URBAN ENVIRONMENTAL CONDITIONS ASSESSMENT IN TANGAIL MUNICIPAL AREA, BANGLADESH

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Abstract

The study was conducted in Tangail Municipal Areas (TMA), a fast growing semi-urban town of Bangladesh. The present study was emphasized to investigate the environmental conditions and problems have been faced by inhabitants. The study was performed through both experimental and perceptional basis. The study revealed that about 86.7% household had no access to dustbin, 68.7% had no outlet to drain out waste water, and only 15.3% get supply water. Supply water contains bad odors and high concentration of Iron, nearly 7% use unhygienic latrine, water logging due to heavy rain in several Wards, etc. caused major environmental problems for town dwellers. The study also found that, about 3000-3500 kg/day of hospital waste were generated from more than 40 clinics and hospitals as a result huge amount of solid waste generated in TMA. Most of these waste are improperly disposed into nearby ditches, ponds, canals, open place, road side, etc. which creates huge environmental problems. Noise intensity is higher than prescribed levels and its frequency from 57.0 to 112.3 dB (A) at different areas in TMA. Due to the disposal of waste water, effluent from factories, hospital and solid waste, etc. in the Louhajang River, the river water is polluted and along with continuous encroachment. Town dwellers have been suffered by frequent diseases due to unhealthy environmental conditions. Increasing awareness about environmental issues among town dwellers, and introduction to programmes and projects to mitigate the above mentioned problems are effective ways for overcoming the environmental problems in urban planning of TMA.

Introduction

Bangladesh is one of the fast growing urbanizing country in which various scale of urbanization, especially from divisional city level to Upazila town level are rapidly urbanizing. Due to improper urban planning and management with increasing population, many sorts of environmental problems are generated.

The impact of urbanization in Bangladesh in terms of mass poverty, gross inequality, high unemployment, under-employment, over-crowded housing and the proliferation of slum areas and squatters and general deterioration in overall environmental conditions have become the major concerns of policy issues (ALMEC, 2000). Unhygienic sanitation, unsafe water, inadequate sanitation causes for high incidence of diseases, along with violent crimes and social tensions are most commonly seen in the metropolitan cities like Dhaka, Chittagong and Khulna and other municipal cities in Bangladesh (Ghulam, 1998). Noise pollution is a significant environmental problem in many rapidly urbanizing areas. This problem is properly not recognized despite the fact

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that it is steadily growing in developing countries (Barboza *et al.*, 1995). It is well established now that noise is a potential hazard to health, communication and enjoyment of social life. It is becoming an unjustifiable interference and imposition upon human comfort, health and quality of modem life (Ahmad, 1998). The hearing ability of the inhabitants of the City has reduced during the last ten years due to noise pollution (Das, 2001).

To ensure a good quality of life in a city, the environmental conditions within which a city dweller is living is of utmost importance (Aqua-Sheltech Consortium, 1998).

With rapidly increasing unplanned urban areas including rapid increasing population, disposal of garbage in nearby drains or low lands, improper disposal of municipal solid waste and hazardous hospital waste, discharge of waste water into open roadside drains, the concentration of hanging latrines in lower income settlements areas, annual flooding, noise, traffic congestion and water pollution are major environmental problems faced by inhabitants which degrading the ambient quality of environment of TMA.

The present study was emphasized to assess the environmental conditions and problems faced by the inhabitants of TMA and their views and opinions in addressing these problems in order to facilitate improvements in the environmental conditions. For considering the urban environment perspective, the study was conducted - i) to assess the environmental problems due to unplanned and rapid urbanization in the study area, and ii) to have a clear idea from local people's perception about the problems and remedial measures.

Materials and Methods

Study Area

The present study was conducted to know the existing status of several environmental problems in Tangail Municipal Area (TMA). TMA is also an old district town of Bangladesh which has been established in 1 July, 1887. At first it had 5 wards and now it has 18 wards. TMA covers an area of 29.43 km^2 and total population is around 128785 (BBS, 2001). TMA is the fast growing urban area, situated 100 kilometers in the north of capital city Dhaka, along with Dhaka-Mymensingh Highway.

Materials

The study was conducted with different materials such as- 4 IN 1 Multi-Function Environment Meter (STANDARD-ST-8820-Environment Meter), pH meter, Wooden and digital Thermometer, Sicchi Disk, DO meter, Buffer solution, Distilled water, Measuring tape, etc. were used for experimental analysis and questionnaire survey was used to assess local perceptions.

Methods

The data on environmental problems in TMA have been taken from both the study on primary and secondary information. In this study, noise levels have been measured by a sound level meter which consists of a microphone that converts the pattern of sound pressure fluctuation into a similar pattern of electric voltage, amplifiers and a voltage meter that is normally calibrated to read in decibel. All the measurements were taken at different times during day time (between 10 am to 2 PM). More than three observations were taken in each station at a time. The minimum, maximum and average levels of

sound were recorded in each observation from various types of vehicles at every station. The duration of data collection in each station was 15 minutes.

Several criteria of water pollution were measured directly into the Louhajang river in which temperature, pH, DO, transparency, odor and color were measured at a particular time every seven days interval from these four stations. Buffer solution and distilled water was used to calibrate the instrument for accuracy.

Data about hospital and solid waste was collected directly through interviewing with hospital, clinic and solid waste disposal authority. The accuracy of the data of hospital and solid waste are depend on the fairness of the authority.

Also perceptional information was collected from 120 sample households through interviewed with questionnaire in 18 Wards of the Tangail Municipal Areas (TMA) area in all. A household has been defined here as consisting of all the members who live together and have the same cooking arrangement. These households were sampled on the basis of their income levels so as to highlight the environmental problems faced by the town dwellers. The questionnaire included a wide range of household level environmental issues. Secondary data were collected from TMA management authority. Finally the data were arranged and analyzed by SPSS and Microsoft office software to reflect the objectives of the study.

Results and Discussion

The study was conducted on both the experimental and perceptional basis. The perception study was carried out through household survey. The households were randomly sampled at various stages in which one respondent was selected from each household. The occupation of the respondents were 25.3% service holders, 38.7% business, 6.7% day labour, and 29.3% housewife, respectively. The level of income of the respondents were 13% of more than 2500/-, 23% of 2500-5000/-, 13% of 5000-7500/-, 20% of 7500-10000/- and 28% of more than 10000/- (Taka), respectively. The household size was 14% of 3, 63% of 4-5, and 23% of more than 6, respectively. Among the respondents 10% were illiterate, 25.3% S.S.C., 16.2% H.S.C., 29.5% Bachelor and 19% others, respectively.

Solid waste

In TMA, high amount of solid waste is generated every day. Disposal of waste is really a problem for Tangail town dwellers due to the unsatisfactory waste management system (disposal system, inadequate dustbin, lack of awareness etc). So that waste is scattered in everywhere. TMA has only 4 small and big size truck, Rickshaw and Van numbers are 18, dustbins are 180 and their dumping system is open dumping in the low land and along the road side. Total personnel related to solid waste management were 291. Among them sweeper 124, collectors 5, labor 162 (Truck driver, van labor and drain labor). Everyday total amount of waste collection is approximately 2/3 ton.

About 75% of the total households put their waste either into open space of road side, low lands (more than 90% of the total waste), only 5-6% households put waste into dustbin (only 2-3% of the total waste) and nearly 19.4% household put their waste into near by canal and other places (7-8% of the total waste) (Fig. 1). About 13.3 % of the households have access to dustbins within short distance and other 86.7% households do have not dustbin facilities. About 100% household replied that dustbin numbers are not adequate for waste management. More than 90% of the local people answered that waste are not collected in time. Most of these waste are disposed into the Louhajang river and

open space and along road side to Kagmari bridge area, and others are disposed into near by ponds, ditches, and canals which create foul odors, pollute the river water and ground water, and finally makes unhealthy conditions of the town environment.
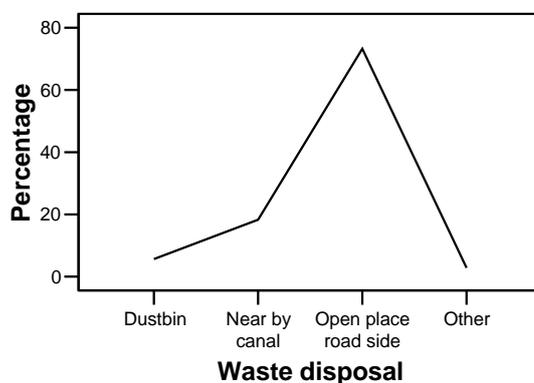

Fig. 1. Waste disposed by locality.

Drainage System

About 31.3 % of the drains are connected to homesteads in which most of the drains are paved but open. About 68.7% of the houses have no outlet to drain out waste water. Such practice creates public nuisance and a dirty and unpleasant environment. Discharge of waste water drainage system mainly more than 45% into pond/ditch and more than 40% into the river and nearly 12-15% into the municipal system.

Water supply

Only 15.3% households received water from water supply system and other 84.7% depends mainly on tube-well. In 15.3%, nearly 90 households are not satisfied with supplied water for drinking purpose because the water is not supplied in due time as well as high concentration of Iron (Fe; 10-14 ppm), other contaminants such as Manganese (0.01-0.6 ppm), odors, etc (Table 1).

Table 1. Water supply system of TMA.

Name of the system	Number/Amount/%
Overhead tank	3 (Total reserved water 6 lakh 80 thousand)
Linked houses	5675
Street hydrant	15
Tube-well	8230
Motorized tube-well	7 (Total power of water extraction 95 thousand/hour)
Treatment plant	3 (Power of water purification 2-3 lakh/hour each of the tank)
Amount of every days total supplied water	43 lakh liter (4 lakh 43 thousand liter water supply in the zilla sadar every day.
Total pipeline	86 km including 21 km old and 55 km new
Water supply covers	40-45% of the total population in TMA
Water misuse	10-15%

(Source: Tangail Paurashava Authority, 2009).

Sanitation facility

Tangail Municipal Area does not have any sewerage network. About 90% household use sanitary latrine, 7% use unhygienic latrine and 3% use water sealed latrine. About 85.9% children use latrine and 14.1% children don't use latrine as they are going to yard or road side. About 80% use soap, 10% soil, 3% ash and 20.7% use only water for washing their hand after using toilet. The Ward wise latrine use, household and types of toilet in TMA is shown in Table 2.

Table 2. Sanitation facility in TMA.

Ward no.	No. of families	No. of toilet user	Hygienic toilet	Unhygienic toilet
1	715	714	679	35
2	1231	1153	843	310
3	1489	1206	1043	163
4	1127	1059	862	197
5	1265	1235	903	329
6	1106	1088	1009	79
7	1026	1026	661	365
8	1221	1219	546	673
9	1230	893	555	338
10	1179	1072	395	677
11	1116	924	751	173
12	1242	1201	976	225
13	1385	1370	1207	163
14	1420	1420	1265	155
15	1083	1018	783	232
16	1071	1039	682	357
17	1002	1002	857	145
18	1062	1052	895	167
Total	**20,970**	**19,691**	**18,912**	**4,783**

(Source: Tangail Paurashava Authority, 2009).

Water Logging

Due to rapid urbanization and other development activities like dam, building, pavement area, etc. over the years, the natural drainage and other water retention areas have gradually been converted into built-up areas. Some of them are replaced by narrow surface drains. The Louhajang River is rapidly encroached in every year by the local people which play a major role in discharging rain water. As a result, some Wards of TMA are facing water logging problem regularly during intense rainfall particularly in the late monsoon.

Hospital waste

Hospital clinic waste management system in TMA is very poor. About 3000-3500 kg/day hospital waste (in which 79.77% non-infectious and 20.33% infectious) are generated

from more than 40 private hospital-clinics, and one public general hospital in TMA. The waste includes sharp things, vial-ampoule, cotton bandage, saline bags, body fluids, placenta, blood, urine, body parts etc. About 59% of the total hospital waste are generated from Tangail General Hospital and it includes 1200 Kg/day (75%) noninfectious waste and 750 Kg/day (25%) of infectious waste. Maximum of this waste are disposed into ditches, ponds, canals, and some are dustbin and some are burned.

Noise Pollution

The noise levels were measured by following standard procedure using calibrated sound pressure level meter at many places predominated by both commercial, sensitive and residential tenements at Tangail town particularly reflecting motor vehicular traffic prone areas. The results indicate high noise levels, surpassing on many occasions to the prescribed levels. Overall minimum and maximum noise levels 57.0 dB (A) and 112.3 dB (A) were founded in the major road side. The comparison between founded noise levels at the study area and various standard levels is shown in Table 3.

Table 3. Noise levels in main area of TMA and comparison with Standard noise levels.

Road/Place	Average Noise level in dB	Standard noise levels		
		*DoE	*FHA	*AASHTO
New Bus stand Road (commercial area)	85.21	70	75	75
Old bus stand (mixed area)	87.71	60	70	70
Hospital Road (sensitive area)	84.07	45	60	55-60
Mahmudul Hasan College (mixed area)	80.63	70	75	75
Thanapara Road (residential area)	82.74	50	70 (Interior max. 55)	70 exterior 55 Interior

*DoE = Department of Environment, Bangladesh, *FHA = Federal Highway Agency, *AASHTO = American Association of State Highway and Transportation Officials.

The noise pollution levels in TMA exceeded the recommended level by DoE Bangladesh standard. It can be concluded that the city is environmentally noise polluted and road traffic are the major sources of it.

River water pollution

Louhajang River is one of the major rivers in Tangail. Originating from Dhaleshari River, a tributary of Jamuna River, flows through TMA and falls into the Banshai River. Some of the different industrial units have been established on both of the banks of the river. Most of the industries are directly and indirectly discharging a huge quantity of wastes without any treatment into the river. The downstream water of the Louhajang River is polluted as a result of the discharge of waste water, disposed of waste by local residents, soap factory, industries effluents, etc. Water quality parameters of the Louhajang River is shown in Table 4.

Table 4. Water quality parameters of the Louhajang River, Tangail.

Parameter	Station-1	Station-2	Station-3	Station-4 or source point
Temperature(°C)	30.67	31.9	32.87	33.37
pH	10.37	10.77	10.82	10.92
DO(ppm)	3.17	2.77	2.66	1.37
Transparency(cm)	5.73	6.67	5.73	5.92
Odor	Foul odor	Foul odor	Foul odor	Foul odor
Color	Dark	Dark	Dark	Dark

Odor Pollution

The unscientific accumulation and open dumping of solid waste, sewer overflow, and stagnation of water in open drains, slaughter houses and decomposition of wastes in derelict ponds are the major sources of odor and bad smells in the TMA.

Energy for cooking

TMA, not being completely connected to piped gas supply, depends on different kinds of fuels for cooking, without the overwhelming dominance of any. The municipal households depend on firewood (48.7%), cylinder gas (nearly 6%) and supply gas (45.3 %) as fuels.

Household's Perception

The urbanites of TMA acquainted with environmental problems of diverse nature ranging from solid waste pollution, river water pollution, scarcity of supply water, water logging, noise pollution, spread of odor etc. The local dwellers are suffered frequently several diseases such as 17.2% by diarrhea, 71% by fever and cold, and 11.8% by others. According to the present study, about 25% , 20%, 10%, 30% and 15% respondents opined that law and order development, build and improving drainage system, supply of safe drinking water, improving solid waste collection and disposal system, and following above opinions, respectively can minimize or play an important role in reducing the existing problems in TMA.

Conclusion and Recommendations

The study revealed that there were several problems faced by town dwellers such as inadequacy of dustbin, waste water outlet problem, water supply problem, using unhygienic latrine, water logging, improper management of hospital waste and solid waste, noise and inland water pollution, etc.

It can be concluded from the study that, TMA is inhospitable sub-urban environment for urban dwellers with various environmental pollutions due to lack of proper management, negligence by the management authority and local administrators, inadequate and skilled resource persons, unawareness of local people, etc.

Increasing awareness about environmental issues among town dwellers, and introduction of programs and projects are effective ways to address the environmental problems in urban planning and management of TMA. It has come into knowledge that the city dwellers expressed their concerns about the environmental problems that they are encountering.

To minimize and solve the problems and to create have sound environment for urban dwellers, the following measures may be practiced: i) create awareness among the people about the environment itself and the gravity of the problems and their responsibilities, ii) build an institutional base to tackle environmental problems with the participation of the people iii) go for action by drawing up programs for execution of projects, iv) facilitate adequate dustbin and drainage system, v) manage hospital and solid waste properly with timely collection and disposed into selected sites, vi) encroachment of Louhajang river should be stopped, vii) increase safe and pure water supply with proper filtration and treatment, viii) increase enforcement of law, ix) control open dumping into pond, river, etc. and x) control traffic noise pollution in several areas such as residential area, hospital area, educational area, etc., xi) mobilizing public support and participation, xii) improving policy interventions making strategic choices, xiii) building institutional capacity, xiv) strengthening service delivery, xv) closing the knowledge gap and xvi) planning strategically.

In fact, there is an urgent need to undertake certain short, medium and long term programs and projects to address the environmental problems encompassing the idea and thoughts of all concerned people and agencies of Tangail Municipal Area. Thus, to make any programme concerning environmental improvement a success, the participation of the people is crucial.

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