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SOLID WASTE DISPOSAL AND ENVIRONMENTAL CONSEQUENCES IN SURI MUNICIPAL TOWN OF BIRBHUM DISTRICT, WEST BENGAL: A GEOGRAPHICAL ASSESSMENT

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ABSTRACT

The ever increasing problem of solid waste generation, its disposal and management in the Suri municipal town of Birbhum district, West Bengal has been discussed upon data collected and generated in the field. It has been observed that this municipal town has experienced a remarkably rapid urbanization particularly over the last three decades and the extension of infrastructure of the urban service system, provided through the municipal office, has not been able to keep pace with this. Huge quantities of both bio-degradable and non bio-degradable wastes are being generated every day and due to the shortage of manpower and transport facilities solid waste disposal service cannot work properly. Rapid development of slums in the fringe areas of this municipal town in recent years has also aggravated the problem of solid waste management and disposal.

***Key words:* Municipal town, solid waste disposal, infrastructure, bio-degradable, manpower.**

INTRODUCTION

Urbanization over the last few decades has grown on such a scale that has never been experienced earlier. If we arrange the aspects of major global changes in hierarchical order for the last 20th century through to the early part of this 21st century urbanization will certainly rank highest in the list (Bai, and Sutanto, 2002; Dewan. and Sudarshan, 1999). Now almost half of the world's population lives in the cities. While only 20% of people in Africa and Asia lived in cities 25 years ago, by 2030 this figure will exceed 50%. With the growth of urbanization a number of environmental problems have been occurring steadily and certainly the aspect of solid waste disposal is one of them (Gupta, Krishna, Prasad andKansal,1998). This researcher has already conducted a thorough survey on the present pattern of waste disposal and management in Suri municipal town (Sarkar, 2016). A discussion has

been made here on the present scenario of solid waste disposal and environmental consequences in Suri municipal town of Birbhum district, West Bengal.

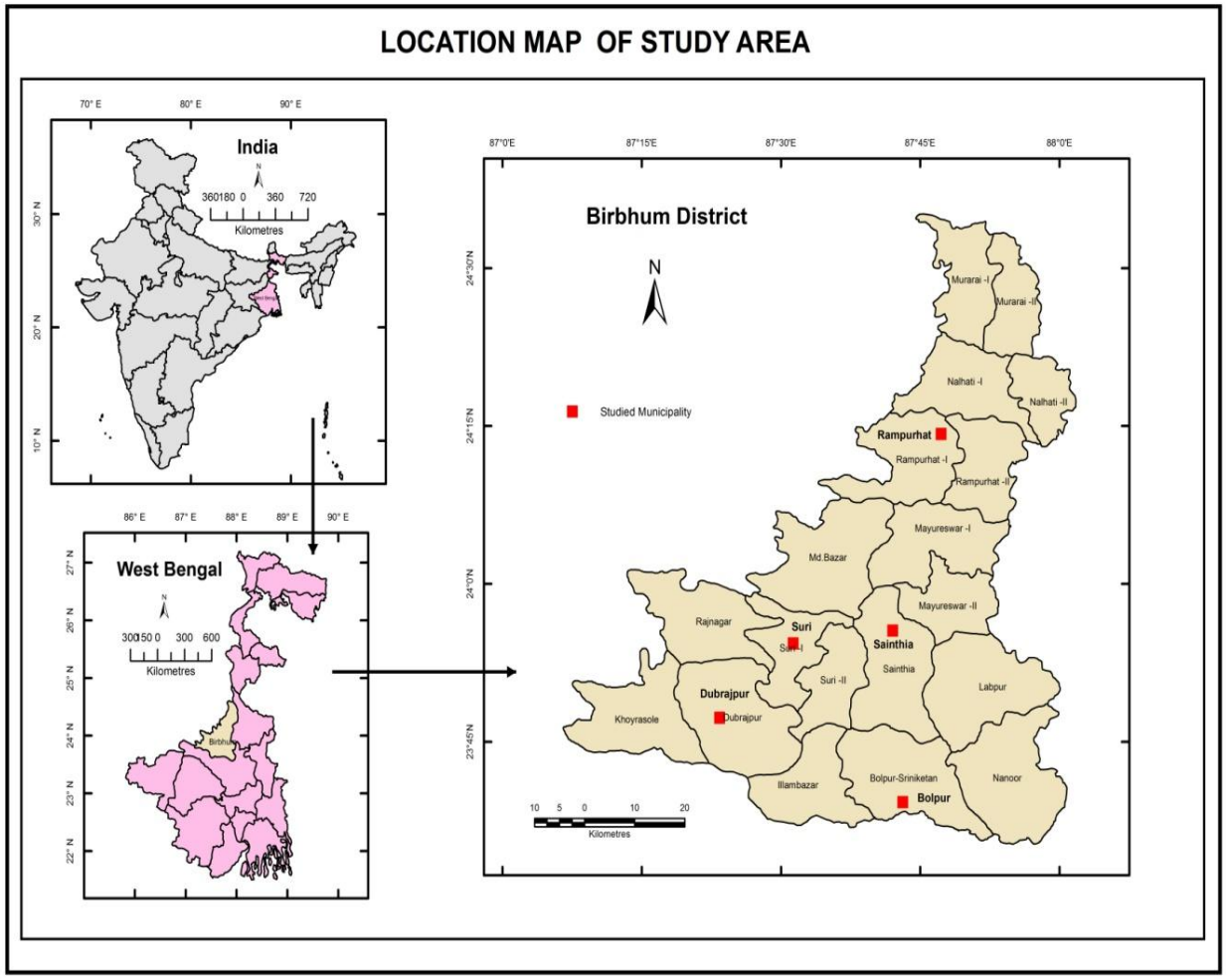

Figure 1: Location of Suri and other municipal towns in Birbhum district

ENVIRONMENTAL SETUP OF THE SURI MUNICIPAL TOWNSHIP

Birbhum district is located in the western part of West Bengal and lies within 23°32′30″N - 24°35′10″Nlatitudesand 87°5′25″E - 88°01′40″E longitudes.The district covers about 4,545km^2 (Birbhum District Gazetter, 1995). Suri municipal town, being the head quarter of the district, is located in the south-central part of this district.

A general and introductory account of Suri municipal town is given in the table below.

Table 1: The overall scenario of Suri municipal town at a glance, 2011

Sl No	*Name of the Municipality*	*Population (2011 Census)*	*Area of the Municipality (in Sq km)*	*No of Wards*	*Year of Establishment*	*Name of the Chairman*
1	SuriMunicipality	67864	9.47	18	1876	Ujjwal Mukherjee

Source: *- Suri Municipality Office Database*

The above table: demonstrates the overall scenario of the Suri municipal town. The total population of Suri municipality is 67,864 (2011) with 18 wards altogether. The municipality was established in 1876 and it is the oldest municipality in Birbhum district. The area of the town is 9.47km^2.

A scenario of the Suri municipal town: Suri Municipality now consists of 18 wards. The total area is about 9.471km^2. Suri municipality is under Suri Sadar Sub-Division and Suri Police Station. This town is located close to the Panagarh-Moregram Highway. The town is connected with Bolpur, Dubrajpur and Illambazar through State Highway. River Mayurakshi flows beside this township. Suri Railway station is located to the east of the main township on the Andal-Sainthia connecting line.

Plate1: Main entrance to the Suri Municipal Office

The table given below shows the consisting wards with the important 'paras' within the Suri municipality.

Table 2: Name of important areas of Suri Municipality (Ward-wise) as per 2012 report

Ward No	*Name of the important mahallas (Paras) of the wards*
Ward No 1	Bara Bagan, Indira Pally.
Ward No 2	New Dangal Para, Maal Para, Samonnoy Pally, Rabindra Pally (North), Rabindra Pally (South).
Ward No 3	Mallick Guno Para, College Para, Kenduya (Phakir Para, North), Kenduya (Phakir Para, South).
Ward No 4	Sonatore Para, Sunri Pukur.
Ward No 5	Sonatore Para, Sonatore Para (East,West).
Ward No 6	Keyuta Para, Dutta Pukur, Mallick Guno Para.
Ward No 7	Barui Para (Mali Para), Keyuta Para I, Barui Para II, Sonatore Para I & II
Ward No 8	Bene Pukur, Churi Para, Tika Para, Dangal Para, Sonatore Para.
Ward No 9	Laal Kuthi Para I, II, Laal Kuthi Para (W), Fair Brigade Colony, Irrigation Colony.
Ward No10	Sehara Para, Laal Kuthi Para (South), Laal Kuthi Para (North), Sri Bhumi and Laal Kuthi Para, Arabinda Pally and Sri Bhumi.
Ward No 11	Chandni Para, Laal Kuthi Para, Ruti Para, Sibtola Para, Sehara Para.
Ward No 12	Chapatola, Sehara Para, Saddi Para, Nurai.
Ward No 13	Barui Para I, Chandni Dom Para, Ruti Para, Sehara Para I & II, Chandni Ruti Para, Chandni Para.
Ward No 14	Barui Para.
Ward No 15	Anandapur, Pratan Line, Dangal Para.
Ward No 16	Rabindra Pally, Hatjon Bazar, Rabindra Pally (Near Nursing Home), Durga Mandir, Subhash Pally (North-East), Subhash Pally (South).
Ward No 17	Raksha Kalitola (West), Taalbona, Ramakrishna Pally, Ramkrishna Pally and Police Line, Katabuni and Sonatore Para, Hatjon Bazar.
Ward No 18	Hatjon Bazar (North), Hatjon Bazar (South), Muchi Para, Kenduya.

Source: *Office record of Suri Municipality, 2012*

TYPES OF SOLID WASTE GENERATED WITH THE GROWTH OF URBANIZATION

West Bengal as a state witnessed significantly high level of urbanization during the decades of nineteen seventies and eighties. In 1991 urban population in West Bengal was estimated as 27.39% of the total population against 25.70% for the entire country. In terms of density of urban population, West Bengal is much ahead of other states. The overall density of urban population in West Bengal in 1990-91 was estimated at 6,207 individuals per square kilometre against the national average of 4,098. The percentage of urban population has increased from 27.97% in 2001 census to 31.89% in 2011. From this range of variation it is apparent that the percentage of urban population has increased rapidly towards the closing decades of the last century.

With the steady increase of the number of urban dwellers the rate of solid waste generation has been increasing at an alarming rate. Major types of wastes classified as municipal solid wastes are: waste tires, septage, scrap metal, latex paints, furniture and toys, garbage, appliances and vehicles, oil and anti-freeze, empty aerosol cans, paint cans and compressed gas cylinders and, construction and demolition debris, asbestos

While the urban areas in Birbhum District have rapidly increased in terms of activities and population, the municipal services available in these urban centers like Suri are yet to reach required level. Solid wastes in the urban areas are generated from a multitude of sources out of domestic, commercial, institutional and industrial activities. If these wastes are not stored, collected, hauled and disposed off safely and timely, these will create severe impact upon the public health by means of pollution of air, soil and natural water source. Therefore solid waste management (SWM) is one of the crucial civic services, without which no pollution abatement measure can be taken properly. Although SWM is the single largest item of expenditure in the municipal budget, the service suffers from critical deficiencies.

Duet rapid urbanization and uncontrolled growth rate of population, municipal solid waste management (MSWM) has become a burning problem in India as well as in West Bengal. The study area i.e., Suri also falls in this category. The rapid rate of urban expansion around this township is one of the main reasons for ever increasing the amount of solid waste generation. These huge amounts of solid waste become an acute problem for the Suri Municipal Authority to handle with. Unfortunately till now solid waste management though an essential services gets lesser priority from the municipal authority. Lack of financial support, institutional weaknesses,

improper choice of technology and public apathy towards Municipal Solid Waste Management, have made this service far from satisfaction. The current practices of the uncontrolled dumping of waste on the out skirts of Municipal Town have created a serious environmental and public health problem. In Suri, throughout the municipal area the wastes are dumped along the main road sides, mainly alongside the Suri-Dubrajpur Highway.

The following table shows the quantity of solid waste generated daily by the Suri Municipality in 2011.

Table 3: Types of solid wastes generated dailyin the Suri Municipal township in 2011

Total Area in Sq km	*Total Population (Census 2011)*	*Total House Holds (Census 2011)*	*Quantity of Solid Waste (in Metric Tonnes)*						*Bio-Degradable Waste*	*Non-Bio-Degradable Waste*
			Domestic Waste	*Market Waste*	*Agricultural Waste*	*Commercial Waste*	*Other Waste*	*Total Generation of Waste*		
9.47	*67864*	*15385*	*35.4*	*12.65*	*2.85*	*7.8*	*7.14*	*65.84*	*23.89*	*41.95*

Source: *- Suri Municipality Office Database*

Total Generation of Solid Waste 65.84 Metric Tons / Day (Total).

Total Generation of Solid Waste (Total Waste) 970.17 Grams / Capita / Day.

Total Generation of Solid Waste per Household 4.27 Kg / Day.

Total Generation of Solid Waste (Domestic Waste only) 521.63 Grams / Capita / Day.

The amount of total solid waste generated in the Suri Municipal township area is markedly high and is quite alarming for the future as well. Suri municipal area itself has become very congested in recent years. The lanes and the roads are very narrow. As a result the huge amount of solid waste generated daily has become a real burden for the municipal authority to handle. Out of the total waste the domestic waste is about 35.10 MT (metric ton) and Market Waste is 12.65 MT. The total of agricultural waste, commercial waste and other wastes amount to about 17.79MT. Among the total waste of 65.84 MT, bio-degradable wastes and non Bio-degradable wastes amount to 23.89 MT and 41.95 MT respectively.

In the following table (Table 4) the total generation and collection of wastes on daily basis have been analyzed in detail. Ward-wise analysis of waste generation and collection and the percentage of waste generation and collection everyday have been given in the table and the locations of the dumping grounds are below.

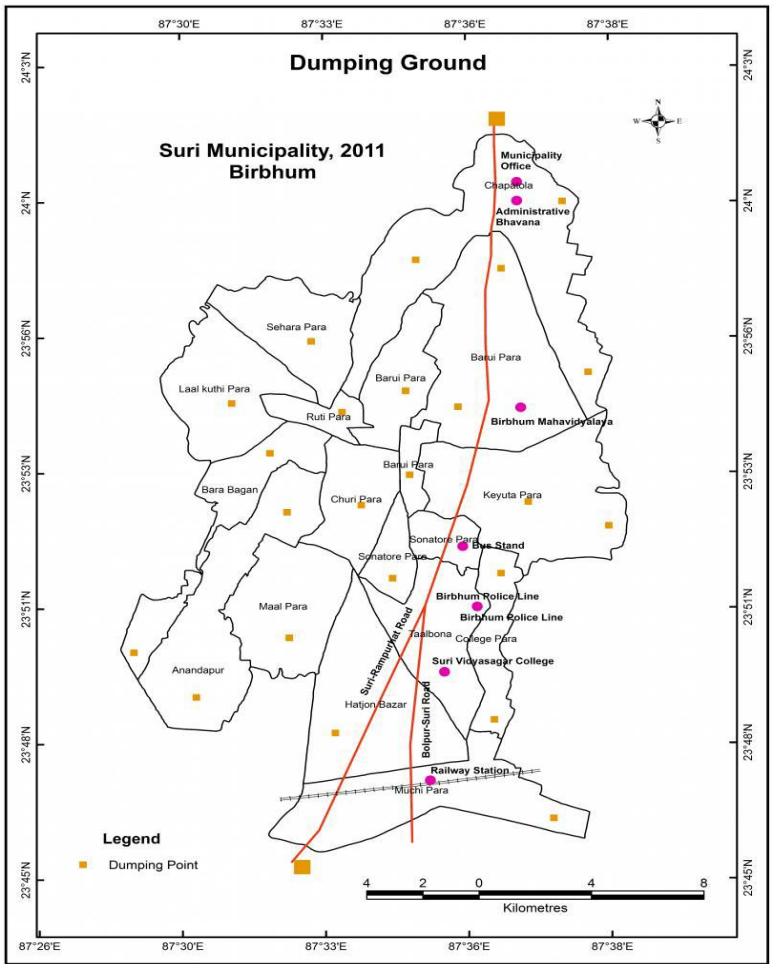

Figure 2: Dumping Grounds of Municipal Wastes in Suri

Plate 2 and 3: Solid waste encroaching upon the water body and the open meadow close to the Suri municipal township area

Table 4: Generation and collection of total wastes (Ward-wise) in Suri Municipal area in 2011

Sl	Ward No	No. of House	Total Population (Census	Quantity of Waste Generation per	% to the Total Generated Waste per Day of the	Quantity of Waste Collection per	% to the Total Collection of Waste per Day of the
1	WARD	855	3582	3.25	4.94	3.12	5.09
2	WARD	1465	5741	4.75	7.21	4.25	6.93
3	WARD	817	3816	3.38	5.13	3.22	5.25
4	WARD	677	3086	3.03	4.60	2.89	4.71
5	WARD	720	3375	3.22	4.89	2.98	4.86
6	WARD	982	4033	3.2	4.86	3.01	4.91
7	WARD	504	2078	3.48	5.29	3.28	5.35
8	WARD	477	2792	3.21	4.88	3.17	5.17
9	WARD	621	2463	3.95	6.00	3.25	5.30
10	WARD	1108	4913	4.19	6.36	3.8	6.20
11	WARD	620	2711	3.28	4.98	3.07	5.01
12	WARD	815	3842	3.55	5.39	3.13	5.11
13	WARD	834	3842	3.78	5.74	3.38	5.51
14	WARD	595	2539	3.18	4.83	3.05	4.98
15	WARD	1088	4505	4.43	6.73	4.25	6.93
16	WARD	1367	6028	4.52	6.87	4.29	7.00
17	WARD	1053	4914	4.17	6.33	3.98	6.49
18	WARD	787	3604	3.27	4.97	3.18	5.19
Total		15385	67864	65.84	100	61.3	100

Source: *Compiled through the field survey and Suri Municipality office data base*

WARD-WISE TOTAL WASTE GENERATION AND COLLECTION IN THE SURI MUNICIPAL AREA

On the basis of the data made available from the Suri Municipal office a comprehensive assessment of ward-wise total waste generation and collection hasbeen made and the result is presented bellow diagrammatically.

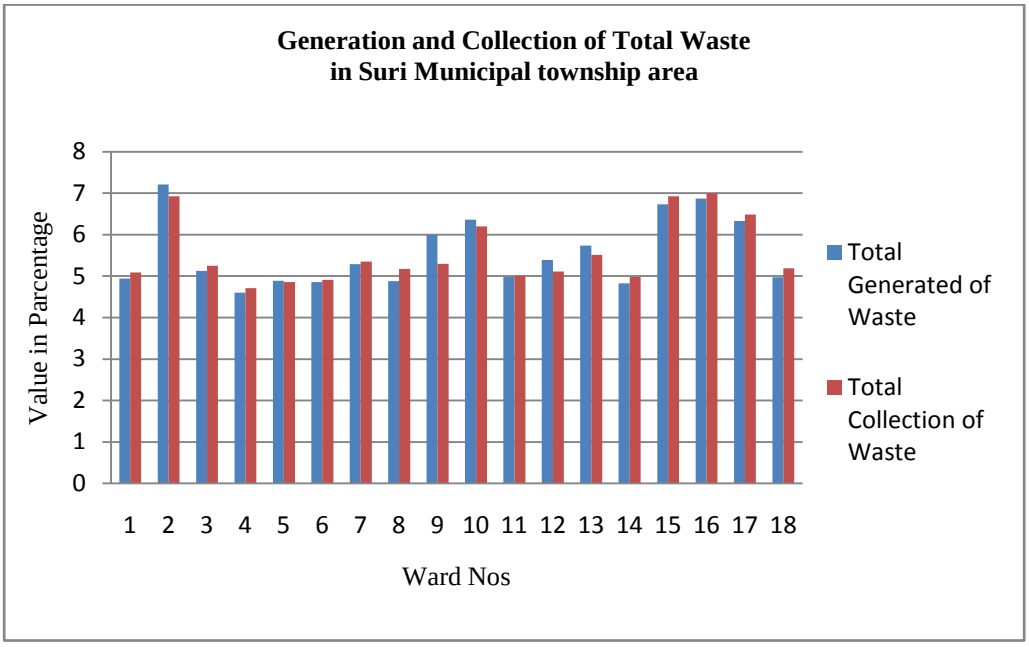

Figure 3: Generation and Collection of total wastes (Ward-wise) in Suri Municipal area in 2011

In the above table (Table 4)and diagram (Figure 3) ward-wise total waste generation and collection in the Suri municipal town have been shown. Total generation of waste for Suri municipality is 65.84 MT and the total collection of generated wastes is 61.30 MT on daily basis. Nearly 93.10 percent of total generated wastes are collected from the source region and is disposed off daily. According to the 2011 census the total population of Suri municipality is 67,864 and the number of total households is 15,385.It can be seen that Ward No. 2 generated maximum numbers of wastes out of total municipal wastes. 4.75 MT wastes are generated by the residents of the ward daily. Out of total 7.21 percent of wastes are generated by the Ward No. 2.The man power employed for garbage and waste collection dispose of 4.25 MT of wastes from this ward daily. Ward No. 4 produces minimum amount of wastes among these 18 wards; only 3.03 MT daily.

SOLID WASTE MANAGEMENT PATTERN IN SURI MUNICIPAL TOWN

Solid waste generation and its management are indeed the biggest problem in the Suri municipal area in the present day. The rate of environmental pollution is now growing day by day drawing problems for the urban dwellers. This problem is not restricted only around the dumping grounds and dumping pits located in every locality but it covers all parts of the township environment which leads to toxic pollutants in the affecting the health of the people. The major risk remains in the seepage of pollutants in to the ground water.

The household wastes mainly consist of readily decomposable organic wastes which would decay, ferment etc., and produce undesirable odours and also become the breeding ground for flies, mosquitoes, and others. These wastes have low calorific value because most of the reusable like newspapers, plastics would have been removed at the household level itself and sold to waste buyer.

From the collection stage to disposal stage of solid waste (at household level) the responsibility is fully of the municipal authority. The wastes which are not generally segregated are collected in a wheel barrows / tricycles / bullock cart etc. and taken to the main road side and is dumped there. Later they are shifted by trucks which are not specially designed with protected cover system for this purpose. This results in spillage of wastes on the road during transport. Though collection is supposed to be done daily, the norm is not followed properly and this results in the accumulation and decomposition of wastes at that site, emanating bad odours and unhealthy atmosphere (Ramulu.Sree.U.S. and U.S., Shoba, 2008).

DEFICIENCIES IN THE PRESENT URBAN SOLID WASTE MANAGEMENT SYSTEM

The present municipal solid waste management problem has come up within a short span of time and is constrained by lack of financial as well as managerial skill due to gigantic nature of the task of handling such huge quantities of wastes. Some of the areas in the present urban solid wastes system have been identified and described here

Source: Very little attention is being paid to segregation and storage of wastes at source because no system of segregation of recyclable organic and inorganic wastes at household level.

Primary Collection: The system of primary collection of waste is not properly designed to suit each area. In many places, door step collection facility does not exist, nor are bins kept at short intervals for collection and / or community collection and disposal of wastes. Not much attention is given to segregate hazardous industrial wastes in many areas as many parts of the town, particularly in older parts of the town small scale industries co-exist or even found within the same house complex.

Street Sweeping: Most streets are not swept regularly, a few are done occasionally and others not for long time. Even where they are swept regularly, the sweepings are not cleared on Sunday and holidays.

Community Storage bins for Streets: The community storage bins are poorly designed and also the required numbers of these are not provided. Many are broken and are invariably over flowing due to excessive dumping of wastes in one bin. Permanent structures for these community storage bins will not be suitable as they may have to be removed frequently due to the various developmental activities like expansion of roads, installing of underground drainage system, underground electrical cables etc.

Transport of waste to the Waste Dumping Grounds: Properly designed vehicles are used in waste transport purpose. Various factors like width of the road, transport volume, road conditions, etc. play important role in selection of vehicles. Mainly tractors and tri-cycles are used in waste transport. All the municipalities of the study are using these vehicles for the waste transport to the dumping sites. Proper garage need to be provided to save the vehicles from wear and tear due to heat and rain. Preventing maintenance system should be introduced which is useful for longer life of the vehicles. Time and motion study shouldbeconductedtoreducethenon-productiveidletimeofthevehiclesand increase productivity.

Disposal of Waste: Sanitary land fill technique should be adopted for disposal for waste. Compaction of waste should be carried out regularly preferably with bulldozer. Though land filling is followed in number of places, as they are not properly planned, they are just dumping sites and not even sanitary landfills. This results in significant pollution of nearby areas, water bodies and underground water resources through the leachiest.

Socio-economic environmental degradation: Present scenario and future prediction

High rate of population growth, declining opportunities in the rural areas and shift from stagnant and low paying agriculture sector to more paying urban occupations, largely contribute to the rapid urbanization around Suri. Not only Suri but also the other municipal towns in this district have grown haphazardly over the last three decades in particular. This has created congestion, inadequate water supply and sanitation, urban poverty and environmental degradation and poses a challenge to urban planners and citizens alike. The priority assigned to urban environmental issues has traditionally been low, resulting in substantial damage to human health and reduced productivity, development.

The unexpectedly high rate of migration has also contributed to the burgeoning of slums and the growth of squatters, and informal housing all around the rapidly expanding township in the recent times. In the town of Suri, the rapid population growth has overwhelmed the capacity of the municipal authorities to provide even basic

services. Thousands of people in towns in the recent time cannot meet their basic needs of shelter, water, nutrition, sanitation, health and education. Thus urban poverty becomes a characteristic feature of urbanization in the twentieth century. There have grown up a large numbers of slums around this municipal town.

OVERALL ASSESSMENT:

- One of the contributory stress factors for the environment of the municipal town Suri in Birbhum district is the remarkable process of urbanization which started taking place in this district of West Bengal since later part of the 1990's; the life style of people living in the urban (Municipal) area has changed abruptly. People started using various packaged items for their livelihood and these materials started producing increasing amounts of the household waste.
- The outstanding problem of environmental protection of management of the Suri and other municipal towns of Birbhum district in the present day is the large amounts of the volume of wastes (particularly solid wastes) which are diverse in nature – from biodegradable to non-biodegradable
- The volume of garbage being generated in this municipal town has increased significantly in recent years. The scenario is very much similar to the other districts of West Bengal as well of India.
- In Suri the urbanization process is remarkably high compared to the other district head quarters. So the problem arising out of waste dumping is growing steadily.
- Management of solid wastes is yet to reach the required level. However, recently special emphasis has been given by the municipal authority on house-to-house garbage collection, segregation at source, sanitary land fill and development of dumping ground sat a safe distance from the townships.

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