

Ganga Riverpollution Through Big Drains in the Municipality Areas– A Case Study



Environmental Science

KEYWORDS : Municipalities, Big drains, Ganga pollution, CSP, STP, SWM, Awareness

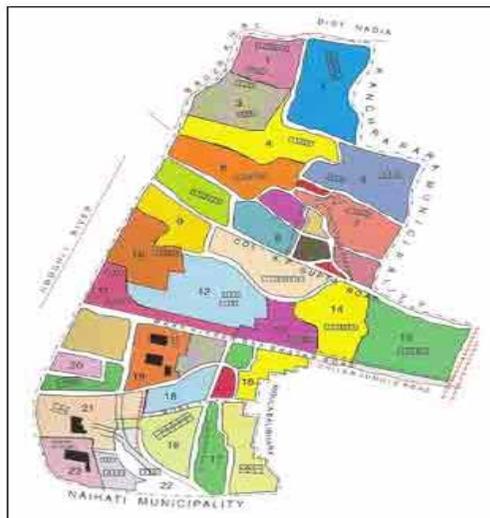
Dr. Anadi Gayen

Senior Hydrogeologist (Scientist-C), Central Ground Water Board, Rajiv Gandhi National GroundWater Training & Research Institute (RGNGWTRI), Raipur, CG.

ABSTRACT

Big drains in different municipalities situated along the bank of Ganga are carrying municipal wastes from households and other sources, which is finally discharging in the Ganga River. Especially during rainy season, storm drainage carries huge wastes from entire municipality areas and causes large scale Ganga pollution. The City Sanitation Plan (CSP) is very much essential for these Municipalities, which has a polluted stretch of river Ganga. At present, very few municipalities are having sanitation related scheme under execution within the municipal area. Hence, Sewage Treatment Plant (STP) may be installed with all big drains to combat the big drains pollution issues. The solid waste generation is increasing in parity with population explosion over the period. Therefore, Solid Waste Management (SWM) is very important to maintain the clean environment. Community based approach and public awareness along with Municipality initiatives may be the suitable measure for cleaning the big drains and minimize the Ganga River pollution.

Ganga, the holy river of India is getting polluted by many contaminants through various sources. Ganga provides water for drinking and irrigation in agriculture sector covering about 40% of India's population in 11 states. In 2007, the Ganga was ranked among the five most polluted rivers of the world. The solid and liquid wastes like domestic usage (bathing, laundry and public defecation), Sewage wastes from the municipal areas are being dumped in the Ganga River through big drains. Therefore, anthropogenic pollutants are one of the major contributing factors for Ganga River pollution. Pollution of Ganga through big drains has been studied in three Municipality areas - *Kanchrapara, Naihati and Halisahar* Municipalities of North 24 Parganas district in West Bengal State (Fig.1).



Halisahar Municipality

Fig.2: Halisahar Municipality

(i) Introduction

The Halisahar Municipality has been set up in 1903 under the then Bengal Municipal Act. Population of the Municipality is 1.24 lakh (as per the Census, 2001). It occupies an area of 8.29 sq. km. The number of Households is 27267 having 4.5 persons per house hold. The entire municipal area has been delimited into 23 wards. The town also has 102 slums which are inhabited by about half of the town's population.

The Halisahar Municipality was established in the year of 1903 and located at the northern end of the District of North 24 Parganas. This Municipality is situated on the eastern bank of the River Hooghly, surrounded by the border of Kalyani Municipality of Nadia District at the north, Naihati Municipality at the south and Kanchrapara Municipality and Halisahar Railway Station in the east. The Municipality is divided into 23 wards

Halisahar Municipality is located in Greater Kolkata in the district of North 24 Parganas. The co-ordinates of the Municipality is 22° 57'15" latitude and 88° 26' 22" longitude.

Halisahar Municipality is located on the great Gangetic delta. Its climate is very much influenced by the sea. The annual mean temperature is 26.8° C. The maximum temperature sometime exceeds 40° C. The temperature does not fall below 10° C. Maximum rainfall occurs during the monsoon in August (306 mm) and the average annual total is 1,582 mm.



Not to scale

Fig.1: Location of three Municipalities

Halisahar Municipality

(ii) Characteristics of the drain

In dry season, drains carry household sullage as well septic tanks effluent. In wet season, the same drains carry storm water as well as wastewater from household and connected to open surface drain/nikashi network and finally discharging to Ganga. In heavy showers these drains result water logging in low lying localities. In some cases, the levels of the open drains are not technically sound and it require reconstruction. In some cases wastewater is directly discharged into water bodies. Quick drainage of the rainwater from the waterlogged zone is a key issue. Some of the drains are not working properly. The details of existing drainage network in Halisahar Municipality (Ward wise) are described below in Table-1.

Table-1: Existing drainage network in Halisahar Municipality (Ward wise)

Ward No.	Surfaced Drains (km)	Un surfaced Drains (km)	% Surfaced Drains	% Un surfaced Drains	Nikashi Khal (km)
1	5	2	71	29	0.5
2	6	4	60	40	1
3	7	5	58	42	1
4	4	3	57	43	0.2
5	9	5	64	36	
6	8	6	57	43	1
7	7	5	58	42	
8	8	5	62	38	0.7
9	8	7	53	47	
10	6	5	55	45	0.2
11	4	3	57	43	
12	7	3	70	30	1.2
13	5	3	63	37	0.3
14	7	2	78	22	0.2
15	6	4	60	40	1
16	5	2	71	29	1.2
17	4	2	67	33	1
18	4	2	67	33	0.5
19	2	1	67	33	0.3
20	2	1	67	33	0.3
21	5	3	63	37	
22	3	1	75	25	0.7
23	5	2	71	29	0.5
Total	127	76	63%	37%	11.8

The main channels for draining waste water as well as the storm water in Halisahar municipality area are i) *Suripara Nala* (Outfall at ward no. 23), ii) *Balur Para* drain (Outfall at ward no. 20), iii) *Kona* drain (Outfall at border of ward no. 10 & 11), iv) *Khasbati* drain (Outfall at ward no. 10), v) *Kalika Tala khal* (Outfall at ward no. 6) and vi) *Bagher khal* (Outfall at ward no. 4).

Polluted big drains and Ghats in the Municipality have been depicted as below:



Fig.3: Polluted Bager Khal in Halisahar Municipality

(iii) Issues highlighted during the discussions with the local people/local public representatives

The magnitude of uncontrolled river water pollution at Halisahar Municipality area can lead to alarming situations. There is no treatment at present for waste water and the discharge of *Khatal* waste in the existing drainage system is choking the drains.

Sanitation through septic tank is a general practice in the city, where sewerage network is not available. A total number of 4,285 Pre-Fabricated latrines are covering almost 17% of total population. Total 11,094 no. Septic Tanks are covering almost 52% of total population. The remaining population either goes for open defecation or using unsanitary latrines - need immediate attention. At present, Halisahar municipality generates around 40-45 metric tones of garbage per day, which is collected and disposed on a trenching ground in ward 8. There are numbers of unauthorised cattle sheds. There is no scientific process to manage the quantity of cow dung generated daily. All wastes are being dumped into the municipal drain leading to blockages of the drains as well as outfalls. On an average 60 to 68 % of households are covered under house-to-house solid waste collection in the slum areas.

The projected population for Halisahar Municipality in the base year of the project implementation will approach 1.47 lakh and the generation of solid waste will increase simultaneously to about 52 MT. In light of this issue, for Solid Waste Management (SWM).

(iv) Strategies towards management of polluting drains

The City Sanitation Plan (CSP) is very much essential for these Municipalities, which has a polluted stretch of river Ganga. In this perspective the CSP will help the planners/managers to achieve the following objectives:

- To identify all point and non-point sources of pollution of the river in the town.
- To assess how the pollution of the river affects the stakeholders.
- To identify the pollution abatement schemes and measures that is essential to adopt to address the issue of pollution and achieve the objective of the improvement of the river water quality to the desired level.
- To identify the agency that should be given responsibility to handle it for each component of the proposed scheme and sources of funding.

Therefore, formulation of a potent CSP and its proper implementation will not only help to regulate the water pollution in the stretches of the river Ganga along the city, at the same time it

will help to maintain the water quality within permissible limit. At present, there is no sanitation related scheme under execution within the municipal area. Hence, Sewage Treatment Plant (STP) may be installed with all big drains to combat the big drains pollution issues.

The solid waste generation is increasing in parity with population explosion over the period. Hence, Solid Waste Management (SWM) is very important to maintain the clean environment. The Solid Waste Management (SWM) has two modes:

I. Development of solid waste collection system by:

- Purchase of equipments for collection of solid waste.
- Construction of new container platforms.
- Construction of new garbage vats.

II. Improvement in the operation of SWM sector by:

- i) Daily collection of solid waste from each and every household.
- ii) Improvement in operation by two shift collection of solid waste from the market and commercial areas.
- iii) Segregation of solid waste at the house holds level.

(v) Big drains water quality data

Pollution status of different nala, khal and ghats has given as below:

Component	Name of the Location							
	Suri-para Nala	Bolur-para ghat Nala	Kona khal	Khas-bati Nala	Ka-likata-la Nala	Bagher khal	Bolur ghat	Ram-prasad ghat
Colour	Slightly Blackish	Slightly Blackish	Slightly Blackish	Slightly Blackish	Slightly Blackish	Slightly Blackish	Grayish	Grayish
Temp (°C)	22	20	20	21	21	20	22.5	22
Total Dissolved solids, mg/l	494	490	380	372	268	364	154	164
Total Suspended Solids, mg/l	92	40	78	94	22	36	172	92
B.O.D days at 27°C, mg/l	90	60	40	18	90	18	16	5.2
C.O.D., mg/l	320	136	104	80	320	138.24	92.16	76.8
Faecal Coliforms/100 ml	110000	80000	350000	72000	88000	210000	2500	2250

Kanchrapara Municipality

(i) Introduction

Kanchrapara (9.07 sq.Km) is located at 48 km. Apart from Kolkata and situated at the Northern most tip of North 24 Parganas District in West Bengal. The co-ordinates of the place is between Latitude 88.42` E to 88.47` E and longitude 22.92` N to 22.96` N with an area of 9.06 Sq. Km and a population of 1, 26, 191. It is butted and bounded by Gayeshpur Municipality to the East, Kampa-Chakla Gram Panchayet to the East and South East, Bager Khal to the North & Halisahar Municipality to the West. It is bounded by the Ganga River on the west.

In Kanchrapara Municipality, the main big canal is only 'Bager Khal'. No other big drains are available in this area. This drain is

connected with Irrigation canal in Nadia district and finally with Ganga river. No Sewerage Treatment Plant (STP) is available in this Municipality. Location of Kanchrapara Municipality has been shown as below:

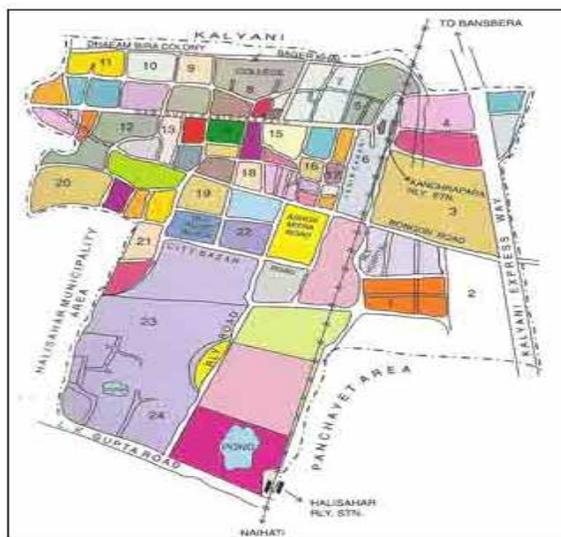


Fig.4: Kanchrapara Municipality

(ii) Characteristics of the drain

Very few small drains are available in this municipality, which are open drains. In summer season, big drains carry household sludge as well septic tanks effluents only. In rainy season, these drains carry storm water as well as waste water from households, which are connected to open surface drain/nikashi network and finally discharging to Ganga. During heavy precipitations, these drains result water logging in low lying localities. Some of the drains are not able to perform properly. The existing drains in Halisahar Municipality (Ward wise) have shown in below. Main drain is 'Bager Khal' passes through this Municipality.



Fig.5: Bager Khal passes through

Fig.6: Polluted Bager Khal at Bager More Kanchrapara Municipality

(iii) Strategies towards management of polluting drains

It is essential to identify all point and non-point sources of pollution of the river in the town and it is also important to assess how the pollution of the river affects the stakeholders.

The Municipality may take up a project to identify the pollution abatement schemes and measures that is essential to adopt to address the issue of pollution and achieve the objective of the improvement of the river water quality to the desired level.

(iv) Water quality data

The Bager Khal is passing through the Kanchrapara Municipality also. Hence, the water quality of the drain will be the same as mentioned in Halisahar Municipality.

Naihati Municipality

(i) Introduction

Location of Naihati Municipality has given as below:

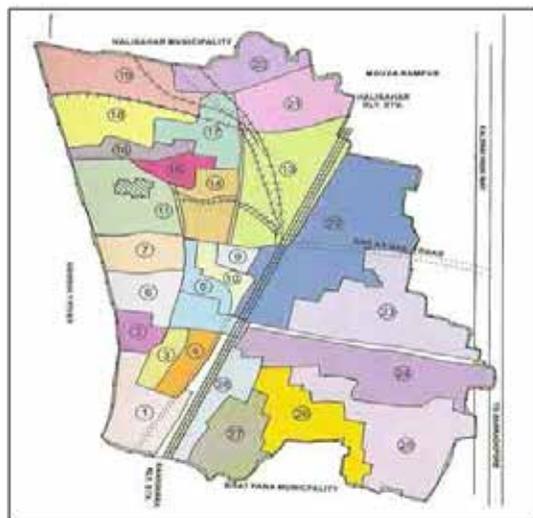


Fig.7: Naihati Municipality

(ii) Characteristics of the drain

In Naihati Municipality (9.85 sq. Km.), total 05 (five) big drains are available – i) *Thana Khal*, ii) *Haran Majumdar Khal-I*, iii) *Haran Majumdar Khal-II*, iv) *Keorapara Khal* and v) *Muktarpur Khal*. Among these drains, main big drain is 'Thana Khal', which is connected with Sewerage Treatment Plant (STP). In this Municipality only STP is running in full fledged form, which is connected with 'Thana Khal'. Total drain area of the municipality is 265 km (open drain) and 0.66 km (Underground drain).As reported, no factory/industry is running in this Municipality. All the drains have finally met to Ganga River.

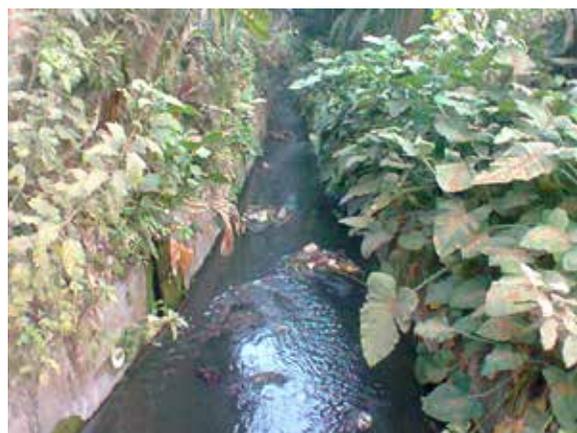


Fig.8: Polluted Thana Khal in Naihati Municipality

(iii) Strategies towards management of polluting drains

House to house sewer connection needs to be developed in the municipality along with a proper Sewage Treatment Plant (STP), which will treat the sewage to make it harmless for reuse.

(iv) Water quality data

As there are no maor industries available except few jute mills, water of five major drains in Naihati Municipality are contaminated by domestic wastes and having similar water quality problem of Halisahasr Municipality.

Sewage Treatment Plant (STP) in Naihati Municipality is in the process of treating the municipal wastes through different stages as below:



Fig.9: Entry gate of polluted drain

Fig.10: Polluted water in Inlet chamber



Fig.11: Pumps lifting polluted water in STP

Fig.12: Reservoir for treatment of water



Fig.13: Waste water treatment process in STP



Fig.14: Criss-cross wall arrangement for settling wastes





Fig.15: Hypo-chloride treatment chamber

Fig.16: Pollution free treated water

for Polluted drain water being discharged to Ganga

Fig.9-16: Municipal waste water treatment process through different stages in STP

Discussion and Recommendations

- i) All the big drains, which are considered as the avenues of municipalities to throw out wastes have to be clean.
- ii) House to house sewer connection needs to be developed in the municipality along with a proper Sewage Treatment Plant (STP), which will treat the sewage to make it harmless for reuse in non-domestic purposes like gardening, street washing and industrial consumption.
- iii) Public awareness has to develop to keep clean the drains.
- iv) Community based approach in this process would be a big help to have expected outcome.
- v) In schools the topic related to cleanliness may be incorporated in the syllabus, so that children may be educated and they can keep their localities clean.

Acknowledgement

The author is thankful to the Head of the Office, CGWB, ER, Kolkata for extending necessary support and guidance to carry out this work in the field. The author would like to convey his sincere thanks to the Regional Director, CGWB, RGI, Raipur for according kind permission to publish this paper in the journal.

REFERENCE

- i) Anon, Halisahar Municipality report. | ii) A report "Status Paper on River Ganga" State of Environment and Water Quality, National | River Conservation Directorate Ministry of Environment and Forests Government of India, | Alternate Hydro Energy Centre Indian Institute of Technology Roorkee, (August, 2009). | iii) A report of Central Pollution Control Board, Ministry of Environment and Forests "Ganga | Water Quality Trend", Monitoring of Indian Aquatic Resources Series, Dec., 2009. | iv) Das, Subhajyoti. "Cleaning of the Ganga", Journal Geological Society of India, Vol.78, | pp.124-130, August 2011. | v) Singhania, Neha. "Pollution in River Ganga". Department of Civil Engineering, Indian Institute | of Technology Kanpur. October, 2011.