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Basirhat Municipality, North 24 Parganas, W.B.: Water Crisis and Proposed Water Treatment Plant Model, Word No. 6 of Basirhat Municipality, North 24 Parganas, West Bengal

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Abstract: - Water as a Resource that is the basic element for sustenance of life on earth. Almost 70% of our body is consisted of water. However, in 21st. century, world is facing a critical problem of accessing pure drinking water. According to WHO, 1.2 billion people or almost 1 out of 5 people in the world are without access to safe drinking water. According to estimate at least 3.5 billion people (nearly 50% of world's population) will face water scarcity by 2025. In that circumstance, the present study intends to address the precarious scenario of water resources of Basirhat Municipality Word No-6, North 24 Parganas in West Bengal. As per Urban Development Plan Formulation and Implementation (UDPFI) guidelines for domestic supply in medium size town is 135 litre of water per day per capita. Basirhat Municipality Word No-6, a medium size part of town demand of water is 1024785 litres whereas in reality it received 614871 litres water through only one submersible pumps and practically shows the grim situation with deficit of 409914 litre of water. With the population projection there will be approximate gap of 1144665 litres and 1304910 litre of water per day in the coming year 2025 and 2030 respectively. This projected scenario should urgently seek remedies otherwise will invite lot of unrest be natural or and cultural. Finally, this micro level empirical investigation has drawn a management plan with alternative avenues to minimize the problems.

Key Words: —*Water crisis, ward level under municipality, provide treatment plant and overcome the problem.*

I. INTRODUCTION

A. Study area:

The latitude of Basirhat, West Bengal, India is 22.657402, and the longitudes is 88.867180. It is located at India country in the Cities place category with the GPS coordinates of 22° 39' 26.6472" N and 88° 52' 1.8480" E.

Basirhat Municipality, Word No. 6, North 24 Parganas, W.B and is located on the right bank of river Ichhamati.

B. Aims and Objectives:

In this paper I have attempted to make identify the location of the area as well as reservoir with the major stages of treating water in Ichhamati River and big ponds to fulfill the present needs.

To identify the location of the area as well as reservoir,

- Determine the preliminary treatment methods like screening and grit removal,
- Identify primary treatment like sedimentation.
- List out various major aerobic biological processes.
- Point out major anaerobic biological process.

C. Date Base and Methodology:

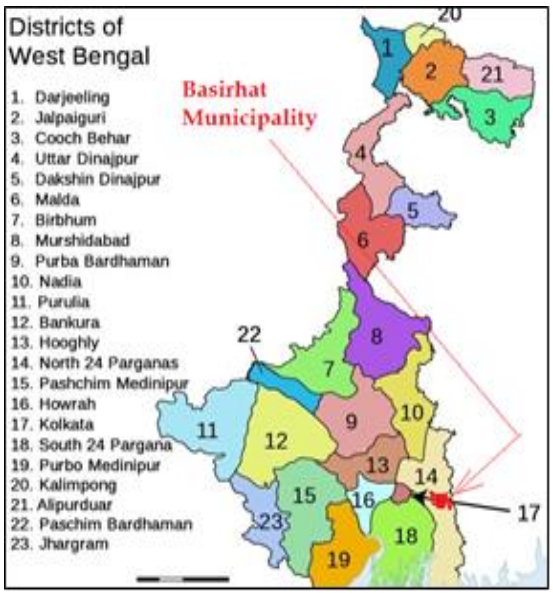

Fig.1. Basirhat municipality

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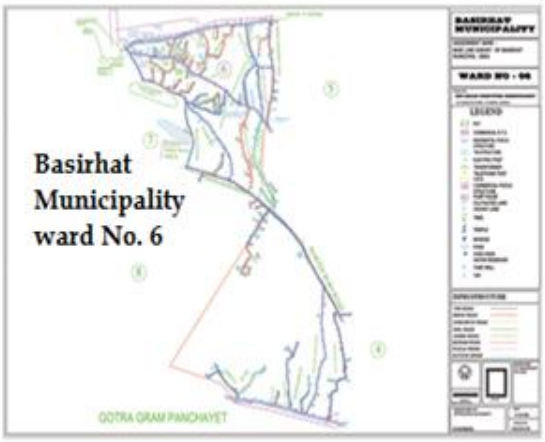

Fig.2. Basirhat Municipality Ward No.6.

Present study is based on available date gathered from both primary and secondary sources. Generally, data, information and records have been collected from Basirhat.

B.D.O., Basirhat Municipality**,** District Gazetteer North 24 Parganas, B.L. &L.R.O. (Basirhat), Asstt.Ev. Office, A.D.O.(Basirhat), PHE Basirhat. The collected data have been tabulated. A detailed land use survey was conducted.

Personal interviews with head of household (20% house hold) have been taken for consulted the secondary data.

Thematic and Cartographic maps have been utilized for lucid illustration.

D. Introduction to Water treatment

Water treatment aims at removal of unwanted components to switch for useable water. Its objective is to produce a stream & big ponds (or treated effluent) and a solid waste or sludge also suitable for discharge or reuse back into the environment. This material is often inadvertently contaminated with toxic organic and inorganic compounds. This can be achieved by physical, chemical and biological methods either alone or in combination. However, most of the treatment processes are not completely effective and do not offer complete solutions for the removal of contaminants as it transfers the contaminant to a different component.

The safe drinking water crisis in Basirhat Municipality is not to day, very ancient. Over the countries, the Municipality has made many attempts to address this problem. Like- formation of PHE, establishment of depth well, pipe line water supply from Polta water source etc. But its results still fail to day but what the citizens have received a new assurance every five years. There has been a lot of talk about meeting the water crisis but nothing has actually worked. The water crisis of the ward no. 6 is the tremendous crisis among the wards under the Basirhat Municipality. Standing on top of such a context, In the present tropic, I have try just a scene of the water crisis of ward no.6 under the Basirhat Municipality

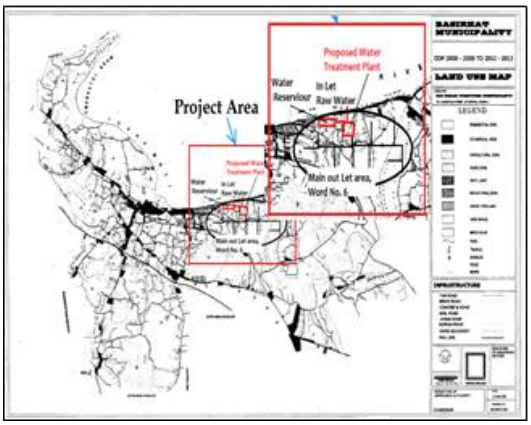

Fig.3. Project Area

The water generated by Ichhamati River, big ponds sources is collected by a system of sewers as well as pipe line and transported to the water Treatment Plant near Jorakalibari vested area (Proposed area).

The division of household water drains into grey water and backwater is becoming more common in the developed world, with grey water being permitted to be used for watering plants or recycled for flushing toilets. A lot of sewage also includes some surface water from roofs or hard-standing areas. Municipal wastewater therefore includes residential, commercial, and industrial liquid waste discharges, and may include storm water runoff.

Sewage systems capable of handling river water are known as combined systems. Such systems are usually avoided since they complicate and thereby reduce the efficiency of sewage treatment plants owing to their seasonality. In addition, heavy river current may overwhelm the sewage treatment system, causing a spill or overflow. It is preferable to have a separate storm drain system for river water. Sewerage systems that transport liquid waste discharges and storm water together to a common treatment facility are called combined sewer systems. As rainfall runs over the surface of roofs and the ground, it may pick up various contaminants including soil particles, (sediment), heavy metals, organic compounds, animal waste, and oil and grease. Some jurisdictions require river water to receive some level of treatment before being discharged directly into waterways.

Preliminary and Primary Treatment:

Preliminary Treatment:

- Sand and grit removal
- Grit and Screen Facility

Primary Treatment:

- Sedimentation
- Primary Settling Basins

Secondary Treatment:

- Major Aerobic Biological Processes
- Major Anaerobic Biological Processes
- Advanced Treatment

Outputs of Treatment:

Seven large reservoirs have to be constructed along the bank of Ichhamati River from JalaPara to Basirhat Bridge, each reservoir must be connected through lock gate to Ichhamati River water current. Each reservoir must be connected by a plant by off-on switch. Lock gate has to turn off when the reservoir is full by the tidal water. After leaving the alluvial partial, Plant will take the water from the reservoir through pipe line connected pump set. Water should be taken from particular reservoir after seven-day interval.

Such collected water should be imposing to the water plant for purification which mention in below-

II. Preliminary And Primary Treatment

It is used to reduce Solids 50-60%, BOD 30- 50%. The commonly used units in this treatment are bar screens, Comminatory, Grit chamber (Settling tank).

A. Preliminary Treatment

Preliminary treatment, the first treatment process, consists of the removal of substances that may interfere with the downstream processes or be detrimental to the plant equipment.

Primary treatment is to reduce oils, grease, fats, sand, grit, and coarse (settle able) solids. This step is done entirely with machinery, hence the name mechanical treatment.

Influx (influent) and removal of large objects:

In the mechanical treatment, the influx (influent) of sewage water is strained to remove all large objects that are deposited in the sewer system, such as rags, sticks, sanitary napkins, cans, fruit, plastic, lumber, grit., living and nonliving water plants etc. This is most commonly done with a manual or automated mechanically raked screen. This type of waste is removed because it can damage the sensitive equipment in the sewage treatment plant.

Sand and Grit Removal:

This stage typically includes a sand or grit channel where the velocity of the incoming wastewater is carefully controlled to allow sand grit and stones to settle but still maintain the majority of the organic material within the flow. This equipment is called a detractor or sand catcher. Sand grit and stones need to be removed early in the process to avoid damage to pumps and other equipment in the remaining treatment stages. Sometimes there is a sand washer (grit classifier) followed by a conveyor that transports the sand to a container for disposal. The contents from the sand catcher may be fed into the incinerator in a sludge processing plant, but in many cases, the sand and grit is sent to a land-fill.

Materials removed may include rags, plastic, lumber, and grit. This is done by bar screens which remove large objects, rags, and plastic that would cause plugging problems in the downstream lines. The grit basins remove the grit by sedimentation. Grit is abrasive materials such as sand and gravel that must be removed to minimize wear on the downstream equipment. Materials removed by the bar screens and grit removal system are de-watered, discharged to a dump trailer, and transported to the landfill for disposal.

Grit and Screen Facility:

The Grit and Screen Facility is where sewage first enters the plant. The speed of the wastewater is reduced to 0.3 meters per second and air is pumped in to set up a rolling motion. This movement separates the heavier grit and sand materials from the suspended organic matter. The larger sand particles settle to the bottom of the tanks, thus preventing harm to equipment within the Plant or clogging of pipes during the treatment process. The settled sand is removed once a month and buried at approved sites. The wastewater continues through the grit tanks and passes through bar screens to remove any material larger than12.5mm in size. The wastewater then flows by gravity to the Primary Settling Basins.

B. Primary Treatment

The second step in the treatment process is primary treatment. The wastewater enters two primary clarifiers (sedimentation basins) which remove suspended and floating materials.

The primary clarifiers remove about 60% of the Total Suspended Solids and about 30% of the Biochemical Oxygen Demand in the incoming wastewater. Biochemical Oxygen Demand is a measure of the amount of oxygen needed to biochemically degrade the organic matter in the wastewater. Primary treatment does not remove colloidal or dissolved solids.

Sedimentation:

Many plants have a sedimentation stage where the sewage is allowed to pass slowly through large tanks, commonly called "primary clarifiers" or "primary sedimentation tanks".

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The tanks are large enough that faucal solids can settle and floating material such as grease and plastics can rise to the

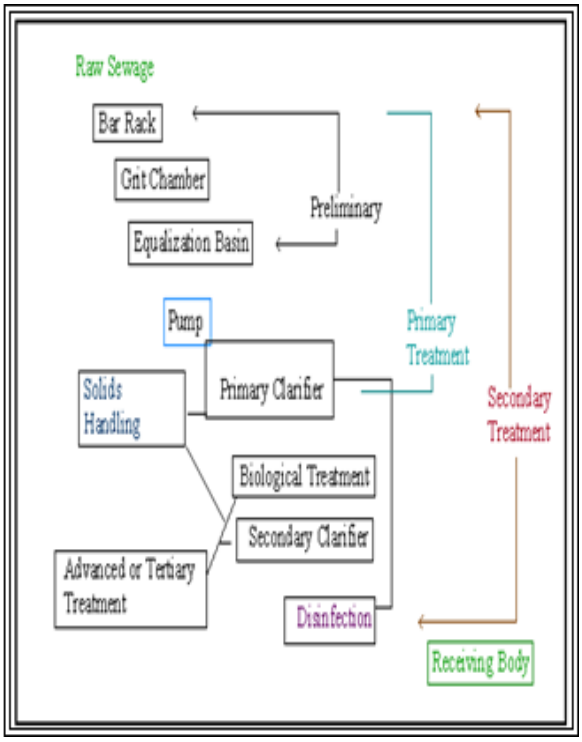

Fig.4. Typical Process Flow Diagram

surface and be skimmed off. The main purpose of the primary stage is to produce a generally homogeneous liquid capable of being treated biologically and a sludge that can be separately treated or processed. Primary settlement tanks are usually equipped with mechanically driven scrapers that continually drive the collected sludge towards a hopper in the base of the tank from where it can be pumped to further sludge treatment stages.

Primary Settling Basins:

This is where suspended solids settle out and floating scum is removed for further treatment. Upon entering the Primary Settling Basins, the velocity of the wastewater is reduced to 3 meters per minute, allowing fine particles to settle to the bottom. Settled sludge on the bottom of the basins is continuously scraped into hoppers at the end of tanks. It takes about 4 hours for wastewater to flow through the Primary Settling Basins. Upon completion, the primary effluent is pumped to the Bioreactors and the settled sludge is pumped to the Fomenters. The scum from the top of the basins is collected in hoppers and pumped to the Digesters.

C. Secondary Treatment

It is used to reduce Solids 85-95%, BOD 80-95%, Col. 90-95%. The commonly used units in this treatment are Trickling filter, Activated sludge, Water treatment ponds.

The biological treatment of water is based on the natural self-purification capacity of natural waters. This treatment is designed to substantially degrade the biological content of the sewage such as are derived from human waste, food waste, soaps and detergent.

The majority of municipal and industrial plants treat the settled sewage liquor using aerobic biological processes. For this to be effective, the biota requires nutrients and a substrate on which to live. There are number of ways in which this is done. In all these methods, the bacteria and protozoa consume biodegradable soluble organic contaminants (e.g. sugars, fats, organic short-chain carbon molecules, etc.) and bind much of the less soluble fractions into flock. Secondary treatment systems are classified as fixed film or suspended growth, such as rock filters where the biomass grows on media and the sewage passes over its surface.

Suspended growth systems - such as activated sludge - the biomass is well mixed with the sewage & can be operated in a smaller space than fixed film systems that treat the same amount of water. However, fixed film systems are abler to cope with drastic changes in the amount of biological material and can provide higher removal rates for organic material and suspended solids than suspended growth systems. This is reflected in two different possibilities for water treatment. The first type is a so-called fixed bed bio-reactor, usually referred to as a trickling filter.

Roughing filters are intended to treat particularly strong or variable organic loads, typically industrial, to allow them to then be treated by conventional secondary treatment processes. Characteristics include typically tall, circular filters filled with open synthetic filter media to which sewage is applied at a relatively high rate. Designed to allow high hydraulic loading and a high flow-through of air. On larger installations, air is forced through the media using blowers. The resultant liquor is usually within the normal range for conventional treatment processes.

Secondary treatment usually consists of two steps which remove the dissolved and colloidal organic material not removed by the primary treatment. There are various secondary treatment processes in use today. These treatment Use microorganisms to convert organic wastes into stabilized compounds - similar to self-purification process in streams.

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III. Major Aerobic Biological Processes

The major aerobic biological processes are listed in the following,

Table 1: Aerobic Biological Processes

Type of Growth	Common Name	Use
Suspended Growth	Activated Sludge (AS)	Carbonaceous BOD removal (nitrification)
	Aerated Lagoons	Carbonaceous BOD removal (nitrification)
Attached Growth	Trickling Filters	Carbonaceous BOD removal. Nitrification
	Roughing Filters (trickling filters with high hydraulic loading rates)	Carbonaceous BOD removal
	Packed-bed reactors)	Carbonaceous BOD removal (nitrification
	Rotating Biological	Contactors Carbonaceous BOD removal (nitrification)
Combined Suspended & Attached Growth	• Trickling filter-solids contact process • Bio filter-AS process • Series trickling filter-AS process	Carbonaceous BOD removal (nitrification)

IV. Major Anaerobic Biological Processes

Table.2 Anaerobic Biological Processes

Type of Growth	Common Name	Use
Suspended Growth	Anaerobic Contact Process	Carbonaceous BOD removal
	Up flow Anaerobic Sludge-Blanket (UASB)	Carbonaceous BOD removal
Attached Growth	Anaerobic Filter Process	Carbonaceous BOD removal, waste stabilization (denitrification)
	Expanded Bed	Carbonaceous BOD removal, waste stabilization

A. Advanced Treatment

This treatment will reduce nearly Solids ~100%, BOD ~99%, Col. ~99%). This treatment technique includes Land Application, Coagulation-sedimentation, Adsorption, Electro dialysis.

B. Outputs of Treatment

Effluent: Sprayed on fields, treated to make potable Sludge (Treated Biosolids)

Old Way: Burned, Land filled, New Way: Fertilizer, Dewater and treat (then reuse) the water, Digestion in heated sludge tanks, Process and reuse the methane gas etc.

V. Conclusion

If the above mentioned project can be managed properly, water problem will be eliminated. If it is not possible to bear the cast of this project, then we can think each house hold collected rain water may use through mini house hold project as like as above mention project. For doing it properly, a mini house hold instable plant kit has to be made by Govt. and given to the common people through subsidy mode.

Suggestion for The Overcome the Problem:

- The water crisis of ward No.6 has to be met by purifying the water of Ichhamati River.

- Due to the difference in landforms, tap water reaches the lower part but does not reach the higher part. For the overcome the problem, numbers of lock gate must be installed in the supply line.
- The supply pipe line should be laid on the same plane.
- Water supply should be arranged according to the number of the family member.
- Project needs to be adopted to conserve rain water in the house hold and made it usable through mini water treatment plant.

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