, mosquitoes, house flies, rodents and such other organisms. These become nuisance in day to day activity. Many of these organisms are carriers of serious diseases of man, animals and plants. These insects and pests physically carry a number of pathogenic organisms from one place to another. Some virus, bacteria and protozoans may enter the body of insect or pest, feed, breed, multiply and persist there in for long periods. The pathogen is transferred to the other animals or man with the saliva when insect bites or feeds on them or else such carriers simply continue to excrete the pathogen for long duration of time. Malarial parasite is transferred by the bite of female mosquito of Genus Anopheles. The mosquito of Genus Aedes transmits viruses causing Dengue fever, yellow fever and the Japanese Encephalitis.

7.2 Impact on Human Health :

Improper domestic waste has also lead to the spread of diseases in such a way that when waste like broken bottles are dumped anywhere, water gets collected in them (when it rains) and this becomes a breeding ground for mosquitoes. Waste like human stool cause diseases when poorly dumped as flies will carry the germs from stool. Clogged drains, choked sewers and rain water on the roadsides are adding the population of microbes, flies and disease vectors. Due to uncollected waste and improper disposal techniques drains also gets clogged which leads to mosquitoes by which various diseases like malaria, chickenguinea, viral fever, dengue etc is caused and affect the health of people adversely. Problem of domestic waste is drawing attention of people as huge garbage remains uncollected beside the roads, streets and dustbins and on the ground which is causing threat to the environment as well as endangering public health. The municipal workers are most affected people by the occupational danger of waste handling. They suffer from illness like eye problems, respiratory problems like pulmonary irritation and impaired lungs function, chronic bronchitis, emphysema, gastro intestinal, cardiac problem and several skin problems. The person who wander for collecting the discarded things for selling purpose through waste also suffer from various health problem like respiratory problems from inhaling particles, infection from direct contact with contaminated material which leads to headache, diarrhoea, fever, cough and

cold increases susceptibility, causes cancer and even premature deaths. The growing problem of lack of solid waste management collection as well as improper disposal techniques also leads to various diseases and even death of the animal specially cow, birds and stray dogs who wander and rummages through the waste for food. These wastes are having different characteristics and toxic elements. Many times the animals like cows, buffaloes eat the plastics along with the food causing death of the animals. Due to eating up of waste generated food it affects the quality and quantity of the milk products of the animals. Public health can be affected when solid waste is not adequately contained and collected from living and working environment because the organic portion of solid waste ferments and favours fly breeding, whereas the garbage in refuse attracts rats and the pathogens maybe conveyed to man through flies and rats. The blame for disease transmittal must be placed specially on the flies, mosquitoes and rodents. Inadequate collection and disposal of solid waste is a major factor in the spread of gastro intestinal and parasitic diseases primarily caused by the proliferation of insects and rodents. Public health can also be affected with solid waste if disposed in open. In open dump there is ready access to the waste by domestic animals and subsequently potential spread of diseases and chemical contaminates through food chain. Hydrogen sulphide takes up the iron from the blood to form iron (II) sulphide when inhaled in small dose may cause nausea, headache and unconsciousness. The odorous organic material compounds, osmogens in gaseous state are taken in the lungs through respiratory tracks and may cause irritation, loss of appetite, giddiness, nausea and anorexia etc. Through lungs these chemicals enter straight into blood streams and general circulation and could affect living system adversely if inhaled in higher quantities. Domestic sewage introduces pathogenic organism (bacteria, protozoas, and helminths egg) into water. The diseases caused by microorganism include jaundice, typhoid, dysentery, diarrhoea, cholera, tuberculosis etc. as oxygen carrying capacity of the blood is reduced.

7.3 Landscape Spoilage :

Growing amount of waste is a major cause of concern. More and more land has to be used to accommodate the dumping grounds for solid wastes as human establishments expand. Useful land has to be converted to ugly looking waste land. A variety of solid

waste materials from domestic operation are scattered by man over the landscape or dumped outside the town everyday. These include peels of vegetables and fruits, ashes, leftovers of eatables, discarded paper, clothes, leather goods cans and plastic containers, carcasses and others. Poor waste management can be a source of underdevelopment around society surrounding that particular area. It also affects drainage when solid wastes are dumped in drainage channels and gutter, they block the flow of sewage. This may cause flooding at the same time solid waste also affects soil drainage which hinders the growing crops. Since some of the waste materials are water proof they can be dangerous to the aeration system of the soil hence hindering agriculture. It also leads to reduction of fertile cultivable land in the form of dumping site. Poor domestic waste management also displays an ugly scenario of the environment. This can affect tourism industry as the tourist may not get attracted to visit. Uncontrolled dumping of solid waste can lead to wastage of land where we find lots of land being used as dumping sites for waste. The same pieces of land are later on neglected by the inhabitants of the area. Due to discarded plastic carry bags and uncollected waste there is a drain clogging which leads to stagnant water and becomes breeding ground for mosquitoes and insects. All this happens because there is no proper management and collection of solid waste which ultimately causes grave threat to the human being and animal life. Uncollected solid waste is a public nuisance. It clogs sewers and open drains, encroaches roads, diminishes aesthetics and causes unpleasant odors. Open dumping is a most common effortless practice where waste is thrown just outside the house in lanes in Kanpur Metropolis. Administrative negligence and common man's unawareness multiply the prevailing condition. Daily disposals that are must to discard are thrown here and there creating illegal and uncontrolled dumps in whole city occupying open space, roads, parks playgrounds etc. spoiling city's aesthetics and healthy environment completely. Rather uncontrolled littered dumps are the synonym of the city Kanpur Metropolis.

Landscape spoilage is a serious problem in large cities. Dumping of the discarded materials makes land under and around them barren. The organic solid waste decomposes and befouls the air. Others that do not decompose and have aggravated the problem of solid wastes disposal, create unhygienic condition for living.