DISSERTATION

ON

"Study on the solid waste management in Tamluk Municipality area of Purba Medinipur district"

M.Sc. Semester-IV Practical Examination-2023

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CERTIFICATE

This is to certify that **MS. Alisha Khatun** Roll- **PG/VUEGG19/GEO-IVS** No. **019** has prepared a dissertation work on **"Study on the solid waste management in Tamluk Municipality area of Purba Medinipur district"** under my guidance and supervision for M.Sc. Semester-IV, Examination in Geography, 2023 as a partial fulfilment of the curriculum of Vidyasagar university in geography paper 496.2 it is further certified that this is her original work and no part of this work has been submitted elsewhere before for the awardment of any degree.

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Alisha Khatun

Date: 11.08.23 **Signature**

PREFACE

The report is prepared as a part of M.Sc. final semester Geography honours curriculum and in order to gain knowledge about how to conduct a survey. We were required to prepare a report on Solid waste management. The basic objective behind doing this project report is to get knowledge about disaster and understand its management strategies.

Solid waste management is a critical aspect of maintaining public health, preserving the environment, and ensuring sustainable development in any community, including Tamluk. Tamluk is a town in the Purba Medinipur district of West Bengal, India. Developing an effective solid waste management system in Tamluk requires the collaboration of local authorities, residents, and various stakeholders. Here's a general framework for a solid waste management plan in Tamluk: Through this report, we understand about different aspect of a research and how they are undertaken and also understand the importance of research and field work in the subject geography. We also understand the research and field work in the subject geography.

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CHAPTER- I

1.0 INTRODUCTION:

The term solid waste management mainly refers to the complete process of collecting, treating and disposing of solid wastes. In the waste management process, the wastes are collected from different sources and are disposed of Solid waste is the unwanted or useless solid materials generated from human activities in residential, industrial or commercial areas. It may be categorised in three ways. According to its: origin Domestic, Industrial & Commercial, Construction or institutional. In my dissertation work done by only DOMESTIC HOUSEHOLD SURVEY in TAMLUK word number 02,09,11,12,13, in my dissertation work, I survey 50 household among this municipality areas.

1.1. Objectives Of The Study:

The overall objectives for the waste management assessment are summarised below:

(i) To identify any potential environmental impacts from the generation of waste associated with the works.

(ii) To assess the construction activities involved for the proposed works and determine the type, nature and where possible, estimate the volume of waste to be generated.

(iii) To categorise waste materials for re-use, recycling, disposal to public filling areas, disposal to landfill and any pre-treatment requirements prior to disposal.

(iv) To recommend appropriate waste management options (including waste minimisation on-site, re-use or recycling opportunities and off-site disposal options)

(v) To identify site management/mitigation measures that should be implemented to minimise any potential impacts from the generation, handling, storage and disposal measures/routings of waste, in accordance with the current legislative and administrative requirements.

1.2 Literature Review:

"M. Sanyal, A. Das, A. Majumder, P. K. Roy & A. Mazumdar" is examined that most urban areas in the country are plagued by acute problems related to solid waste. It is estimated that the total solid waste generated by 300 million people living in urban areas is around 40 million tonnes/year. Municipal Solid Waste (MSW) is a heterogeneous mixture of different constituents out of which around 50% is organic. Municipal Solid Waste management (MSWM) is perhaps the most essential service required by urban population to combat the severe implications that MSW may have on their health and to the overall environment.

"Ali Sk Ajim" in his paper he given a general over view of the current Solid Waste (MSW) management in Kolkata Municipal Corporation (KMC), West Bengal. Solid waste management is one of the most challenging issues in urban cities at present scenario, which are facing a serious pollution problem due to the generation of huge quantities of solid waste. The KMC generates more than 3520 MT solid waste per day. As a group, households are the single largest generators of Municipal waste in Kolkata. On an average maximum solid waste generated from commercial around 36.37% and market area and minimum from institution around 6.32%. It has been projecting that KMC will generate near about 8805 MT solid waste per day in 2035. But on an average has been estimated that approximately only 700 ton of these generated waste are collected and stored in every day. So, there exist a huge gap between waste generation and waste disposal, which create several environmental problems.

" Amit Kumar Das, Uday Chatterjee & Jenia Mukherjee" discuss about Solid waste management (SWM) is a crucial service governed by urban local bodies (ULB). Hence, it is essential to identify challenges and opportunities in the SWM procedures and practices towards improved delivery of services. In this study, analytic hierarchy process (AHP) has been applied in the three sub-divisional towns of the Hooghly district, West Bengal (India), namely Chandannagar, Hooghly-Chinsurah and Serampore to analyse the existing SWM scenario. As AHP is a Multi-Criteria Decision-Making tool, hence, it has been deployed by experts to come up with SWM performance index, clearly demonstrating the strengths and weaknesses of management strategies in selected study sites.

"M.K. Ghose, A.K. Dikshit, S.K. Sharma" given a view point in recent years has made solid waste management an important issue. Very often, a substantial amount of total expenditures is spent on the collection of solid waste by city authorities. Optimization of the routing system for collection and transport of solid waste thus constitutes an important component of an effective solid waste management system. This paper describes an attempt to design and develop an appropriate storage, collection and disposal plan for the Asansol Municipality Corporation (AMC) of West Bengal State (India).

Plate No: 1 Waste collection facility

1.3. Database And Methodology

1.3.1. Database:

The database is the most important part of any project or field study. For the collection of any necessary database primary and secondary data sources have been need. But in the very short time I cannot collect adequate number of primary data from the survey.

- **Primary Data Source**: Household or door to door survey through structure questionnaire.
- **Secondary Data Source**: Secondary data have been collected from the different government and the nongovernment official website, journal and research paper.

1.3.2. Methodology:

The work is based on empirical study. Primary data have been obtained through in the field area. Household survey using structure questionnaire have been done photography record of the relevant features have also been done. The relevant secondary data have been collected from different appropriate source. All the Maps and diagram of this study have been prepared by using MS Excel software. For all other related calculation in this study MS Excel have been used. The total project work has been completed by dividing total time spend of project in three stages given below –

i. Pre field stage:
   - Selection of the study area.
   - Preparation of survey schedule or questionnaire.
   - Collection of maps and other necessary information.

ii. Field stage:
   - Household survey.
   - Interaction with local people.
   - Collection of information office.
   - Taking necessary photography etc.

iii. Post field stage:
   - Data tabulation and summarization.
   - Preparation of maps and diagram.
   - Data and maps analysis interpretation and drowning of conclusion

❖ House-Hold Survey

We collect primary data through intensive door to door household survey with the help of structured questionnaire. To fulfill the objectives of the study, data on socio-economic factors (level of education, Occupation, income, expenditure pattern of the family, household assets etc.) were collected from Tamluk of Purba Medinipur

❖ Cartographic and Statistical analysis

- We have compiled all the primary and secondary data and tabulate the data to prepare master table. After that analyzed data for preparation of diagrams and subsequent analysis.
- Statistical analysis has been done. We have drawn some cartograms by suitable cartographic techniques.
- Map of Study area has been done by Arc- GIS 10.3 software.

➢ Sex ratio

The **sex ratio** is the ratio of females to males in a population. Sex ratio has been carried out by using this formula

$$\text{Sex Ratio} = \frac{\textbf{Female Population}}{\textbf{Male Population}} \times 1000$$

❖ Literacy rate

Literacy rate is defined by the percentage of the population of a given age group that can read and write. Literacy rate has been calculated by following formula

$$\text{Literacy rate} = \frac{\textbf{No.of Literate Population}}{\textbf{Total Population}} \times 100$$

❖ Dependency Ratio:

The dependency ratio is a measure of the number of dependents aged zero to 14 and over the age of 65, compared with the total population aged 15 to 64. This demographic indicator gives insight into the number of people of non-working age, compared with the number of those of working age. The dependency ratio has been calculated using the following formula.

Dependency Ratio = [(Total Number of Children under age 14) + (Total Number of Senior Citizens above age 65)] / Total Number of People from the age group of 15 to 65 *100

❖ Software use:

- **ArcGIS:** It is a geographic information system (GIS) for working with maps and geographic information. It is used for creating and using maps, compiling geographic data, analysing mapped information, sharing and discovering geographic information, using maps and geographic information in a range of applications, and managing geographic information in a database.
- **Ms-Excel:** We have compiled all the primary and secondary data and tabulate the data to prepare master table with MS-Excel. For the interpretation of data and subsequent analysis we have prepared different diagrams with the help of MS-Excel software.

CHAPTER II

2.0. Description Of The Study Area :

Tamluk is a town and a municipality in the district of East Medinipur of west Bengal, India. It is also the headquarters of the East Medinipur. Tamluk is the site of the ancient city variously known as Tamralipta. It is now located on the banks of Rupnarayan River close to the Bay of Bengal.

- **Location:** If you are looking for the coordinates (Latitude and Longitude) of **Tamluk,** it is: 22° 3'N 87 ° 92'E.
- **Area:** The total Area of **Tamluk** is 17.86 km^2.
- **Altitude:** The average altitude of **Tamluk town** is 7 m (23ft).

2.1. Location Map Of The Study Area :

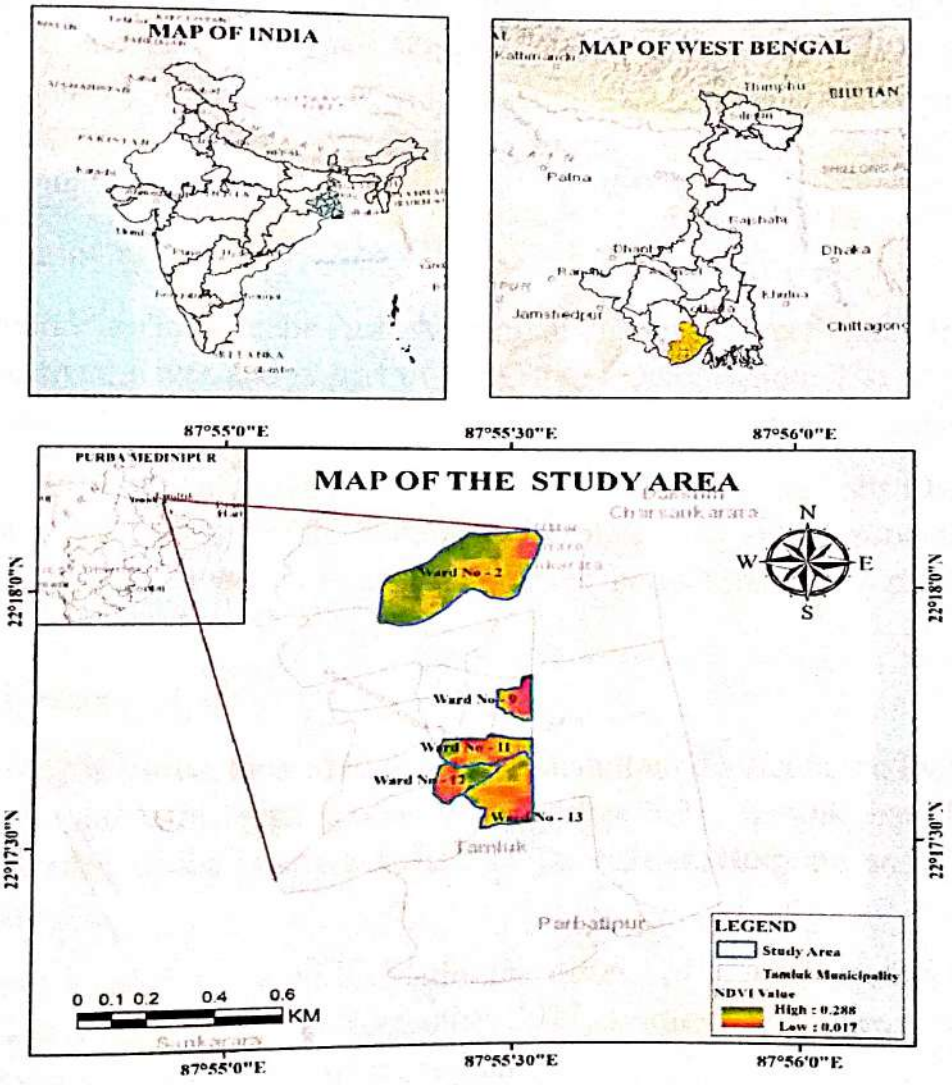

Fig: 2.1 Location map of tamluk study area

2.2. PHYSICAL STATUS

2.2.1 SOIL:

Tamluk is a town located in the Purba Medinipur district of the Indian state of West Bengal. The soil type in Tamluk, like much of the surrounding region, is predominantly alluvial soil.

The soil type of the study area in tamluk ward no. 02,09,11,12,13 is divide into mainly 4 categories:

- Alluvial Soil
- Marshy Soil
- Sandy Soil

2.2.2Slope:

Lateritic Soil It seems like you're asking about the slope of a specific location called "Tamluk." However, Tamluk could refer to a place, a region, or something else entirely. Without more context, I'm unable to provide a precise answer. If you could provide more details about what you're referring to, I'd be happy to help. Are you asking about the geographical slope of a certain area in Tamluk.

2.2.3 Drainage:

Tamluk is a town in the Purba Medinipur district of West Bengal, India. It is located near the Rupnarayan River and is part of the Ganges Delta region. The drainage system of Tamluk is influenced by the surrounding geography and the presence of the Rupnarayan River.

The Rupnarayan River, along with its tributaries and distributaries, plays a significant role in the drainage of the Tamluk region. The river and its associated water bodies help carry excess water away from the area during periods of heavy rainfall and prevent flooding.

2.2.4 Climate:

Tamluk is a town located in the Purba Medinipur district of the Indian state of West Bengal. As of my last knowledge update in September 2021, Tamluk experiences a tropical wet and dry climate, which is characteristic of the region. Here are some key features of Tamluk's climate:

Tamluk is a town located in the Purba Medinipur district of the Indian state of West Bengal. As of my last knowledge update in September 2021, Tamluk experiences a tropical wet and dry climate, which is characteristic of the region.

Here are some key features of Tamluk's climate:

- Seasons:

- Summer (March to June): Summers in Tamluk are hot and humid, with temperatures often reaching above 30°C (86°F). The highest temperatures are typically recorded in May and June.
- Monsoon (June to September): Tamluk experiences a monsoon season, with heavy rainfall during this period. The southwest monsoon brings substantial rainfall to the region, making it lush and green.
- Autumn (October to November): After the monsoon season, the weather begins to cool down, and humidity levels drop. This is a pleasant time to visit Tamluk.
- Winter (December to February): Winters in Tamluk are generally dry and relatively cool. Temperatures can drop to around 15°C (59°F) during the coldest months of December and January.

- Rainfall:

  Tamluk receives the majority of its rainfall during the monsoon season, with July and August being the wettest months. The average annual rainfall in Tamluk is around 1,600-1,800 millimeters (63-71 inches).

- Humidity:

  High humidity levels are common throughout the year, particularly during the summer and monsoon seasons. Humidity levels can make the weather feel more uncomfortable during the hot months.

- Cyclones:

  Tamluk, like many coastal areas in the Bay of Bengal, is susceptible to cyclones. Cyclone seasons typically occur from April to June and September to December. The region may experience strong winds and heavy rainfall during cyclones.

CHAPTER-III

3.0 Socio Economic Background Of The Study :

3.1 Cultural Status

- **Economic Status:** Tamluk is the one of town region in east Medinipur district. Here, all of the business activities and other curriculum activities also done. The local people of this surrounding region came Tamluk in many purposes.
- **Education:** Education in East Medinipur district of West Bengal, has a strong foundation since ages. In Tamluk is 81.6% of the population literate with male literacy of 85.0% and female literacy of 78.1%.
- **Medical Facilities:** The Town has recently seen an increase in the number of Private Nursing Homes, serving people of the town and mostly of the rural areas in and around Tamluk. Tamluk also is a growing medical Hub, with chambers of many repeated doctors, that have brought top level diagnosis and facilities to the people of Tamluk and rural villages beside Tamluk.
- **Language:** Bengali is the primary language of Tamluk. Hindi and English are the prevailing languages.
- **Religion:** Hindu people are majority, Many Muslim family also well established and permanent settle here. People of Buddhism, Christian and other remain negligible.
- **Food:** The main food habits is generally fish served with rice. cuisines and varied cooking techniques also there.
- **Festival:** Though all the festivals of different religions are celebrated with full zeal and enthusiasm but then also the most common ones are Diwali, Durga Puja, Maha Shivratri, and many more.
- **Industry:** Haldia petrochemical industry is nearby Tamluk.

3.1.2 Transportation

- **Roadway:** Tamluk Mecheda Haldia road passing through Tamluk and many small roads are joint in together.
- **Railway:** Tamluk has two railway stations Tamluk Junction and Sahid Matangini station which connect Panskura junction to Haldia.
- **Waterway:** Short distance is done in river Rupnarayan.

CHAPTER – IV

4.0 Data Analysis and Finding the Result

4.1 Demographic Profile:

Demography is the statistical study of populations, especially humans. Its examines and measures the aspects and dynamics of populations; it can cover entire societies or groups defined by criteria such as education, nationality, religion, and ethnicity. Educational institutions usually treat demography as a field of sociology, though there are a number of independent demography departments. These methods have primarily been developed to study human populations, but are extended to a variety of areas where researchers want to know how populations of social actors can change across time through processes of birth, death, and migration. In the context of human biological populations, demographic analysis uses administrative records to develop an independent estimate of the population.

As a rule, in the same country and at the same period, the size of an urban community is much larger than that of a rural community. In other words, urbanity and size of a community are positively correlated. Density of population in urban areas is greater. Urbanity and density are positively correlated. So far as urban community is concerned, greater importance is attached to the individual than to the family. Nuclear families are more popular in urban areas.

4.1.1. Population Composition:

As per survey information in Tamluk the word number 02,09,11,12,13, in the district of East Medinipur here 4.8% of the Male population is in 0-10 years, 12.8% of the male population is in 11-20 years, 24.8% of male population is in 21-30 years, 26.4% of male population is in 31-40 years, 18.4% of mal population is in 41-50, 8.8% of male population is in 51-60 years and 4% of male population above 60 years.

Here 8.04% of female population is in 0-10 years, 10.7% of the female population is in 11-20 years, 22.32% of female population is in 21-30 years, 24.11% of female population is in 31-40 years, 19.64% of female population is in 41-50, 8.94% of male population is in 51-60 years and 6.25% of female population above 60 years.

TABLE NO: 4.1.1 AGE AND SEX COMPOSITION

Age Group	Frequency		Percentage	
	Male	Female	Male	Female
0 -10	6	9	4.8	8.04
11 20	16	12	12.8	10.7
21-30	31	25	24.8	22.32
31-40	33	27	26.4	24.11
41-50	23	22	18.4	19.64
51-60	11	10	8.8	8.94
Above 60	5	7	4	6.25
Total	125	112	100	100
Source : Field survey 2023				

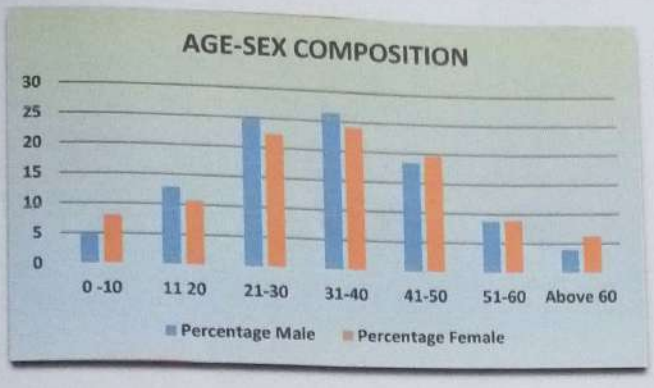

Fig No 4.1.1 Age-Sex Composition

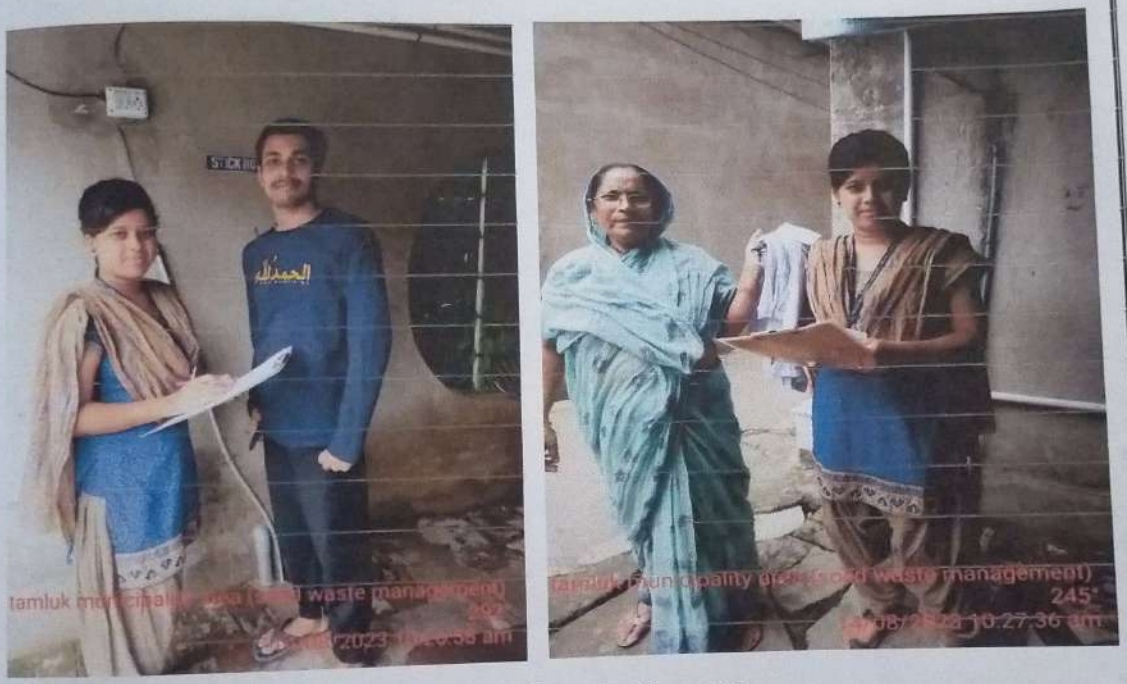

Plate No:2 Household survey

5.0 Socio-Economic Status

Socio Economic Status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic access to resources and social position in relation to others. When analysing a family's SES, the household income, level of education, and pattern of occupation are examined, as well as combined income, whereas for an individual's SES only their own attributes are assessed. Socioeconomic status is classified into three levels (high, middle, and low) to describe the three places a family or an individual may fall into. When placing a family or individual into one of these categories, any or all of the three variables (income, education, and occupation) can be assessed.

Education in higher socioeconomic families is typically stressed as much more important, both within the household as well as the local community. In poorer areas, where food, shelter and safety are major priority, education is typically considered as less important.

Additionally, low income and education have been shown to be strong predictors of a range of physical and mental health problems, including respiratory viruses, arthritis, coronary disease, and schizophrenia. These problems may be due to environmental conditions in their workplace, or, in the case of disabilities or mental illnesses, may be the entire cause of that person's social predicament to begin with.

5.1 CASTE COMPOSITION:

As per survey information general were 49.78% of total population in Tamluk the word number 02,09,11,12,13, in the district of East Medinipur, OBC – A 27.43% while the OBC – B is 15.61%. and the other caste around 7.18%.

TABLE NO 5.1 CASTE CATEGORY		
Category	Frequency	Percentage
General	118	49.78
OBC - A	65	27.43
OBC - B	37	15.61
Others	17	7.18
Total	237	100
Source: field survey 2023		

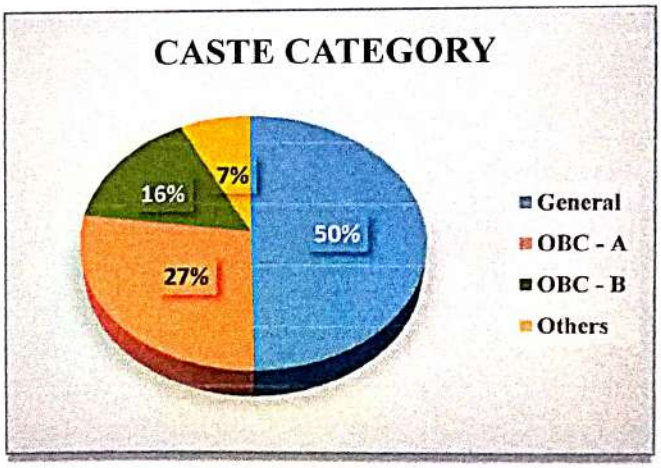

Fig No 5.1 Caste Category

5.2 Poverty Status:

Poverty is a condition in which an individual or household lacks the financial resources to afford a basic minimum standard of living. According to field survey, out of the 50 household in the study area are 4% APL household and 96% BPL category belong in this area. According to the field survey 96% family belong in low level of poverty status, and there lifestyle also very low level.

Table No: 5.2 Poverty Status

Poverty status	Number	Percentage (%)
APL	2	4%
BPL	48	96%

Source: Field survey 2023

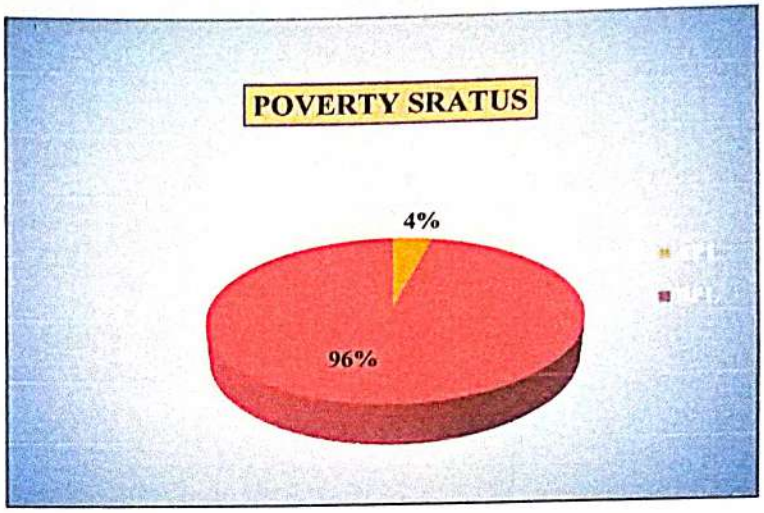

Fig No:5.2 Poverty status

5.3. Level Of Education:

As per survey information in Tamluk the word number 02,09,11,12,13, in the district of East Medinipur here the number of illiterate people are among 5.91%, primary educate 9.28%, secondary educated are 25.74% around 37.13% people are higher secondary, 15.19% people are graduate and 5.06% people are post graduate and nearly 1.69 % people are in higher education. According to survey report male literacy rate is higher than female.

TABLE NO 5.3. LEVEL OF EDUCATION

Education Status	Gender		Total	Percentage
	Male	Female		
Illiterate	5	9	14	5.91
Primary	10	12	22	9.28
Secondary	28	33	61	25.74
Higher Secondary	47	41	88	37.13
Graduate	23	13	36	15.19
Post Graduate	9	3	12	5.06
Higher Education	3	1	4	1.69
Total	125	112	237	100
Source: Field survey2023				

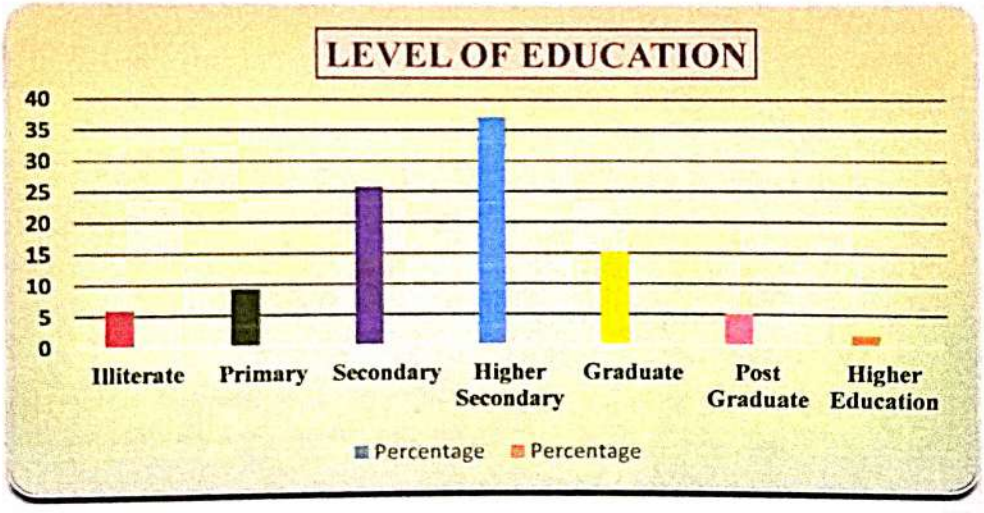

Fig No 5.3. Level Of Education

5.4 Marital Status:

Marital status is the legally defined marital state. There are several types of marital status: single, married, widowed, divorced, separated and, in certain cases, registered partnership. According field survey most of the people is married (79%) followed by the unmarried people is 15%, widow people are 6%.

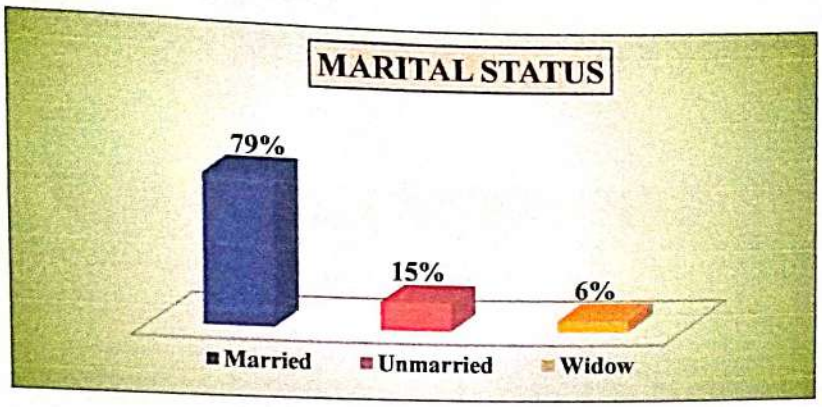

Fig No: 5.4 Marital Status

5.5 Occupation Pattern:

Base on survey information around 37.14% male and 16.88% female of the total population are workers. And nearly 15.61% male and 30.37% female of the total population are non-workers Tamluk the word number 02,09,11,12,13, in the district of East Medinipur region.

TABLE NO 5.5. OCCUPATION STATUS

Status	Gender	Frequency	Percentage (%)
Workers	Male	88	37.14
	Female	40	16.88
Non - Workers	Male	37	15.61
	Female	72	30.37
Total		237	100

Source: Field survey 2023

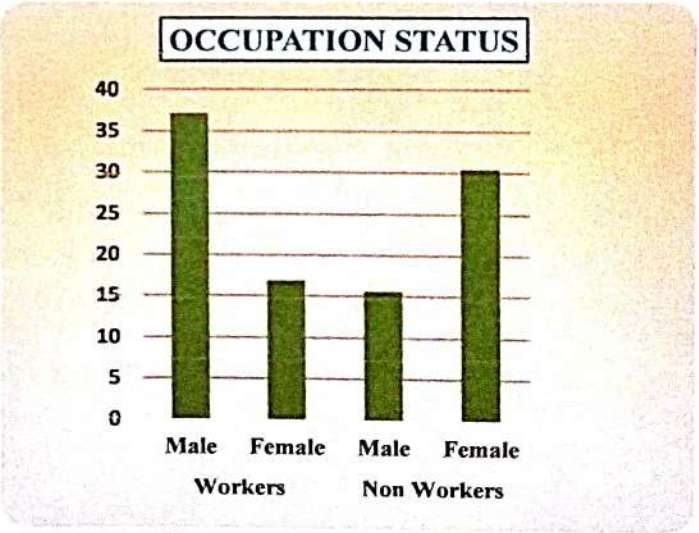

Fig No 5.5. Occupation Status

5.6 Monthly Family Income

As per survey information in Tamluk the word number 02,09,11,12,13, in the district of East Medinipur here 6% of the population are monthly income around 5000 RS, 16% of the population income of 5000 RS -10000 RS and 22% population monthly income between 10000 RS -20000 RS, and 34% populations monthly income around 20000 RS- 30000RS. 22% of people's monthly income more than 30000 RS.

TABLE NO 5.6. MONTHLY FAMILY INCOME		
Family Income (monthly)	Frequency	Percentage
Less than 5000	3	6
5000 - 10000	8	16
10000 - 20000	11	22
20000 - 30000	17	34
Above 30000	11	22
Total	50	100
Source: Field survey 2023		

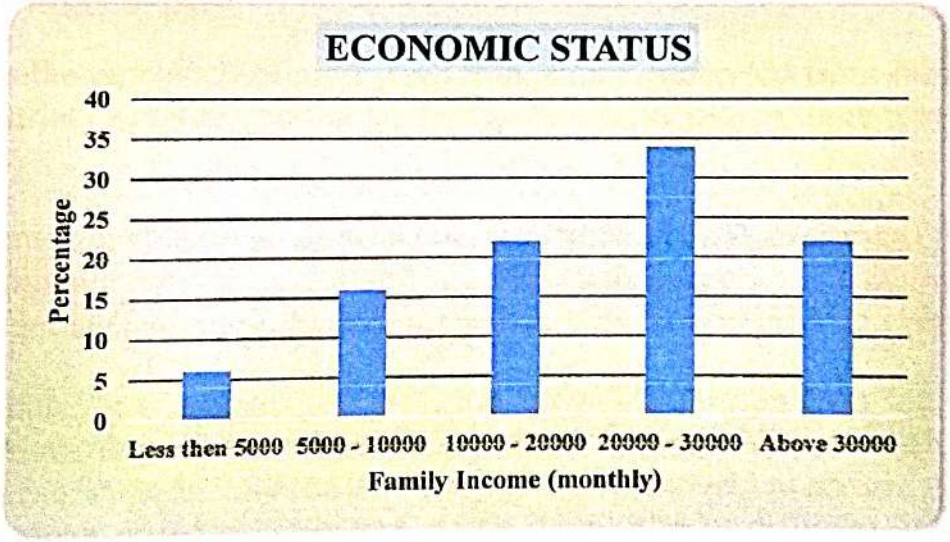

Fig No 5.6. MONTHLY FAMILY INCOME

5.7 Bank Account:

In the study area, here most of the peoples are involved agriculture, business or others trade work, and also present many students. Now days farmers are get many financial help also many students basically girls (like kanyashree, rupashree) from the govt. that's why bank account is very essential in our daily life so, they prefer bank account very muchly. So the percentage of bank account holders (89%) in Tamluk but the bank account are dose not present (11%) people according to survey data.

Table No: 5.7 Bank Account

Bank Account	Number	Percentage (%)
Yes	193	89%
No	23	11%
Source: Field survey 2023		

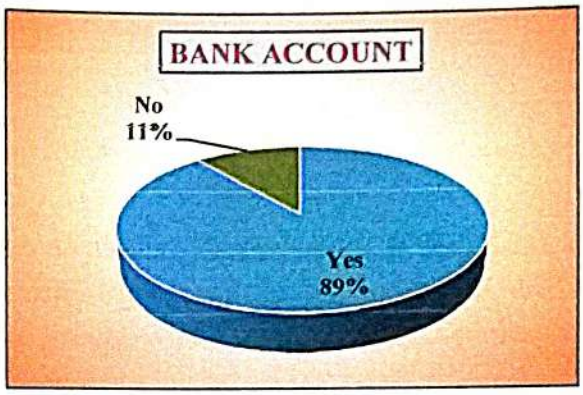

Fig No: 5.7 Bank Account

Definition Of Solid Waste

Solid waste is the unwanted or useless solid materials generated from human activities in residential, industrial or commercial areas. It may be categorised in three ways. According to its:

- origin (domestic, industrial, commercial, construction or institutional)
- contents (organic material, glass, metal, plastic paper etc)
- hazard potential (toxic, non-toxin, flammable, radioactive, infectious etc).

Solid Waste Management reduces or eliminates the adverse impact on the environment & human health. A number of processes are involved in effectively managing waste for a municipality. These include monitoring, collection, transport, processing, recycling and disposal. The quantum of waste generated varies mainly due to different lifestyles, which is directly proportional to socio economic status of the urban population.

6.0 Management of Solid Waste:

The term solid waste management mainly refers to the complete process of collecting, treating and disposing of solid wastes. In the waste management process, the wastes are collected from different sources and are disposed.

6.1 Sources of Solid Waste Collecting

The main sources of solid waste are:

- Medical centres
- Food stores
- Feeding centres
- Food distribution points
- Slaughter areas
- Warehouses
- Agency premises
- Markets
- Domestic areas

6.2 Types of Solid Waste

➢ Bio degradable

Biodegradable waste is a type of waste, typically originating from plant or animal sources, which may be degraded by other living organisms. Biodegradable waste can be commonly found in municipal solid waste as green waste, food waste, paper waste and biodegradable plastics.

➢ Non-biodegradable

Any waste type which cannot be decomposed by natural or biological processes is considered non-biodegradable waste. Besides plastic, glass, and metals, it includes cardboard, paper, old clothes, thermocol sheets, cans, man-made polymer, biomedical waste, chemical waste, electronics, batteries, etc. As per my survey information in Tamluk the word number 02,09,11,12,13, in the district of East Medinipur here the Non bio degradable type of waste is much higher then bio degradable type of waste that's are people useless products.

TABLE NO 6.2. TYPE OF SOLID WASTE

Types	Frequency	Percentage
Bio-degradable	23	46
Non bio degradable	27	54

Source: Field survey2023

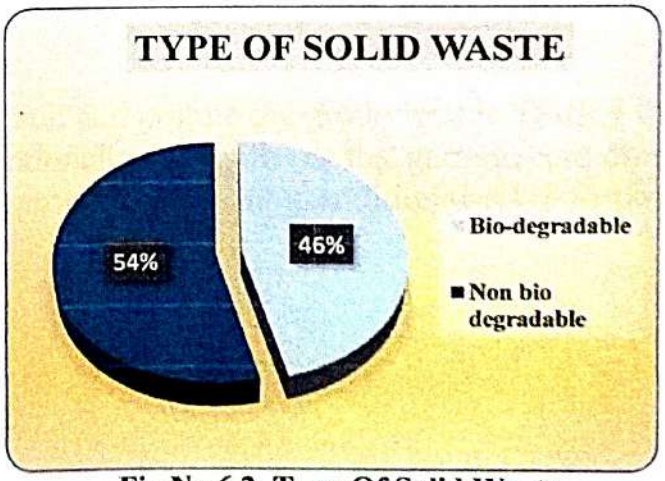

Fig No 6.2. Type Of Solid Waste

✓ **Emission of Toxic Gases**

When hazardous wastes like pesticides, batteries containing lead, mercury, or zinc, cleaning solvents, radioactive materials, e-waste, and plastics mix with paper and other non-toxic scraps and are burned, they produce dioxins, furans, polychlorinated biphenyls (PCBs), and other gases. These toxic gases have the potential to cause various diseases, including cancer.

✓ **Impact on Land and Aquatic Animals**

Our carelessness with our waste and garbage also affects animals, and they suffer the effects of pollution caused by improperly disposed of waste and rubbish. Consuming styrofoam and cigarette butts have been known to cause deaths in marine animals. Animals are also at risk of poisoning while consuming grasses near contaminated areas or landfills as the toxins seep into the soil.

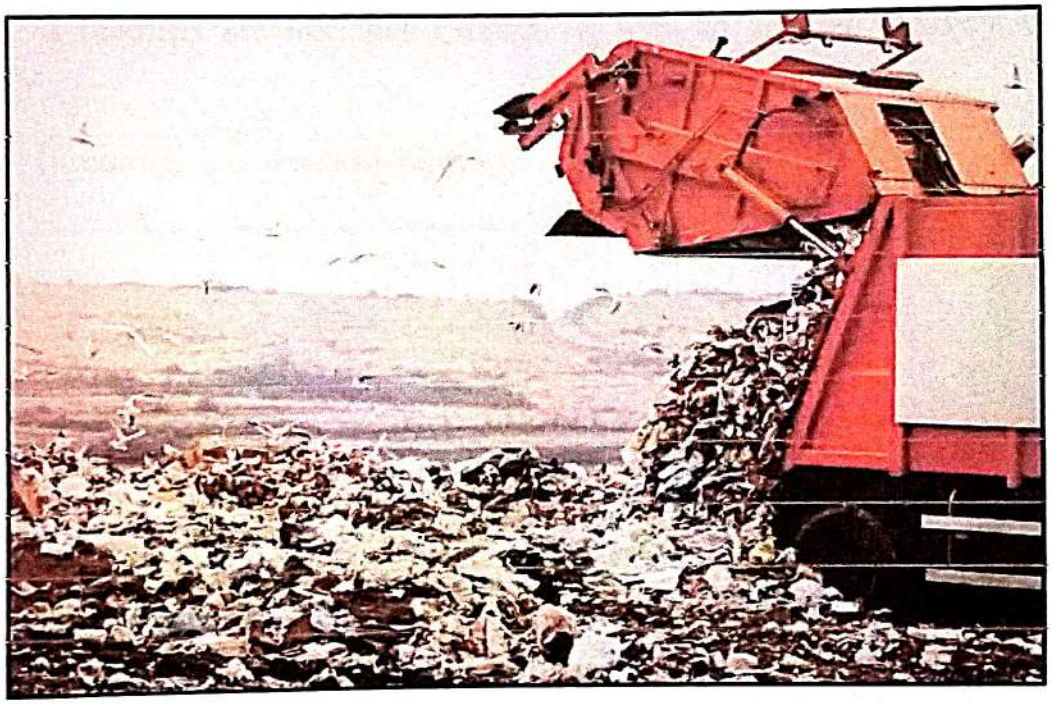

Plate No:3 Waste store point

6.4 Method Of Solid Waste Management

There are different methods of solid waste management. The following are some of the recognized methods:

- ✓ **Sanitary Landfill**

  This is the most popular solid waste disposal method used today. In this solid waste management method, garbage is spread out in thin layers, compacted, and covered with soil or plastic foam to contain the smell. Modern landfills typically have the bottom of the landfill covered with an impervious liner, usually made of several layers of thick plastic and sand. This liner protects the groundwater from being contaminated because of leaching or percolation. When the landfill is full, it is covered with layers of sand, clay, topsoil, and gravel to prevent water seepage.

Advantage: If landfills are managed efficiently, it is an ensured sanitary waste disposal method.

Constraint: It requires a reasonably large area.

Plate No:4 Stack of solid waste

- ✓ **Incineration:** This method involves burning solid waste at high temperatures until it becomes ashes. Incinerators are sealed to ensure that they do not give off extreme amounts of heat to the environment when burning solid wastes. Incinerators that recycle heat energy through furnaces and boilers are called waste-to-energy plants. These systems are more expensive to set up and operate than plain incinerators because they require special equipment and controls, highly skilled technical personnel, and auxiliary fuel systems. This method of solid waste management can be done by individuals, municipalities, and even institutions. The good thing about it is that it reduces the volume of waste by 80 to 90%.

Advantage: The volume of combustible waste is reduced considerably by burning waste. In the case of off-site pits, it is an appropriate method to minimize scavenging.

Constraint: It can cause smoke or fire hazard and also emits gaseous pollutants.

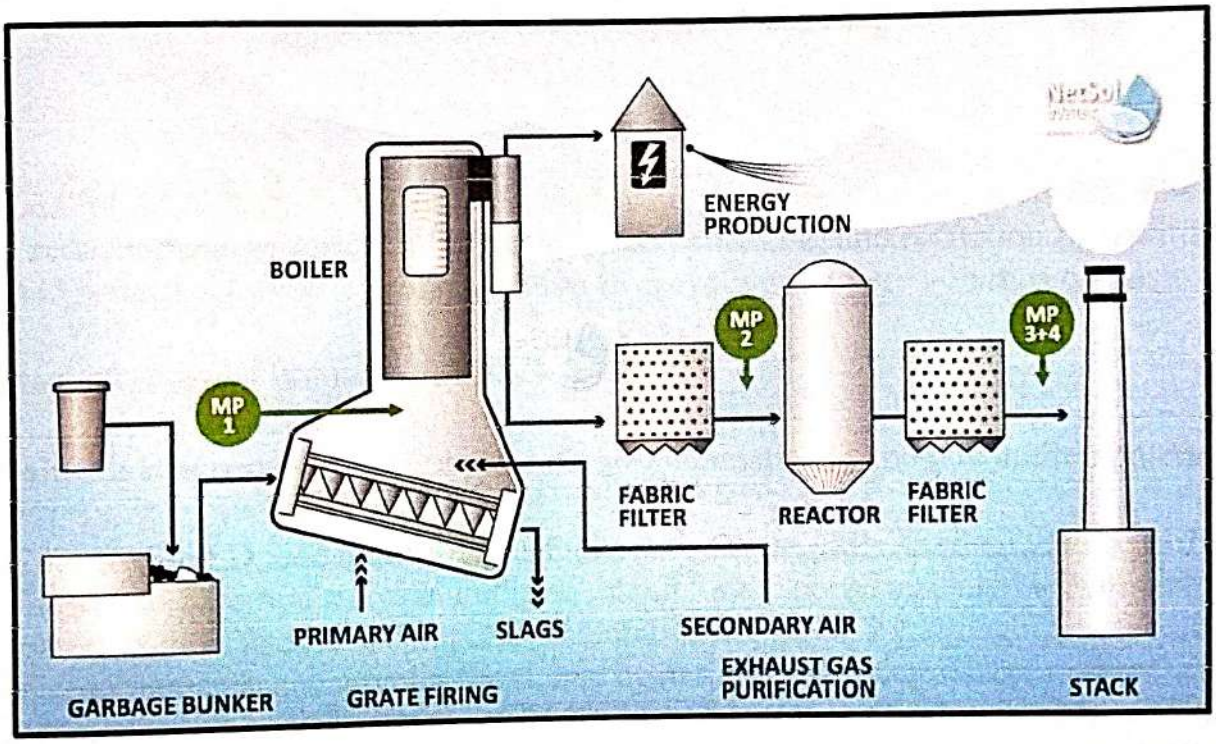

Plate NO:5 Processing of solid waste

✓ **Recovery and Recycling:** Recycling or recovering resources takes useful but discarded items for the next use. Plastic bags, tins, glass, and containers are often recycled automatically since, in many situations, they are likely to be scarce commodities.

Plate No:6 Recovery and recycling

Traditionally, these items are processed and cleaned before they are recycled. The process aims at reducing energy loss, consumption of new material, and reduction of landfills. Most developed countries follow a strong tradition of recycling to lower volumes of waste.

Advantage: Recycling is environmentally friendly.

Constraint: It is expensive to set up, and in most emergencies, there is limited potential.

✓ **Composting:** Due to a lack of adequate space for landfills, biodegradable yard waste is allowed to decompose in a medium designed for the purpose. Only biodegradable waste materials are used in composting. Composting is a biological process in which microorganisms, specifically fungi, and bacteria, convert degradable organic waste into substances like humus. The finished product of compost, which resembles soil, contains high levels of carbon and nitrogen. This environmentally friendly and nutrient-rich compost serves as excellent manure, providing an ideal medium for plant growth. It can be utilized for various agricultural purposes, promoting sustainable and eco-friendly farming practices.

Advantage: Composting is environmentally friendly as well as beneficial for crops.

Constraint: It requires intensive management and experienced personnel for large-scale operations

- ✓ **Pyrolysis:** This is a method of solid waste management whereby solid wastes are chemically decomposed by heat without oxygen. It usually occurs under pressure and at temperatures of up to 430 degrees Celsius. The solid wastes are changed into gasses, solid residue of carbon and ash, and small quantities of liquid.

Advantage: This will keep the environment clean and reduce health and settlement problems.

Constraint: The systems that destroy chlorinated organic molecules by heat may create incomplete combustion products, including dioxins and furans. These compounds are highly toxic in the parts per trillion range. The residue it generates may be hazardous waste, requiring proper treatment, storage, and disposal. To summarize, proper solid waste management is an integral part of environmental conservation that should be observed by both individuals and companies globally.

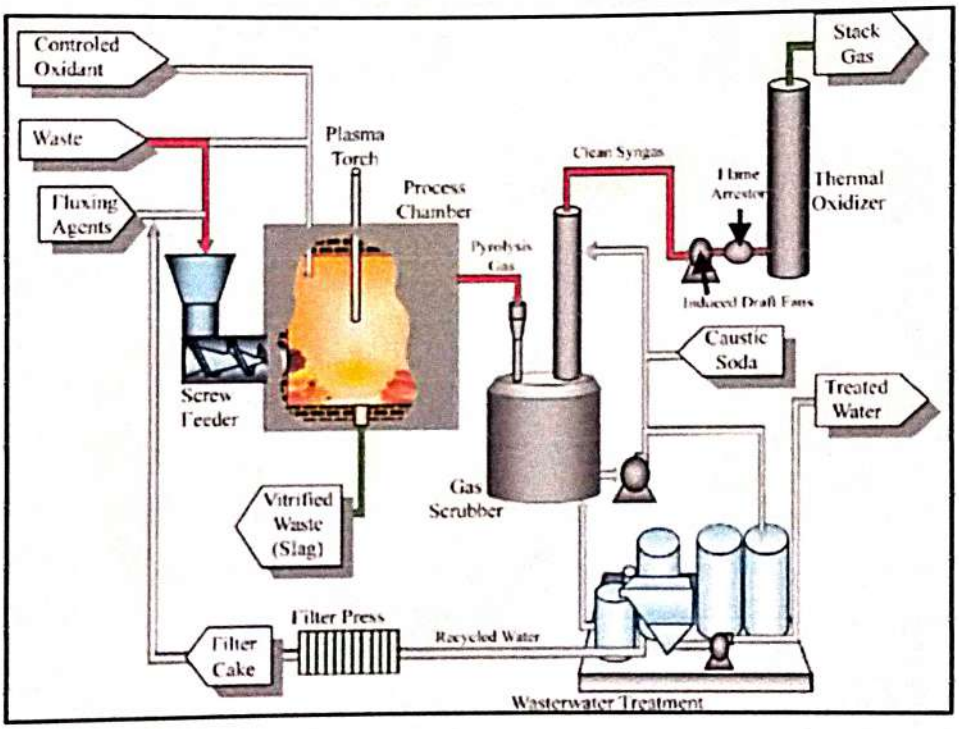

Plate No:7 Process of waste management

6.5 TYPES OF WASTE BIN

As per my survey information in Tamluk the word number 02,09,11,12,13, in the district of East Medinipur here the 32% of people collect their whole waste in together, whereas 68% of people took their waste separately as per biodegradable and non-biodegradable.

TABLE NO 6.5. TYPE OF WASTE BIN		
Type (Bin)	Frequency	Percentage
Together collect	16	32
Separate collect	34	68
Total	50	100
Source: Field survey2023		

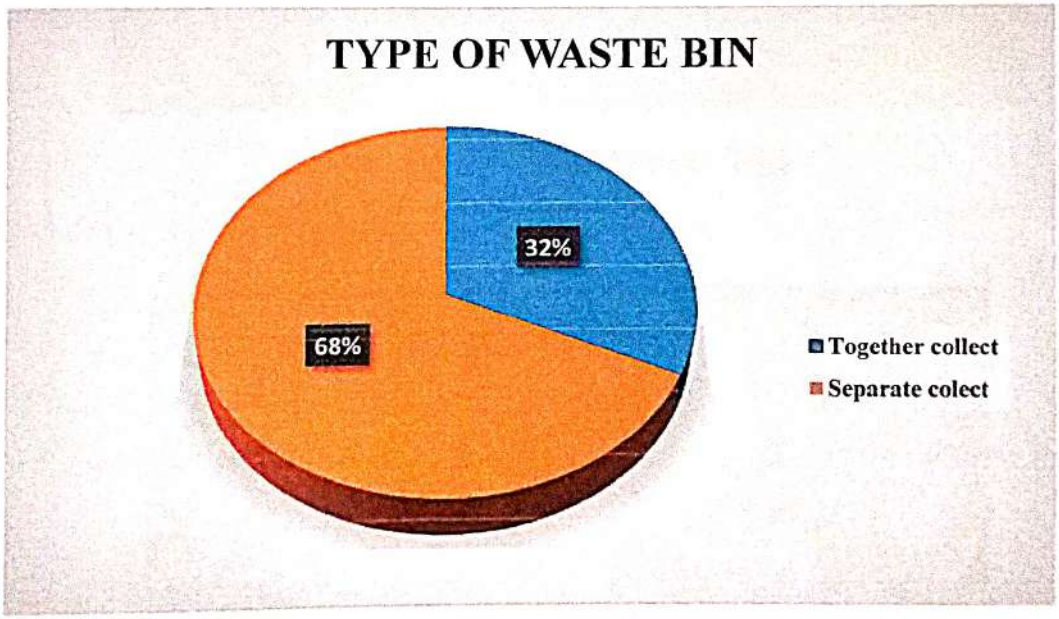

Fig No: 6.5. Type Of Waste Bin

Plate No:8 Waste bin

Plate No: waste bin

6.6 Waste Collect Door to Door

Here in bellow showing the table and fig. that's the frequency of door-to-door waste collection in the municipality of Tamluk. In my survey report 40 household people say that's the van of municipality everyday came in door to door and collect the household waste. But the rest of 10 household people say that's van are not coming regularly.

Table No 6.6. Waste Collect Door To Door

Regularity	Frequency	Percentage
Yes	40	80
No	10	20

Source: Field survey 2023

Fig No 6.6. Waste Collect Door To Door

6.7 People Perceptions About the Solid Waste Management:

Here in the word number 02,09,11,12,13, in Tamluk most of most of the people concious about solid waste management. They are collaborating to the waste collection people in Tamluk municipality. Here, out of 50 household 37 household they want to proper solid waste management in their municipal area. Whereas other 13 household people have no suggestion about this solid waste management.

Table No 6.7. People Perceptions About the Solid Waste Management

People Perceptions	Frequency	Percentage
Yes	37	74
No	13	26
Source: Field survey 2023		

Fig No 6.7. People Perceptions About the Solid Waste Management

CHAPTER – V

7. MAJOR FINDINGS

1. DOMESTIC HOUSEHOLD SURVEY in TAMLUK word number 02,09,11,12,13, in my dissertation work, I survey 50 household among this municipality areas.
2. If you are looking for the coordinates (Latitude and Longitude) of Tamluk, it is: 22° 3'N 87 ° 92'E.
3. The total Area of Tamluk is 17.86 km.The average altitude of Tamluk town is 7 m (23ft).
4. The data on age composition reveals that the percentage of adult population is high (50.51%) and least amount of population belongs to old age group(10.25)
5. Illiterate people are among 5.91%, primary educate 9.28%, secondary educated are 25.74% around 37.13% people are higher secondary, 15.19% people are graduate and 5.06% people are post graduate and nearly 1.69 % people are in higher education. According to survey report male literacy rate is higher than female.
6. Here 6% of the population are monthly income around 5000 RS, 16% of the population income of 5000 RS -10000 RS and 22% population monthly income between 10000 RS -20000 RS, and 34% populations monthly income around 20000 RS- 30000RS. 22% of people's monthly income more than 30000 RS.
7. Biodegradable waste can be commonly found in municipal solid waste as green waste, food waste, paper waste and biodegradable plastics (46%).non-biodegradable waste Besides plastic, glass, and metals, it includes cardboard, paper, old clothes, cans, man-made polymer, biomedical waste, chemical waste, electronics, batteries, etc (54%).
8. Here the 32% of people collect their whole waste in together, whereas 68% of people took their waste separately as per biodegradable and non-biodegradable.
9. In my survey report 40 household people say that's the van of municipality everyday came in door to door and collect the household waste. But the rest of 10 household people say that's van are not coming regularly.
10. Here, out of 50 household 37 household they want to proper solid waste management in their municipal area. Whereas other 13 household people have no suggestion about this solid waste management.

8. Problems of Solid Waste Management:

- Municipal solid waste stack up on the roads due to improper disposal system. People clean their own houses and throw mixed waste to their immediate surroundings which affect the community including themselves.
- The study area has poor Waste management due the causes of institutional weaknesses, poor waste collection system etc.
- Dumping of waste allows biodegradable materials to decompose under uncontrolled unhygienic condition. This produces bad odors, breeds, various types of insects and infectious organisms beside spoiling the aesthetics of the site which brings many diseases like malaria, diarrhea, cholera, dengue etc.
- Different types of solid waste in municipal area which may spread on land and can cause changes in physiochemical and biological characteristics thereby affecting productivity of soils.
- Various types of waste like cans, pesticides, cleaning solvents, batteries (Zinc, lead or mercury), radioactive materials, plastics and e-waste are mixed up with paper, scraps and other non-toxic materials which could be recycled.

9. Analysis of the Suggestion:

To overcome such problems and recommend for a sustainable Managing plan of Solid involves steps which are summarized below:

- Segregation of mixed waste at the source.
- Collection at the source with different segregated material in different package.
- And optimization of load relies and collection point (both primary and secondary)
- Improvement in transportation system comfortable to the type of load.
- Selection and identification of transportation route with improved capacity of caring with the utilization of MIS and GIS methods.
- Upgradation and disposal ground as per the solid waste landfill guideline of CPCB with the application of sanitary landfill system and improved version incineration.
- Adoption of a systematic disposal technique suitable to the type and quality of waste generated.
- Possible marketing of the product (if any) from the disposal ground.
- Organizing awareness and motivation camp in the locality.

LIMITATION OF THE STUDY AREA: The present study has some shortcomings, like-

- This is a very short time study.
- Limited household survey
- Lack of previous study on the topic.
- Lack of data collection.

CONCLUSION

In the waste management process, the wastes are collected from different sources and are disposed of Solid waste is the unwanted or useless solid materials generated from human activities in residential, industrial or commercial areas. It may be categorised in three ways. According to its: origin Domestic, Industrial & Commercia, Construction or institutional. In my dissertation work done by only DOMESTIC HOUSEHOLD SURVEY in TAMLUK word number 02,09,11,12,13, in my dissertation work, I survey 50 household among this municipality areas. Education in East Medinipur district of West Bengal, has a strong foundation since ages. In Tamluk is 81.6% of the population literate with male literacy of 85.0% and female literacy of 78.1%. Bengali is the primary language of Tamluk. Hindi and English are the prevailing languages. Hindu people are majority, Many Muslim family also well established and permanent settle here. People of Buddhism, Christian and other remain negligible. The main food habits is generally fish served with rice. cuisines and varied cooking techniques also there. Though all the festivals of different religions are celebrated with full zeal and enthusiasm but then also the most common ones are Diwali, Durga Puja, Maha Shivratri, and many more. Short distance is done in river Rupnarayan.

As Per Survey Information General Were 49.78% Of Total Population In , OBC – A 27.43% While The OBC – B Is 15.61%. And The Other Caste Around 7.18%. Biodegradable Waste Can Be Commonly Found In Municipal Solid Waste As Green Waste, Food Waste, Paper Waste And Biodegradable Plastics (46%). Non-Biodegradable Waste Besides Plastic, Glass, And Metals, It Includes Cardboard, Paper, Old Clothes, Cans, Man-Made Polymer, Biomedical Waste, Chemical Waste, Electronics, Batteries, Etc (54%). 8. Here The 32% Of People Collect Their Whole Waste In Together, Whereas 68% Of People Took Their Waste Separately As Per Biodegradable And Non-Biodegradable. Out Of 50 Household 37 Household They Want To Proper Solid Waste Management In Their Municipal Area. Whereas Other 13 Household People Have No Suggestion About This Solid Waste Management.

In Conclusion, Effective Solid Waste Management In Tamluk, As In Any Community, Is A Complex And Ongoing Process That Requires Infrastructure Development, Community Involvement, Policy Support, And A Commitment To Sustainability. Continuous Efforts And Adaptation To Changing Circumstances Are Essential For Maintaining A Clean And Healthy Environment For The Residents Of Tamluk.

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