

ENVIRONMENTAL POLLUTION AND CONTROL WITHIN SABO AREA OF OGBOMOSO IN OYO STATE OF NIGERIA

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ABSTRACT

Environmental pollution as experienced over the years is known to be deleterious to the welfarism of every organism within the atmosphere of its occurrence. Little does one thought of its effect but the overall consequence pose by ecological degradation has been proved to be insidious as many cancerous diseases that are prevalent in this present age have been traced to the accumulated effect of pollutants in their various measure over a very long period of time.

A case study examined in this report is a locality within Ogbomosho in Oyo State of Nigeria, due to the presence of abbatoir, market place, vehicular movements and some other prominent regions that are potent source of pollutants. Thence the needs for critical assessment of the problem pose by these pollutants in order to improve the welfarism of inhabitants of the area.

Measures of various techniques and approaches that will enhance the proper welfarism of the inhabitant of the area have been suggested and commensurate result is potent to be achieved in the area, if only, these rescue approaches are put in place.

However, overall study of this report exposes the various hazards that the area is prone to and the control measures that will go a long way to produce results that will generally improve the condition of people living in the area.

Key word: *Environment, pollution, welfarism, abbatoir, hazard, contamination, combustion.*

INTRODUCTION

In the last few decades, there has been an increasing awareness about the major catastrophes caused by environmental pollution. For instance, the report of the massive oil stick caused by the spillage of 85,000 tonnes of crude oil from plundering oil tankers and its toil of dead and dying sea birds and mammals make many people to be aware, for a short time at least, of the fragility of the environment. (Ambasht and Ambasht, 1999).

However, what is generally appreciated, but much more important overall in most environmental pollution is the insidious nature and its harmful effect only becomes apparent after a long period of exposure.

Many people are exposed to pollutants which may likely cause cancer, 10 or 20 years later, without realizing it. Also, gradual increase in atmospheric pollution can equally cause chronic toxic effect on trees which do not appear for 20 years or more and are irreversible. (Asia, 2000).

The contamination of air, water and soil are respectively referred to as the pollution of air, water and soil which are collectively called environmental pollution. Air pollution can also be referred to as atmospheric pollution which is also harmful. The particulate pollutants produce various allergic reactions in our body and many diseases such as bronchial asthma, tuberculosis etc, the pollutants also produce visibility obstruction by producing haze in the atmosphere, this causes hindrance in road and air traffic. It also reduces the amount of radiations coming from the sun reaching the earth and this disturbs the thermal imbalance on the earth. (Shukla and Srivastava, 1992).

Smoke particles present in air combine with the droplets of fog containing poisonous gases discharged by the burning of fossil fuels in homes, industries and automobiles and form smog, thus, smoke particles + droplets of fog containing poisonous gases = smog. Smoke particles also blacken buildings and clothes. Smog formed as above caused respiratory problems. Air is never pure, since it is always contaminated with poisonous gases e.g. carbon monoxide (CO), nitrous oxide (NO₂), sulphur dioxide (SO₂) etc, finely divided solid and liquid particles, smog, etc. The presence of these materials pollute the air (air pollution).

Carbon monoxide is produced by the incomplete combustion of all carbon containing fuels used in automobile engines and defective furnaces. Thus the smoke obtained by the incomplete combustion of petrol in the internal combustion engines because the petrol, which is used as fuel, is burnt inside the engine not outside of it. Other sources of carbon monoxide are from the combustion of coal, wood, oil, cigarette smoke, incomplete combustion of agricultural and slush matter and the reaction that takes place at high temperature in industrial furnaces such as blast furnace. (Khan, 2005).

It is well known that haemoglobin (Hb) which is present in the human blood acts as oxygen carrier and when combine with oxygen a compound called oxy-haemoglobin, HbO_2 , is formed. If one breathes in air containing carbon monoxide (CO), this will lead to the replacement of the Oxygen (O_2) present in Oxy-haemoglobin (HbO_2) and become carboxy-haemoglobin (HbCO) which is a poisonous compound that could lead to the death of the individual.

HbCO is a stable compound and its formation reduces oxygen availability to the body cells and this condition is referred to as anoxia (oxygen starvation). This deficiency of oxygen produces headache, dizziness, choking, cardiac and pulmonary complication, paralysis and death. The effect of carbon monoxide (CO) also kills many miners working in coal mines. (Rao and Rao, 1998).

Effects of sewage and industrial waste

*Sewage contains organic compounds which act as food for bacteria in lakes and rivers water thus increase the population of bacteria. These bacteria oxidize nitrogen and phosphorus present in organic compounds of the sewage to nitrates and phosphates. This oxidation process consumes a large quantity of oxygen gas dissolved in river water which causes the death fish and other aquatic animals. (Peary and Rowe, 1985).

*These wastes produce scum and sludge in water.

*These wastes change the colour of water and produce foul smell.

*The metallic elements present in the industrial waste pollute the water, they are referred to as heavy metals. These metals affect human beings, plants and aquatic life adversely. Examples of such metals are; lead (Pb), Mercury (Hg), Cadmium (Cd) and others.

*If residents of the metropolis suffer from diseases such as dysentery, typhoid, cholera etc, the faeces and urine discharged by such patients contain micro-organisms which are transmitted through water supplies and this can cause disease in other animals.

*Accidental or intentional discharge or spilling of petroleum oil from tankers into sea also cause pollution.

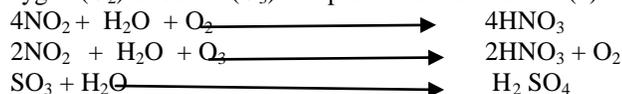
*Phyto-plankton on the surface of water absorbs dirt and acts as pollution filter, but the oil film on water surface checks the growth of plankton and the knocking out of plankton by oil film disrupts the entire cycle of marine life. (Ahmed and Rahman, 2000).

*The oil film may also catch fire causing the death of aquatic animals and human being living on sea shores.

*Oil pollution also affects sea birds since it penetrates the feather and eliminates the entrapped air in the feather. It makes birds to feel cold and more susceptible to diseases, makes the bird unable to fly and swim.

*It has become apparent that there is a significant decrease in the production of viable human sperm in technologically advanced countries and this is thought to be due to exposure to pollutants from radioactive wastes obtained in reactors used in hospitals and scientific laboratories.

*The contamination of soil with rain, excess fertilizers, wrong fertilizers, insecticides and herbicides can also be regarded as part of environmental pollution. Air contains sulphur dioxide (SO_2) and nitrogen dioxide (NO_2). Sulphur dioxide undergoes photolytic and catalytic oxidation to form sulphur trioxide (SO_3) which reacts with rain water or moisture to form tetraoxosulphate (VI) acid (H_2SO_4). Nitrogen oxide (NO) reacts with rain water or moisture in the presence of oxygen (O_2) or ozone (O_3) and produces trioxonitrate (v) acid (HNO_3).



H_2SO_4 and HNO_3 formed come down through the atmosphere as acid rain. This acid rain damage crops and other agricultural products. (Alam and Chawduary, 2004).

Sources of sulphur dioxide

Coal and oil when burn in houses and industries

Effect of sulphur dioxide on living things

*Sulphur dioxide (SO_2) irritates the respiratory system of animal and human and eventually damage lungs

If plants are exposed to SO_2 of high concentration over short periods, or low concentration over long periods, they are decolourised from greenish to brownish colour .

Due to the corrosive nature of SO_2 and H_2SO_4 , these pollutants decolourize building materials like limestone, marbles, roof slates and mortars.

Corrosion of most metals. e.g .Iron, steels, zinc, aluminium etc, is accelerated by SO_2

Fabrics, leather, paper and paints undergo fading of their colour in the presence of SO_2 .

*Smoke contains unburnt carbon particles having diameter less than 100nm this particles remain suspended in air. Smoke particles are emitted into the air during the process of burning of fuels such as coal and oil in homes and factories. They spoil clothes, darken buildings, damage lungs.(Sanvicens and Baldwin,1997).

*Dust particles are another pollutant that are produced by heavy traffics on the roads and in some industrial operations. These particles remain suspended in the air, get attracted to our clothes tend to stain it, causes poor visibility and also causes allergic reactions and aggravates diseases like bronchitis. These dust particles are also deposited on leaves and plants which hinder the process of photosynthesis taking place in plants. Dust in air reflects back some of the sun's heat rays and thus undue cooling of the earth takes place.

Another pollutant that is worth of mentioning is smog. Smog is the combination of smoke particles with tiny droplets of fog containing poisonous gases such as sulphur dioxide, nitrogen dioxide and etc, discharged by the burning of fossil fuels in homes, industries and automobiles. Smog usually occurs during winter season. Smog present in the lower atmosphere is taken by men and animals during breathing and this cause damages to their health. In December 1952, a dense cloud of smog was formed over London city and remained there for five days. This smog produced respiratory problems in human beings and about 4000 people died. Many other people suffered from bronchitis, asthma and heart problems. Smog creates irritations to the eyes, nose and throat, it has adverse effect on the growth and development of living things and reduces the visibility and creates difficulties in road and air traffic (Sanvicens and Baldwin,1997).

As earlier mentioned , gradual increase in atmospheric pollution can be causing chronic toxic effect on trees which may not appear for many years and are irreversible, likewise, water can become increasingly polluted and species die out without any obvious sign at least in the early stages, for this reason, environmental monitoring has become recognized as being virtually important in detecting where insidious pollution is occurring, the pollutants involved and the sources from which they come.(Shukla and Srivastava,1992).

Water pollution

Water pollution is due to the discharge of effluents, insoluble solid particles, soluble salt, sewage, garbages, low level radioactive substances, industrial waste, algae, bacteria etc. Water pollution has become worldwide concern for the past few decades. It is well known that some heavy metals are harmful and cause tonic effects to human beings. The waste discharged by industries contain compounds of metals, organic compounds, alkalis, phenols etc which make water to be polluted.(Palin,1997).

Sewage is the dirty which contains human and animal excretion (urine and faeces). This is produced everyday by human activities like bathing, washing of clothes, excreting urine and faeces. Solid waste comprises all the waste arising from human and animal activities. According to World Health Organisation (WHO); solid waste is defined as useless, unwanted or discarded materials arising from domestic, trade, commercial, industrial and agricultural as well as from public services. Some petroleum chemicals can also cause some changes in the behaviour and the physical composition of waste component varies widely with location and season of the year. The major components of municipal solid wastes includes food wastes, clothes, metals, animal dung, stagnant water (canal), filled and blocked drainage with refuse dumps and similar objects, and also vegetable waste.(Alam and Chawduarry,2004). patterns of aquatic organisms, examples are; lobster and some fishes may also lose their ability to locate food, avoid injuries, escape from enemies, find habitat, communicate, migrate and adapt.

DESCRIPTION OF THE STUDIED AREA

Sabo area is located in the northern region of Ogbomoso town, along Ogbomoso-Ilorin road, Oyo State, Nigeria. This area (Sabo) is majorly occupied by the Hausa traders, students, transporters, artesians, market men and women. The area can be describe as a market place where people from different communities within and outside Ogbomoso. The market is a day- to-day market in which at any time or day transaction go on. Materials like food stuff, kitchen utensils, households materials and the likes can be obtained there.

An abattoir is located in the area, also vehicles like trailers carrying heavy loads majorly pass through the area because it is the major route for trailers and tankers going and coming through Abuja and some other neighbouring states. Hospitals, churches, mosques, clubs and other organisations, club and the likes can also be found in the area.

AVAILABLE POLLUTANTS WITHIN THE STUDY AREA

Solid waste accumulating in Sabo area was found to be produced from various sources. These include:

- *Domestic waste from households,
- *Refuse from commercials offices and business holdings,
- *Refuse from the market,
- *Animal remains and dung from the abattoir,

*Refuse from community holdings such as schools, mosques, Churches, clubs, community centers, auditoriums, and community organisations

*Trash swept from all kinds of streets including highways arterial and sub arterial roads, likes, Residue from all types of sanitary facilities in the form of human excreta, toilet papers and the likes,

*waste from the hospitals,

*dry animal excreta (cows, chickens e t c).

At present uncontrolled dumping of collected animal excreta in low lying land and canal located in Sabo area is going on. Sabo area is full of dumped solid waste which leads to environmental pollution. The means by which the residents get rid of these wastes is thorough burning and 0 or probably if rains falls, sweeps them from location which also lead to the accumulation of the wastes at the drainage system. These could also lead to the run off sweeping away shops and houses and through the blockage of the normal drainage and these could cause a severe loss in lives and properties.



Fig.1. Man stirring and picking objects from dumping ground around Kara in Sabo, Ogbomoso, where cow are sold.



Fig.2: Showing the main road for vehicular movement, packing of lorries within the area and dumping of garbages around.

The major problems of the locality are;

- *Lack of drainage
- *Lack of dustbin
- *Waste disposal
- *Insufficient health care facilities
- *Lack of proper communication system
- *Lack of water supply
- *Lack of drainage system monitoring unit in the local council
- *Lack of street light
- *Lack of sanitation facilities
- *Lack of parking facilities for vehicles
- *Lack of public awareness on health issues
- *The existing system of solid waste management in Sabo area has many problems



Fig.3:Showing molecular and human movement and the packing of lorries on both sides of the road.

CAUSES OF ENVIRONMENTAL POLLUTION WITHIN THE AREA**UNPLANNED URBANIZATION**

Unplanned urbanization of Sabo area in Ogbomoso is one the complex problems.

Many streets have narrow lanes and roads. So there is no easy accessibility for the waste collectors.

Dwellers of these congested areas disposed off their wastes into local drains, low-lying lands and ponds.

INCOMPLETE AND INEFFICIENT COLLECTION OF WASTE PRACTICE

With the present number of conservancy facilities, most of the waste remains uncollected. About 60% of the waste is left uncollected; a huge number of clinical wastes from various private hospitals also remain uncollected, according to the survey of the area.

Opinion that 40% of the solid wastes and hospitals wastes remain uncollected due to lack of facilities (lack of cleaners, lack of trucks, vans etc). These market residues are wastes on roads, wastes from the abattoir such as animal excreta etc, waste in road side drains, local drains or in water body. e. g (canal along Kara area),

obviously, accumulation of large amount of uncollected waste produces strong offensive smell and disposal site, CO, SO₂, NO₂ gases from gas, stove kerosine, Heater through various cooking and burning in the market and domestic houses. Also, volatile organic compound (VOC) from cooking, non-decolourizer, sprays, paints, solvents, furniture. Smokes and other particulates from aerosol, sprays, rubber carpets emulsion, asbestos and cements .Mould and fungi from dampness. Moreover, it helps in producing and spreading pathogenic micro-organism. The leachates from these degrading wastes can pollute the ground and surface water.

The present method of collection and disposal is very inefficient. Also, the present number of sweepers, dustbins, and collection vehicles are inefficient. For the present need. Even the present design of communal bin is not satisfactory as it is open and allows entry of rain water producing leachate; birds and other rodent spread the refuse and the scavengers can easily scatter the wastes.(humid, cold and poorly ventilated areas). It also acts as a breeding ground for mosquitoes, flies and other insects.

At presents Sabo area of Ogbomoso does not follow any criteria for selection of site and they are disposing the waste in low-lying area in an unsanitary manner, using crude dumping method. Almost all the entire Sabo area is used as dumping site.

SOLID WASTE GENERATION AND DISPOSAL SYSTEM

It was clear from the survey that daily generation of solid waste in the study area is almost up to 0.36Kg/capital/day, but it is very important to mark that significant portion of Sabo area dwellers reside in slums and squatter settlement. Besides, there are many newly included areas in Sabo region which are very congested and where dwellers do not receive any form of solid waste collection services. These people dispose their waste into low-lying lands, road sides, drains or local drains or channels. At present, some people in Sabo areas collect solid wastes from households and hospitals and dispose it indiscriminately into local drains.

Clinical wastes carry pathogens, sharp and toxic substance endangering the lives of the dwellers. Also the animals remains and excreta especially from the abattoir in Sabo area which are dumped within the area. This dumping site is very close to houses and market where food stuffs are sold thereby causing contamination to the stuff being sold in the market.

Contamination is used for situation where a substance present in the environment but not causing any obvious harm while present about 20 cows, chickens, and the likes are killed daily at the abattoir also the ones that are reared on a daily basis. The excreta from these livestock are not properly disposed, the flies and mosquitoes playing around them and feeding on them also fly to the market place where food items are being sold thereby causing contamination. Some motorist passing through the street of Sabo area, dump refuse on the street and into the drainage because of the way they presume the place and area as a dumping place.

It is evident from the analysis of data that whenever these highly polluted leachates got entrapped in ponds with the surface water, a high degree of pollution of the ground and surface water become imminent with subsequent health hazards leachates from solid waste with high pollution potential from community bins, storage points, and landfills later mix with surface water and would be stored in the lagoons. It is evident that lagoon containing leachates mix with surface water would pollute the environment and also increase the risk of ground water contamination.

The house hold disposal was one of the main problems across the city. Among the different option of waste disposal, generally about 40% of the populace throw their waste into nearby ponds, 30% of the populace dump their waste into nearby drains, 10% of the populace dump their waste in the residential compounds, 10% of the populace use bins through vans passing round, other 10% household throw their garbage on the road side. House-to-house waste collection system is very scare and unreliable in Sabo area. Therefore, disposal of households waste has become a breeding ground of disease. Many household found to have their own drainage system. And almost all of them are connected to the canal at the centre of Sabo area even both the drainage from the market and from the abattoir are connected together complicating the level of pollution in the area at large.

In addition it was observed that waste was indiscriminating dumped on roadside and in open drain leading to serious health risk and degradation of living environment. Dumping of domestic waste in the home and roadsides arena was found to become a potential source of pollution in the localities. In other words, animal excreta and solid waste is serious environmental pollution at Sabo area of Ogbomoso.

From the study, it was found that the tradition concept and technologies of waste collection are becoming insufficient and ineffective, causing major portion of the generated waste to remain uncollected and disposed off locally. At the same time capability of Sabo area solid waste management and its hygienic disposal is miserably lagging behind. This situation makes the environment of the city quite gloomy and dismal for future generation.

The present system of waste management in Sabo area of Sabo is environmentally ineffective and poses a hazard to public health and the operators. The solid waste dumps at Sabo area is unregulated and unsanitary, resulting in adverse impact like degradation of water quality, attraction of diseases carrying insects and rodents and overall degradation of the environment.



Fig.4:Showing dumping ground and cow meant to be sold to the public feeding and sleeping at the site.

ENVIRONMENTAL CONSEQUENCES

Environment is the sum of all social, biological, physical, and chemical factors which constitutes the surrounding of human being (Ahmed and Rahmon 2000). In this study different types of problem such as social and health related problems that posed threats to Sabo area for sustainable development are present.

Facilities

Existing surface drains was found structurally unsound. The numbers of waste bins in the locality were found inactive. As a result many people use to throw their solid waste and other unwanted properties into the street or street drains.

Lack of awareness, Lack of drainage system, Improper maintenance of available drainage and Lack of drainage facilities. These are the main reasons for pollution at Sabo area of Ogbomoso.



Fig.5:Showing dumping ground within a residential around

HEALTH CONSEQUENCE

From the present study, it was found that 40% throw their waste into nearby ponds, 30% dump their waste into nearby drains, and 10% throw their waste on the road sides. There is no house-to-house waste collection system in Sabo area therefore; disposal of household waste has become a breeding ground for disease causing organisms.

ODOUR HAZARD

Another area of concern is the release of odourous gases emanating from solid waste disposal sites offensive odours may be generated during active stage of composting. The intensity of odour increases if composting conditions are not controlled and/or if the wastes like animal excreta and the likes have been kept for a long time. Formaldehyde odour is a common emission from the solid waste disposal site. Hydrogen sulphide (H_2S) is another odourous gas.

CONTAMINATION HAZARDS

Also, other released substances like mercury and lead through hydrocarbon use in petrol for motor vehicles are present in the smoke from coal combustions. Long and heavy vehicles such as trucks, trailers, lorries, tankers and others ply this area because it is a major route that connects the Western part to the Northern part of Nigeria, thus these compounds are produced through their exhausts. The smoke from the exhaust dilutes into the air in which the dwellers and passers-by breathe and this consequently causes diseases such as cancer, eye problems (conjunctivitis) and other symptoms like catarrh.

Contamination also comes from the dumping site near the market where food stuffs are being sold. Most of these food stuffs are uncovered such as meat, vegetable, yam flour, cassava flour and fruits. The contaminating effect is unnoticed in the market place until after purchase and consumption of the products the effect is then observable. These are; diarrhoea, vomiting, coughing, jaundice, anaemia and others. This contamination might be from flies or wind.

Other dangers of pollution

Studies have revealed that exposure to air pollution has both short and long term toxic effects that injure the heart and blood vessels and increase rates of hospitalisation for cardiac illness. Another finding is that women who live in regions with high carbon monoxide or fine particle levels (pollution caused mainly by vehicle traffic) were approximately 10 to 25% more likely to have a premature baby. People who live in urban areas where particulate air pollution is high tend to have higher blood pressure than those who live in less polluted areas. (Jayne Augoye, 2011)

CONTROL STRATEGIES

The possible remedies and control of the environmental pollution in the Sabo area of Ogbomosho, Oyo State, Nigeria.

There are various waste disposal methods that can be applied. These are;

*Composting method.

The choice of solid waste treatment depends on the amount being generated, but as a lot of solid waste is being generated in Sabo area, this method can be generally used to eliminate this waste by converting it to fertilizer. This measure is required to make the waste suitable for disposal and eliminate or reduce the level of hazard being caused. Composting is an aerobic process that involves mixing the waste with source of carbon such as sawdust, straw or wood chips, in the presence of oxygen, bacteria digest both the wastes and the added carbon source and induces a large amount of heat. The superheating of this solid waste converts it to smaller pelletised granules that are high in nitrogen and other organic materials which can be sold to farmers as a soil amendment or fertilizer.

***The use of natural gas for cooking/heating purposes** instead of coal because natural gas does not produce sulphur dioxide on burning.

***The use of electrical energy** can also eliminate the production of smoke or carbon particles

***The provision of disposal facilities should be made** to avoid the dumping of solid waste into drainages and that of the street facilities such as waste bins, incinerators, parkers etc, should be made available.

***Management system for solid wastes** should be set-up for the proper monitoring and control of the environment to ensure that all rules and guidelines are strictly adhered to, this management should provide a proper disposal site for general purpose use where wastes can be properly monitored and controlled.

***Introduction of workshop and seminars.** This can be organised by stakeholders; Government, private companies, NGO (Non governmental Organisation) and other concerned citizens and professionals. This workshop and seminar is to create awareness to traders, motorists and residents concerning the reformation of the environment, the harmful effects of pollutants, sources of pollutants, alternative means of waste or refuse disposal in order to sanitize the environment.

***Government assistance** in the road diversion will go a long way to check the number of vehicles plighting the road; this will in turn reduce the amount of various pollutants the area might be prone to from vehicle exhaust.

***Relocation of the abattoir to another place** is a measure of checking the pollution of the area by the authority. The government can give directive to reposition the abattoir to the outskirts of the town where the effect of the waste disposition as well as the pungent odour it produced will not be felt by the inhabitants of the town. These various methods will reduce environmental pollution and protect endangered species, reduce waste volume and environmental degradation.

Ways to reduce air pollution

- *Use of green vehicles which help reduce any type of pollution by emitting Nitrogen monoxide or less smoke.
- *New researches have confirmed that turning off unused lights also helps in reducing air pollution. So, turning off unwanted lights will certainly reduce pollution.
- *Grow different types of plants to avoid air pollution created by the carbon dioxide and many other gases.
- *Avoid smoking of cigarettes of different kind of products to avoid air pollution.
- *Use of different types of catalytic converters to reduce the emission of smoke during burning of materials such as wood etc. Recycling should be encouraged. Using new materials to produce new products requires a lot of energy and involve the use of chemicals which pollute the air at the long run. (Jayne Augoye,2011)

CONCLUSION

The result of this study generally revealed the various pollutant types that are present within Sabo area of Ogbomosho. The amount of these pollutants and their effects were found to be hazardous to human existence and also devastating to the health of the inhabitants of the area. It is evidence that majority of the pollutants have their sources from the stationed abattoir within the area in terms of animal dung, refuse, domestic waste that are not properly dumped, noises from the market place, exhaust from the vehicles around the area.

Sequel to the critical assessment of the pollution problems within the study area, various measures and ways have been suggested to improve the livelihood of the people living within the area. From the study carried out on the area, it is obvious that the aforementioned control measures and some other measures may be suitable are not being put in place, the concentration of the pollutants may exceed some controllable limits as the accumulation of the various pollution types can increase with age. Although the impact of the pollutants as assessed appear to be more on the soil, there may be risk of prolonged effect caused by other forms of pollution on the health of the dwellers in the vicinity. However the overall implications of this study call for an effective management control of the available resources in the considered service centre.

REFERENCES

- [1]. Ambasht, R.S and Ambasht, P.K.,(1999). Environment and Pollution. 3rd ed. CBS Publishers and Distributors, India.
- [2]. Alam, J.B and Chawduarry, A.K.,(2004). Existing Solid Waste Management System of Small Urban Cities of Bangladesh and Planning Report submitted at World Health Organization, Dhaka.
- [3]. Asia, A.B (2000). Waste Land Filling and Waste Incineration in Sylhet. Report prepared for sylhet City Corporation, Asia Urbs-sylhet partnership, Bangladesh.
- [4]. Ahmed, M.F and Rahman, M.M.,(2000). Water Supply and Sanitation rural low income urban communities ITN Bangladesh, BUET, Dhaka.
- [5]. Khan, S.(2005). Environmental Problems due to rapid unplanned urbanisation of urban city. B.Sc Engineering Thesis, Civil Environmental Engineering department, Shahjalal University of Science and Technology, Sylhet, Bangladesh.
- [6]. Peary, H.S and Rowe, D.R.,(1985). Environmental Engineering McGraw Hill. Publishing Company Limited.
- [7]. Rao, K.V.S.G and Rao, M.V.V (1998). Evaluation of constants diffusion coefficients in air pollution studies. *Indian J. Environmental protection*, pp:603-604
- [8]. Palin, R.,(1997).Power from solid waste using cyclone classifier Bio.Energy. News letter. Vol:3, pp:13-15
- [9]. Jayne Augoye, (July 15,2011). 'Air pollution linked to learning disorders' The Punch Newspaper. Vol.17 No.20,925. pp:3
- [10]. Sanvicens, G.D.E. and Baldwin, P.J.,(1997).Environmental Monitoring and Audit in Hong Kong. J. Environmental Planning and Management. 58(2): pp:432-439.
- [11]. Shukla, S.K. and Srivastava, P.R.,(1992).Pollution Control Objectives and Regulatory Framework. Commonwealth Publishers 1st Ed. India.
- [12]. Sobahans, S., (2005).Existing Solid Waste Management System of Small Urban Cities of Bangladesh and Planning. B.Sc.Engineering Thesis, Civil and Environmental Engineering department, Shahjalal University of Science and Technology Sylhet, Bangladesh.