

**The problems and prospects of Shitalakhya River:
A socio-economic and political Analysis**

M. Phil Thesis

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CANDIDATE'S DECLARATION

This thesis entitled “The problems and prospects of Shitalakhya River: A socio-economic and political Analysis”. It is declared that, the studies in this thesis are the result of research work by author, except for the contents where specific reference has been made to the work of others.

This dissertation or any part of the thesis has not been submitted to any other university or educational institution for the award for any degree either in Bangladesh or abroad.

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CERTIFICATE OF APPROVAL

This thesis entitled “The problems and prospects of Shitalakhya River: A socio-economic and political Analysis” is submitted by Kamruzzaman Miah, for the degree of Masters of Philosophy in Political Science at the University of Dhaka, Dhaka, Bangladesh. He had carried out the research work under my direct supervision. And the main script of the thesis has been scrutinized by me. The enter thesis comprises the candidate’s own work and it is his own personal achievement. It has not previously been submitted for any degree, diploma or other similar title of recognition.

Dr. Dil Rowshan Zinnat Ara Nazneen
Research Supervisor

DEDICATION

This Thesis is dedicated to my parents...

Mrs. Jahanara Begum

&

Mr. Hossain Ali Miah

ABSTRACT

Rivers, marshy lands are the main features of our country, Bangladesh. Many a number of rivers are prevailing in the country like intestine. Bangladesh cannot be imagined except the rivers. The poets, littérateurs wrote their works hailing the wetlands, rivers etc. Poet Rabindranath Tagore once told that he who did not see Bangladesh by sailing boats on Padma had not seen this country. He pointed out the mindset of Bengali people in the early decades by his *Nirjhorer Shapnabhanga* and same as *Padma Mayamoyi* by poet Jasimuddin. So, to understand Bangladesh the overall conception should be about the rivers here in this country.

The physiological structure of Bangladesh is consisted of the silted soil washed out from the river stream. The piling of the silted soil has made our country like a deltaic shape in fact. As a result, the Bangladesh has huge amount of fertile land which is responsible for high yielding of crops. Today, our country has achieved the food sufficiency from food dependency only by frequent grace of the land and soil. At the era of Emperor Jahangir Bangla was marked as *Jannatabad* (land of Heaven).

It is, however, easily perceived that the lifeline of Bengali people and Bangladesh's economy lies in rivers. In accordance of the condition and location of the rivers, the intellects of Bengali people has based on the very rivers from the historical period. The rivers were counted in the early period as the water-highway. By using this river rout once (early British era) the economy of Bengal was dominant in the global market.

The mercantile Europeans such as British, Portuguese, Dutch, and French etc established their commercial hub near the riverside area. The old Dhaka which is eminent for its *Muslin* fabrics was the gift of Bruiganga, Shitalakhya, Balu etc. The district of Narayanganj, dubbed as the Dandy of the East, was the port city for the marine ships carrying the goods from here to Yorkshire, Dandy, and Hampshire etc where the industrial capitalism took place in the early 18th century. This is why I would like to make clear that although these rivers are locally flowing but had contributed the economy globally.

I have conducted an M.Phil research work surveying the Shitalakya river. This river now becomes very lean and thin due to the huge grabbing of its land, polluting its sweet water and causing the threat of extinction of aquatic life. Once, the river was the lifeline for socio-economic development of this area while it has now become the dumping lake of industrial toxic and chemical wastage. I have attempted to address the fault line behind the issue in my research with some of inevitable limitations.

Mainly human created actions are liable to this consequence of rivers. In this point Burigonga is the eminent example for me. The river Shitalakhya is going to be another case of consequence like Burigonga. Many kinds of threat are proactive on the Shitalakhya River. Among of these, illegal dredging, capturing bank of river, throw dust into river from mill-factories etc. This kinds of activities are exercised with money, muscle and political power of some people.

The Sitalakhya River flows from west of Narayanganj District leading to the Dhaleshwari River, which flows into the Meghna River at Bandar. The Buriganga-Turag river system provides an important riverine link with the Dhaka Metropolitan City. Other peripheral rivers such as Balu, Lakhya and Tongikhal are also important in maintaining circular water route and natural environment of the city. Waterways this are vital productive resources for cities, regions and the country. The Shitalakhya provide amenities and services to communities that are taken for granted. Drinking water, food, transportation, communication, recreation, wildlife habitat, aesthetic appeal of places along waterways, economic development, etc. are some of the amenities that rivers provide.

I have conducted field surveys and secondary data collection to clarify the relationships between domestic waste water discharge and pollutant load in the river Shitalakhya. Besides this thesis developed can provide a guideline to the future researchers about change of water quality, pollution, and sand and land grabbers, setting mills-industry on the bank of Shitalakhya etc.

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List of Abbreviations:

UNESCO	United Nations Educational Scientific and Cultural Organiza
ADP	Annual Development Program
BBS	Bangladesh Bureau of Statistics
CPU	Comprehensive Planning Unit
UNEP	United Nations Environment Program
DAP	Detailed Area Plan
DOE	Department of Environment
DPHE	Department of Public Health and Engineering
ECA	Environment Conservation Act
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GOB	Government of Bangladesh
HD	Health Department
IEE	Initial Environmental Examination
JICA	Japan International Cooperation Agency
RFL	Rangpur Foundry Limited
LGED	Local Government Engineering Department
MOEF	Ministry of Environment and Forestry
BOD	Biochemical Oxygen Demand
NCC	Narayanganj City Corporation
NGO	Non-government organization
NOC	No objection Certificate
PAP	Project Affected Person

COD	Chemical Oxygen Demand
SS	Suspended Solid
PS	Pourashava (a type of municipality in Bangladesh)
RAJUK	Rajdhani Unnayan Karttripakkha
TDS	Total Dissolved Solid
RHD	Road and Highway Department
EC	Electrical Conductivity
SCM	Stakeholder Committee Meeting
SWM	Solid Waste Management
TLCC	Town Level Coordination Committee
SWTP	Saidabad Water Treatment Plan
CRCS	Closed-loop Recirculation Cooling System
CoC	Cycles of Concentration
SRW	Shitalakhya River Water
WASA	Water Supply & Sewerage Authority
DoE	Directorate of Environment
WG	Working Group
IWM	Institute of Water Modeling
WSS	Water Supply System
BIWTA	Bangladesh Inland Water Transport Authority
WDB	Water Development Board
CEGIS	Centre for Environmental and Geographic Information System
ETP	Effluent Treatment Plan

TB	Tuberculosis
MC	Mobile Court
DJC	District Judge's Court
HC	High Court
GO	Government Organization
pH	Potential of hidrogen
WHO	World Health Organization
GFF	Ghorasal Fertilizer Factory
EQS	Environmental Quality Standard

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Chapter 1

1.1: General Introduction

This is an introductory chapter where there is an outline of the research. What is done by me in this research is just summary here described. This research topic is fully social science type. The aims and objectives of the study, area of the study, importance of research, rationale of the study and limitations of the study are the parts of preamble chapter.

River is the demand of life. The Shitalakhya is that river which is water supplier of the capital city including Narayangonj city. Slowly this river's water is being untreated for us. There are many causes in this process. Human created causes here highlighted. Not only the matter of polluting water is concern but also many illegal activities directly visible. River filling up, sand lifting, unimaginable excreta from bank side of this river, occurring various crimes etc are very common. On the other hand there is no adequate action against those activities by the concerned authority. Problems, possible solution and future plan of the Shitalakhya river are observed and described in the views of neutral point.

**1.2: Research Question: The problems & probabilities of
Shitalakhya River: A socio-economic & political perspective
Analysis.**

1.3: The problems & probabilities of Shitalakhya River: A socio-economic & political sides:

Bangladesh has many rivers. The main rivers are the Padma, the Meghna, the Jamuna and the Bramaputra etc. Shitalakhya is a distributary of the Brahmaputra. Its length is 110 k.m. (68). It is also known as Lakhya River. This river flows through Gazipur forming its border with Narsingdi for some distance and then through Narayanganj. Narayanganj is an emporium based on Shitalakhya. Not only Shitalakhya but also Narsingdi, Gazipur are greatly benefited by this. The residents of these districts are highly benefited with Shitalakhya. It is abundant in fish. It is an important means for transport too. Boats, launches, steamers ply through them in all seasons. They carry passengers and goods from one place to another. It also mainly helps our trade and commerce. The role, problems and probabilities of Shitalakhya are analyzed with two major parts as following:

1.3.1: Socio-Economic Sides:

Shitalakhya enriches and drives its bank people sociologically and economically from many angles. Oppositely, at the lack of some socio-economic awareness and concern, it is confronted with a detrimental environment. By taking an active agenda, it is possible to save Shitalakhya, which can be tried and found by my research.

1.3.2: Political Sides:

Now it is more concerned that the coastland of Shitalakhya is ousted sea sand of this river is hoisted by some political and local leaders or their supported self interest group. As a result, imbalance and anachronism are being been in river. If we can't take unanimous political and official decision to stop those harmful activities, Shitalakhya is to face the waning one day. Thus possible guidelines can be addressed by doing my research for saving this river.

1.4: Aims and Objectives of the Study:

In this research, I will try to find out the real problems of Shitalakhya and its reactions, influence on the river bank livelihood. It will also try to find out solution, principles and probabilities for betterment of this river. Besides these, some are:

1. To search the opinions and views of bank lived general people, boatmen, businessmen, local political leaders.
2. To analysis the socio-economic and political role of this river on bank people.
3. To measure the loss of lives and their wealth in the past.
4. To discuss the environmental geo-changes of Sitalakhya river.
5. To measure the quality of water of this river.
6. To conclude some recommendation about Shitalakhya and its bank livelihood.

Moreover, the main objective of the study is to develop river system around the Greater Dhaka area and provide round the year flow through rehabilitation and flow augmentation from the Jamuna River.

The overall purpose of the proposed study is to protect the Shitalakhya river system from pollution and to ensure navigation through the rivers round the year for preservation of natural environment throughout the Dhaka City.

1.5: Area of the Study:

I have studied the important area like near to bridge, near to ferry, river port, bank situated mills-factories of Narayangnj, Gazipur and Narsingdi to gather my data, sampling of the data, processing of them as it is essentially connected to it.

Although staying of Shitalakhya is 110 k.m. long, it is not possible for me to go through on that full area. This is why; I gathered my necessary information from the secondary reviewing of literature from about that area.

Totally, my research area is Shitalakhya River, its bank lived people and boatmen etc.

1.6: Importance of the Study:

The research on Bangladeshi rivers isn't available. May be, a few research is on Shitalakhya. It has prevalence role and influences its areas people' economy, livelihood, religious and political views.

And from this situation, I think, it is very need to do research on Shitalakhya. The importance of my research is not only for present adaption but by inner findings to recommend about the geographical, environmental balance of river for future possibilities and safety.

1.7: Methodology of the Study:

This is social science research, in fact. I will try best to approach mainly qualitative methods. As secondary source, I will study on journals, related books, magazines, clippings and other references and so on.

Case study method can be used. Besides conversation, discourse and content analysis method will be also approached in my research.

Without these I will follow interview method with specific questionnaire to collect information from river bank people, boatmen, old general people and some local political people etc. Questionnaire may be structural or non-structural.

1.7.1: Secondary source:

There are some several tools to collect the resources on Shitalakhya river. From the news paper' news, post editorial columns, research papers, expert reports, journals, books, quarterly magazine and clippings, internet or web site links etc. comprehensive data have been accumulated as the secondary data.

1.7.2: Interview:

This method of study notes the utility of interview of real agent as like ferry men, passengers who get across river daily, water and river specialist, owner of bank side organizations, local leaders, the media men who covered the news about river incidents, authority, members of the law enforcing agencies, civil society, intellectuals in the country.

The chief motto of choosing this method of data collection is to give flexibility from where it is easiest way of collection the data from the field.

Besides, there is a convenience of two way communication between the interview and interviewee.

On the other hand, it is easy to the detailed facts and findings from interview as well they provide much more information additionally; not mandatory part of the direct interview.

Since I state earlier, this is also a part of qualitative research; so, the structure of the questionnaire was open ended.

1.7.3: Case Study:

The technique of extracting and analyzing the life of a social unit, be it a person, a family, or a community is known as the case study method. Case study as seen above refers to the intensive investigation of a particular unit.

The case study is the examination of a single situation, persons, groups or institutions as complex whole in order to identify types and process. As this is a qualitative research, case study method will help us to understand the real situation of Shitalakhya river.

Case study is, in fact, a technique which considers all pertinent aspects of a situation employing as the unit of study an individual or group and intensively investigating about it. It examines the complex situation and combination of activities involved in a given situation so as identify the real shape; inter activities of the Lakhya River.

This method is thus the means by which we must reach the actual human experience and attitudes and facts which constitute the full, live and active socio-economical and political reality the formal organization of Shitalakhya.

Case study helps to secure a wealth of details about the unit of study which may produce clues and ideas for further research.

This method deepens our perception and gives us a clear insight about the Shitalakhya and its bank livelihood. It is useful to support a belief, a tradition or a point of view; sometimes, to advance a new interpretation. Case study will also help us to formulate hypothesis, testing hypothesis and generalization.

1.7.4: Content analysis:

We also use content analysis method to study on Shitalakhya River. The basic idea of content analysis is to place the part of a text (words, phrases, paragraphs etc....depending on the unit chosen) in a number of predetermined categories.

In a way, content analysis from one point of view is to arrange all parts in a series of pigeon holes and describing the text by the number of elements in each pigeon hole. We will study the various documents relevant with this river.

We know as a research technique content analysis is concerned less with the style of text than the ideas contained in it. But content analysis is characterized by fact that entities analyzed are not usually words but meanings (synonyms or words with similar meanings are grouped in the same category and often include themes or whole phrases).

The process under which data is categorized or classified is called content analysis. It is different from 'coding' and content analysis. Coding is generally used for the data collected through for some research projects whereas content analysis is used for qualitative data.

In words of Fred N. Kerlinger, “The content analysis is method for study and analyzing communication in a systematic, objective and quantitative manner to measure variables. Nevertheless, Danial Kartz notes, “Content analysis is a research technique for the objective, systematic and qualitative description of manifest content of communication.”

It is a method of observation. The method cannot be applied to all documents. The distinction already made between documents which report facts and those which are facts, is relevant. Content analysis is usually applicable to the latter and not the former.

Content analysis may be helpful when there are technical advantages because the volume of materials to be examined may exceed the researcher’s ability to study. In the studies of newspapers, magazines and clippings and many other forms of communication it is troublesome to examine all the relevant data. One solution to the problem of data volume may be to analyze only a sample of it.

1.8: Rationale of the Study:

By my research, it will be likely to aware mass people and institutions the keeping Shitalakhya and its surroundings environmentally. It will be also able to give some recommendations to stop illegal political power exercises for ousting river land, hoisting and dredging sand unethically. This research can help giving counsel of need-based demand fulfill each other between river and people.

1.9: Limitations:

As we use different sampling people which may arise different opinions regarding the issue. Different case analysis may produce contrasting pictures. Cross and mixed process and methods are used in the research. Generally my research has some limitations. They are:

1. Illegally benefactors will not willingly give true and frank opinions about the fact.
2. As it is geographic topic it need accurate information but it can be implemented a little.
3. There may be lack of quantitative data, statistics rate of loss of lives and wealth.
4. It may hard to approach local political leaders and their workers.
5. There is lack of review, references specifically on Shitalakhya River.

For any kind of research, the prime motto is to find out the depth of the incident so that we could reach to the maximum truth, cause of fact.

We have conducted from both qualitative and quantitative data of problems and probabilities of the Shitalakhya River with view of socio-economic and political perspective analysis. But it is essential to mention here that highly interested group was the part of this river problem whose statement, however are availed thoroughly.

Chapter 2

Background of Shitalakhya River

2.1: River Shitalakhya:

River is the special gift of God. It is the spirit and life support for any country. There are many small or big rivers in our country. About 230 rivers are flowing here. Shitalakhya is such an important river which is saving mainly Narayanganj including Narsingdi, Gazipur, Munsigonj and indirectly helping Dhaka city.

Shitalakshya River is pronounced as **Shitalokkha Nodi**. It is also known as **Lakhya River**. It is a distributary of the Brahmaputra. In its initial stages it flows in a southwest direction and then east of the city of Narayanganj in central Bangladesh until it merges with the Dhaleswari near Kalagachhiya. A portion of its upper course is known as Banar River.

The river is about 110 kilometres (68 mi) long and at its widest, near Narayanganj, it is 300 metres (980 ft) across. Its flow, measured at Demra, has reached 74 cubic metres per second (2,600 cu ft/s). It remains navigable year round.^[1] The river flows through Gazipur district forming its border with Narsingdi for some distance and then through Narayanganj District.

The river's maximum depth is 21 metres (70 ft) and average depth is 10 metres (33 ft).

2.2: Shitalakhya River at a glance:


Shitalakhya River	
	
<p>Fig-2.1: Shitalakhya River near Kapasia, Gazipur.</p>	
City	Gazipur, Narsingdi, Narayanganj (mainly district)
Length	110 km (68 mi)
Width	Near Narayanganj, 300 metres (980 ft) across
Distributary	The Brahmaputra
Flow	At Demra, 74 cubic metres per second
Latitude	23.5725°
Longitude.	90.5597°
Temperature	27° C/81° F
Wind	11.5km/h South
Cloud	Broken at 900ft Solid Overcast at 10000ft
Sunrise	05:37
Sunset	18:20

Table-2.1: The Shitalakhya River at a glance.

2.3: Background of Shitalakhya River:

General background of the main topic Shitalakhya is discussed the below:

2.3.1: Alteration in course of rivers:

The main river port in the country situated river Shitalakhya is a branch of the Brahmaputra which has changed its course at least twice in the Bangladesh region in the fairly recent past, indirectly affecting the flow of water in the Shitalakhya. In the 21st century, the main flow of the Brahmaputra waters is through the Jamuna channel. Brahmaputra is the trans-boundary river among China, India and Bangladesh. Jamuna and Brahmaputra are flowed through Bangladesh into the Bay of Bengal.



Fig-2.2: Position map of Shitalakhya.

Earlier, end of tracing a curve round the Garo Hills on the west, it took a spiky turn in the south-east direction near Dewanganj, and then passing by Jamalpur and Mymensingh, threw off the Shitalakhya branch and flowed through the eastern part of capital Dhaka city and fell into the Dhaleshwari in Munsiganj. The Shitalakhya ran almost analogous to the Brahmaputra and after passing by Narayanganj joined the Dhaleswari in Munsiganj.

The route of the Brahmaputra through greater Dhaka district was deserted by the 18th century when it flowed further east and joined the river Meghna near Bhairabin Kishorganj. Towards the end of the 18th century the Jamuna channel increased its importance and around 1850 it became the main channel of the old Brahmaputra River in China.

In Sir Van den Brouck's map the river is marked as Lecki, flowing west of Barrempooter (Brahmaputra). In Van den Brouck's time in 1660, it was large, vast and swift flowing river. It was so till the early 19th century. There, however, are some reservations about the accurateness of Van den Brouck's map following bellow.



Fig-2.3: Van den Brouck's map of 1660

2.3.2: Chronological importance:

Mughal was the traditional muslim empire rule in British India. When the Mughals came to India, they chose Delhi as the seat of their power because it had the Yamuna (Jamuna) river on one side and forest-jungles on the other two. As luck would have it, despite the fact that we have such an example about the need of water bodies near a city before us, we are abandoning the two big rivers Buriganga and Shutalakhya along greater Dhaka and port city Narayanganj in country.

Sonargoan of port city Narayanganj, a former capital of the British-Bangla region, stood on the banks of the river Shitalakshya. A fort was built by Isa Khan, a former ruler of this area, on its river banks. It is believed with people that it was ordinarily connected with Lalbagh Kella Fort in Dhaka through a wondering underground tunnel. Other Sonakanda Fort, also on the river, was built to counter Magh and Portuguese pirates. There are several historical mosques on its river banks – Bandarshahi mosque which was built in 1481 by Baba Saleh, Kadam Rasul mosque which was containing the footprints of Hazrat Mohammad (SM), Mariamer Masjid that was built by Shaista Khan etc.

2.3.4: Economic importance:

The river Shitalakshya was one time a very important center for the proudy Muslin industry. Even still today, there are centers of artistic weaving on its river banks. There also are a number of industrial units on its banks, including the Adamjee Jute Mills. Thermal power houses are located along the river at Palash (north of Ghorashal) and at Siddhirganj. Industrial affluent dumped into the river resulting in high levels of pollution is a cause for concern to all.

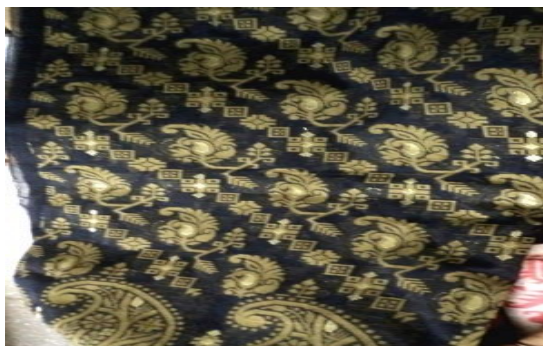


Fig-2.4: Portion of a sari woven on the banks of the Shitalakshya River.

There is the prime and main river port at business and commercial city Narayanganj. Frequent many launches move out along the river to different parts of Bangladesh. The government has approved construction of a container terminal on the river Shitalakhya with foreign investment. Now-a-days government of Bangladesh is achieving ability of small and medium constructions with domestic investment. It is the good sign of development for us. Bengal had held superiority in textile goods since olden times. The legacy of our textile industry is something to be proud of which brings foreign currencies increasing reservoir with remittance in the country.

Muslin was the famous in the whole over the demanded world. In the book *A Sketch of the Topography & Statistics of Dacca*, published in 1840, surgeon James Taylor wrote about the history of the then already declining muslin trade. "Dacca has long been celebrated for its muslins. These fabrics were known in Europe in the first century of the Christian era," he said. Muslins were "highly prized by the ladies of Imperial Rome," he added.

Our old proud Muslin was the interestingly man-made commodity which took place in Queen Palace. Given the level of fame Muslin saw, it can be argued that if the textile industries of Bengal were a cherished crown, then the gem of that crown was Muslin. But before we talk of Muslin, let's not forget its crucial backward linkage: cotton. The history of Bengal's and particularly East Bengal's, which meant cotton production, goes back to time immemorial forever.

Our old Bengal capital, Sonargaon was the famous visiting place for internationally travelers and sigh-seers. The renowned 14th century Moroccan traveller, Ibn Battuta, had praised the cotton-based products of Sonargaon. Chinese accounts of the 15th century mentions some cotton

fabrics found in Bengal as the fine and glossy Pi-po was of several colors, Man-che-ti was ginger yellow. Shawl of Bengal was among the royal presents sent to the Emperor of China by the Bengal Sultan in 1438. Daurte Barbosa, a Portuguese traveler, had described the textiles in Bengal: “In it are woven many kinds of very fine and colored clothes for their own attire and white sorts for sale in various countries.”

Muslin actually was comparedless and great symbol of flame and fair of British-Bengal. All these refer to the fine cotton fabrics of Bengal, and probably the finest cotton fabric we know of was Muslin. One of the many varieties of Muslin, which survives till date, is the highly esteemed Jamdani. Jamdani took place alternativey instead of Muslin in modern time. It is not true but it has self tradition in the country. The traditional art of Jamdani weaving has made it to United Nations Educational, Scientific and Cultural Organization (UNESCO)'s representative List of the Intangible Cultural Heritage of Humanity. Jamdani has always been a thing of fascination. It made its mark in many international exhibitions. Enlisted on number 318 of a catalogue of the National Association of Wool Manufacturers in 1876, Jamdani was described as “a figured muslin of Dacca, of exquisite delicacy; and, by reason of the complicated design of such fabrics, they are considered the greatest work of weaver, and are the most expensive production...”.

The weaving establishments lied in Greater Dhaka; Sonargaon and the banks of River Shitalakhya can be specially named in the world. It cannot be loomed just anywhere. Geography and climate play an important role, without which Jamdani would not have the charm and uniqueness it possesses. Waterof the river Shitalakhya is required for processing cotton, out of which Jamdani is made, and there is something in the content of Shitalakhya River that helps in bringing the supreme quality of Jamdani.

People have indeed tried to manufacture elsewhere, but quality is not the same. Moreover, climatic conditions also need to be friendly: the right level of moisture is very important.



Fig-2.5: Art of Muslin and Jamdani cloth.

Historically, East Bengal, which is now Bangladesh, had a world famous textile industry. Of course, our textile legacy is not all about cotton, Muslin and Jamdani. There were (and are) many other textile arts too in the country.

“It is said that the silted waters of the Shitalakhya river gives the air a unique dampness and a perfect temperature early in the morning, giving a certain quality to the yarn. In the olden days, the artisans worked on the loom only around daybreak,” said Ruby Ghuznavi, managing director, Aranya Craft Ltd. Models showcase colourful Jamdani saris at a fashion show at The Daily Star Centre in Dhaka. Weavers have a proud legacy of producing these unique handloom saris on the banks of the Shitalakhya River near Dhaka and Narayanganj for generations. Most Jamdanis traditionally have geometric floral motifs woven into the cotton fabric with similar or metal character.

2.4: The Shitalakhya and Narayanganj District:

Geologically Narayanganj District lies on the edge of the Modhuour Tract and the Holocene Flood plain deposits from the aquifers. Narayanganj is one of the oldest urban centers of the country and the largest river port. Activities related to jute processing and transportation, for which Narayanganj came to be known as Dundee of east, is waning. Historically, Narayanganj was a salt trading center and the business is still alive today in a much larger scale. Flour milling and small-scale engineering workshops to meet the local needs are also found here. For its easy transportation linkages Narayanganj is one of the important centers of the wholesale trading of all types of commodities, especially textile products. Traders from all around the country collect their needed commodities like yarn, dyes, chemicals, hosiery items, flour, edible oil, salt cement rod etc. from Narayanganj.

2.5: The Shitalakhya and Gazipur District:

The Shitalakhya river is originated from old Brahmaputr. Then it is divided two way at Tok in Gazipur district. Addressing as “Pashar” one way of it have flowed south-west side with taking new name “Shitalakhya” at lakpur. There are Park, mill, bazaar, seven rings cement company, pran-rfl company, school and madrasa type educational institution etc surrounding bank of Shitalakhya river.

2.6: The Shitalakhya and Narsingdi District:

A major part of Shitalakhya is flowing through Palash, Narsingdi. It is situated south-west side of Palash-ghorashal. Palash upozila is industrial place due to good luck of Shitalakhya. Sand mohal, Palash urea fertilizer, ghorashal urea fertilizer, Janata jute mill, Co-operative jute mill, Bangla jute

mill, Ghorashal Power station, four branch of Pran-RFL company, brick-field, school, madrasa-etimkhana etc are available shore of Shitalakhya river.

The Shitalakhya is a vital role playing river in Bangladesh. It is not to suffer like Burigonga still but there a threat pro active due to increase industries, mills, factories, brick-fields etc with plan less way. Other many causes are liable to concern river Shitalakhya. Everybody should be careful and dutiful to keep and clean the Shitalakhya as a safe and durable river in the country.

Chapter 3

3: Literature Review of the Study

In the word of poet...

“Came Sonabibi from Sonargoan

Touched lakhya water

Wetted her dense cloud hair”

From far past The Shitalakhya is an influential river for its surroundings and country. It is familiar with another name, “Lakhya”. It is originated from old Brahmaputra River. Opposite side of this river name is Banar River. The Sitalakhya has fallen into the Dallessari river through the Narsingdi, Gazipur and Narsingdi. It is mainly portioned in Narayangonj District. The rich full centre of jute and fabrics trade was established on two banks of the river in British regime. Muslin industry of old Bengal was founded on the sitalakhya river bank. This river holds navigability around the year even in dry season too. In recent, many commercial and economic industries are mushrooming on side of river. Importance of this river whenever is increasing parallel increasing the pollutions, illegal river dredging, occupying its river bank etc.

3.1: Categories of Shitalakhya as a river:

The water course flows in the straightway or in the meandering way is called the river.

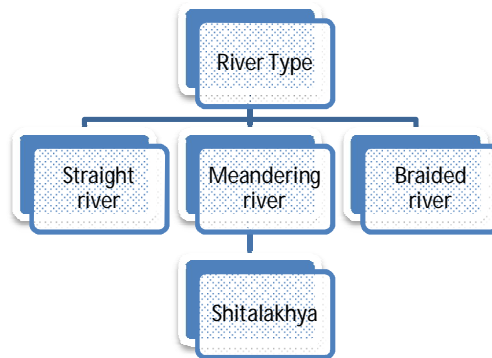


Fig-3.1: Various types of river along with position of Shitalakhya river.

3.1.1: Straight river:

The river runs across the straight line originating from its source point to estuary although such type of river cannot be seen is called the straight river. The river experts think that comparatively wide and low-lying rivers are the example of the straight river.

3.1.2: Meandering river:

The river runs across the curvature line originating from its source point to is called the meandering river. The river experts think that comparatively narrow and deep rivers are the example of the straight river.

3.1.3: Braided river:

The river with multi-courses is that type of. This braided river plays the vital role to transform the soil structure than the other types of rivers. It is known that the Jamuna River in Bangladesh is the largest braided river in the world.

The Shitalakhya is 110 km long and 300 m wide in the near Narayngonj which is simple meandering type river.

PlainWater Land data from Demra	
Highest Plain water land	6.98 m (pwd)
Lowest Plain water land	0.70 m (pwd)
Measurement Water Flow (Highest): 2600 (Qmec)	

Table-3.1: PlainWater Land data

In Narayanganj, danger limit of this river water plain is 5.50 (pwd). Rivers are classified into three broad categories depending on the flow range and are as follows:

No	Catagory	Flow Range	Rivers
1	Major Rivers	300 to 120,000 cumec e.g	Ganges, Brahmaputra, Padma, Meghna
2	Semi major Rivers	100 to 15000 cumec e.g.	Brahmaputra, Dhaleswari, Gorai, Arial Khan, Surma, Kushiyara, Teesta etc.
3	Minor River	1 to 1000 cumec e.g.	Sitalakhya, Buriganganga, Khowai, Manu, Gumti, Dharla, Dudkumar, Karnafuli, Halda, Sangu etc.

Table-3.2: River types according to flow range.

3.2: River related terms:

3.2.1: Char, sand bar:

The land piece is compiled of sand and other elements washed of from river stream. The sand bar could sometimes disappear as well as could survive for many years.

3.2.2: Quicksand:

The layer beneath the surface water mixed with clay, sand and water is called the quicksand. Apparently, the upper part of the quicksand layer is solid, hard and safe but the inner part of it is very soft, liquid which causes to go down something that falls on it.

3.2.3: Reservoir:

The place where water is stuck erecting dam or barrage in aiming to divert the stream of the river. It is, however, made with clay, soil, rocks or concrete. There is a reservoir at Kaptai, Rangamati in Bangladesh. It's area 2122 sq.m.

3.2.4: Water Logging:

The stagnant condition of water that cannot move from one place to another causing huge negative effect for normal public life is called water logging. The sample of this feature is normally noticed in Bagerhat and Narail wetlands adjacent to Modhumati and Chitra rivers respectively.

3.2.5: River Basin:

If the water of a river from a particular area comes to another lower part, the upper part of that river is called river basin. The largest river basin in the world is the surface part adjacent to Amazon river. The main river basin in the Indian sub-continent is the Ganges basin.

3.2.6: River Valley:

The water flows to the way from the source to estuary through the trenches is called the river valley. In the monsoon season the trenches are full of water and again in the dry season those could water free area.

3.3: Rivers in Literature:

River has everything. In every sector, river has thrown its influence. River has taken its part in poem, novel, drama and movie etc. A list of river literature is followed bellow:

S. No	Name of Literature	Year	Name of Author
1	Padma Nodir Maji	1936	Manik Bandopaddai
2	Kalindi	1940	Tarasankar Bandopaddai
3	Echhamoti	1950	Bibhutibhushan Bandopaddai
4	Ganga	1957	Samaresh Baso
5	Gor Srikhondi	1957	Omiyobhushan Majumder
6	Ontarjali Jatra	1962	Kamal Kumar Majumder
7	Titas Ekti Nodir Nam	1963	Odoita Mallabarman
8	Kadho Nodi Kadho	1968	Sayed Waliullah
9	Nodi o Nari	1945	Humayan Kabir
10	E kol Vange o Kol Ghore	1971	Satten Sen
11	Char-Vanga Char	1951	Kazi Afsar Uddin Ahmed
12	Char Keshem	1356(B)	Amarendra Ghosh
13	Gohin Gang	1980	Sadhan Gongapaddai
14	Padmar Polidip	1986	Abu Eshak
15	Pokamakorer Gharbasati	1986	Selina Hossain
16	Teestaparer Brittanta	1988	Debesh Roy
17	Padma Oppakkhan	2006	Sirazul Islam Munir

Table-3.3: A list of novels on Bangladeshi rivers.

Some poet like Salim Sabrin(Nidi Oppakkhan), Hasan Hafizur Rahman (Hai Shitalakhya) has written their poem with river Shitalakhya.

3.4: Inter-linked Rivers:

There are fifty seven indifferent joint rivers in Bangladesh. Among of them, there are fifty-four rivers with India and other three rivers with Myanmar. Father of Shitalakhya is old Brahmaputra which directly joint river with India.

A poet, Ochittakumar Sen Gupta has recited in his poem “Purba-Paschim..... “

*“Your Shitalakhya and my Moyorakkhi
Your Bhoirab and my Rupnarayan
Your Kornafuli and my Shilaboti
Your Payra and my Pialy
Single tide, single stream for this
Same freezing immersion, prosperous power..”
(Author self translated)*

3.5: Importance of Shitalakhya River:

Not only the Shitalakhya river has a socio-historical importance but also it has economic and commercial importance. This river is like mother who only gives its beneficiaries and advantages us.

3.5.1: Fishing:

Every rivers has multi-lateral contributions for human being. One of them is fishing. Fish is the main aquatic in the river. So the Shitalakhya has also the facilities of fishings.

3.5.2: Trade and Commerce:

Where Buriganga would save Dhaka, there Shitalakhya save Narayangong mainly. From British period Narayangonj is familiar with Dundee of East as admjee jute mill and jute trade centre totally a business city. Kapashia, Barmee, Lakpur port, Naryangonj port are situated on the Shitalakhya river.

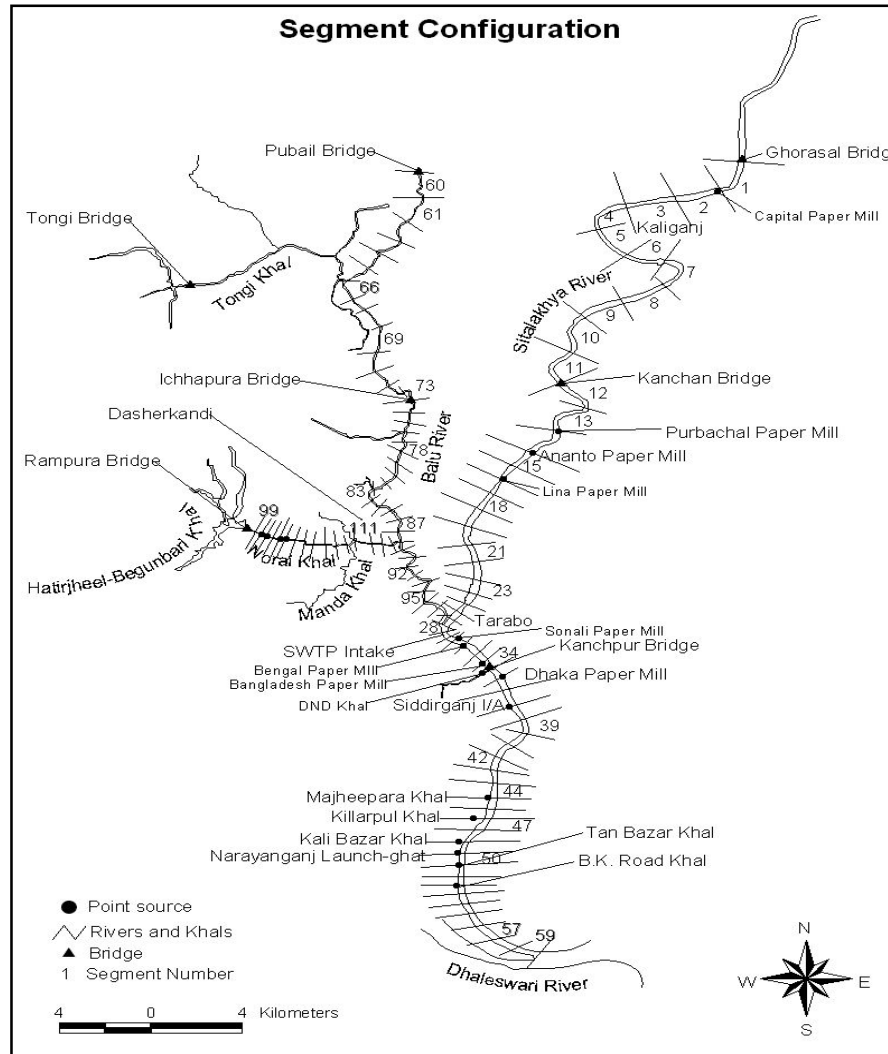


Fig-3.3: Structures position segments of Shitalakhya river.

There are many industries, offices, mills, factories, garments, dyeing, knitting etc are on the river banks of Shitalakhya. Narayangonj river port is the main river port of Bangladesh. Many boats, steamers, launches, ships are moving free through the Shitalakhya river. Core of taka's business is held every day centralizing Shitalakhya river in the Narayangonj. Not only Naryangonj but also Narsingdi, Gazipur are the industrial places where Shitalakhya influence all the time.

3.5.3: Micro business:

There is small business like shops, boat drive, fishing business, stone crushing, micro daily and weekly hat-bazar, cloth stores etc on two sides of the river. In Narayangonj side, total length of both river banks is 82.72 k.m. The river is navigable all the year and in full monsoon season two sides of river are not overflowed. As a result, instant all kinds of micro and local business are held always.

3.5.4: Entertainment in the river Shitalakhy:

The Shitalakhya is a centre of all types of entertainment where boat fair, sightseeing, geographical study tour, tourism, park visit and industry visit etc. Zinda park, Ananda park etc are source of entertainment.



Fig-3.4: Sightseeing on the river.

3.5.5: Model of affected rivers:

The Shitalakhya is model river of its water quality, well saving two river banks, navigability, water vehicle free movement etc. Once there is dolaikhal river, today it is no more! Affected rivers can follow the characters of Shitalakhya.

3.5.6: Transportation in river Shitalakhya:

The Shitalakhya river is source of well water communication. Above of thousand water vehicles run on the shitalakhya river every day. Communication of this river is moved with mainly boats, steamer, trawler, launch and ships and by bridges. This water ways help the extra stress on roads and highway roads etc.

3.5.7: Religious Ceremony:

This river is the media of praying religious values. There are some religious institutions of all religions on the river bank of Shitalakhya. From the views of sentiment of religious values it is impossible to exterminate them. The Hindus ceremony “Holly Bath” is inaugurated every year in Langalbanda.

3.5.8: Sightseeing and Traveling:

Murapara. Here you can visit an old Zamindar’s palace now converted into a college. Also here is a jute mill which you can visit. On this cruise you should easily see the Gangetic Dolphins. On way back we shall serve you tea / coffee with cookies before stopping, at Noapara village to show the traditional and famous Jamdane weaving. It is also possible for you to buy pieces of Jamdane cloths here as a souvenir.

3.5.9: Bridge as a Connector on Shitalakhya:

The Shitalakhya is a big river surrounding the eastern of Dhaka among the other rivers as like Burigonga, Turag and Balu rivers.

No	Name of Bridge	Name of District
1	Ghorashal Bridge	Narsingdi & Gazipur
2	Kanchan Bridge	Narayangonj
3	Kachpur Bridge	Narayangonj

Table-3.4: Names of bridge on Shitalakhya.

There are important bridges on the river Shitalakhya river such as Ghorashal Bridge, Kanchan Bridge and Kachpur Bridge which are major connectors of capital city to others like Gazipu, Narsingdi and Narayagonj etc. To build Narayangonj Bandar Bridge is heartiest demand of people in City. This was a vital issue in Narayangonj City Corporation(NCC) Election on behalf of major two parties: BNP and Awami League. After victory of Awami League candidate Dr. Selina Hyat Ivi has said that to buil up a bridge on the Shitalakhya in Naryangonj is first priority.

3.5.10: Shitalakhya as water supplier:

No river without water. It is navigable only for water. The Shitalkhya river is great source of water for capital Dhaka along with Narayangonj City, Gazipur and Narsingdi. The water of this river is used all purposes of human being, animals and others. Lac liter of water is used in surroundings dyeing, knitting, printing and fabrics industries, garments, mills, factories. The Saidabad Water Treatment Plant lifts water from the Shitalakhya to provide Dhaka Metropolitan City 450 liter daily.

3.5.10.1: The Saidabad Water Treatment Plant:

Efficient supply of drinking water is one of the big challenges for Bangladesh. Fast growing urban and rural population and uncontrolled intensifying industry add to the degradation of the water quality for drinking purpose. Extensive pollution of rivers and water bodies as well as declining ground water tables makes drinking water supply an increasingly challenging task. To meet this problem an advanced water treatment plant was installed in Dhaka city in 2002. It has a practical experience of how raw water was being treated and then supplied to the whole city of Dhaka for drinking purpose. The plant treats the water from Sitalakhya river. The plant

is able to supply 500,000 cubic meter of water every day (45 mld/day) which accounts for 32% of the total drinking water supplied in the city. The team spent a quality time at Saidabad Water Treatment Plant acquiring knowledge about the process of treating raw water supplying safe drinking water to meet the thirst of millions people throughout the Dhaka city.

3.5.11: Eco-Balance of Shitalakhya river:

The ecological condition and balance of Shitalakhya river are not so concerned that looks like Burigonga. If there is standard of Dissolved Oxygen is under 2 mg then aquatic animal with fishes will die. But there is the standard of Dissolved Oxigen is above 2 mg.

3.5.12: Combined Cycle Power Plant at Siddhirganj:

Water quality is a very important factor in management of cooling systems within power plants and it is related to effective electricity generation. A significant amount of water is needed in powerplants for cooling operation. In order to meet the increasing electricity demand, a new 335MW Combined Cycle Power Plant is being established at Siddhirganj, a key industrial hub of Bangladesh located 20 km away from the Capital. The proposed power plant is designed to include a Closed-loop Recirculating Cooling System (CRCS) for cooling operations. The CRCS utilizes the same cooling water several times and only takes up a relatively small amount of makeup water to compensate the water loss through evaporation. Due to evaporation loss the cooling water is operated at several cycles of concentration (CoC) in the cooling system. The proposed power plant at Siddhirganj will use Sitalakhya River Water (SRW) at 2.5 CoC. SRW is polluted near Siddhirganj area due to very high pollution load coming from the industries located on both sides of the river.

The degraded water quality of SRW may pose a threat for its efficient use in the cooling system at 2.5 CoC in the proposed power plant. It is focused on feasibility of using SRW as a makeup water in Siddhirganj Power plant Cooling system in terms of corrosion and scaling management. A synthetic recipe of SRW has been formulated in the laboratory to imitate the water quality of actual SRW at 2.5 Cycle of concentration (CoC).

3.6: The problems of Shitalakhya River:

The Shitalakhya is under tragic concern for its various kinds depending people and their crucial activities. Some interested and power exercised people are liable also directly. There are some problems of river which are described broadly:

3.6.1: Political Sheltering:

These are Buriganga, Shitalakhya, Turag and Balu, and all these rivers are quickly dying because of encroachment by political and social stalwarts, influential organizations and unscrupulous people. Most of these rivers have been so squeezed and narrowed that they have lost their navigability and so communication through them has become risky. It is confirm that Shitalakhya is still target of devouring of greedy people who are directly involved in politics or sheltering of Politicians. Power exercised people also involved this hardhearted job.

3.6.2: Mastering or Occupying Shitalakhya:

This is how people are occupying the mighty Shitalakhya illegally day by day. The river is getting smaller due to for this illegal occupying process conducted by influential people in that area. Now, there is less waves in the river due to illegally built infrastructures in both side of the river.

Though, Bangladesh Government has rules and regulations for saving rivers like Shitalakhya but it's not implemented or followed properly because of the influence of local powerful individuals. Many political representatives gave their commitments to save Shitalakhya which were just a courtesy in the political gestures before elections. These were only to impress people so that they can get vote from the citizens as much as possible. Later on, after being elected no one has raised their voice against the people who are occupying Shitalakhya.



Fig-3.5: Land grabbers fence off a section Shitalakhya near Dikrir Char.

Instead of saving Shitalakhya the representatives of Parliament, Mayor, and ward councilors try to convince the ministry of Environment to hide complains against them on behalf of the guilty persons who occupied this river. This river is not dying only for this reason, but also for the pollution too. The mills, factories and industries established beside this river disposing their industrial wastes everyday that cause more damage. Now, because of pollution the small islands (chor) are rising in this river. It should be a concern for government because this river still facilitated us all the time. Sources said a total of 1158 acres of river area of the three rivers have been occupied by around 3010 illegal structures that has reduced the width of the rivers.

Industries got a whacking as experts and environmentalists maintained that rivers around Dhaka are getting polluted wholesale by industrial waste. Even industries with effluent treatment plants do not run those facilities.

3.6.3: Noxious Emissions and Toxic Effluention:

Noxious emissions and toxic effluents from the industries is flowing continuous. The Sitalakhya is on the verge of losing its very existence as wastes of dyes of mills and factories fall at random into the river polluting the water and endangering its fish. Once sources of sweet and pure water for Dhaka and Narayanganj, the Buriganga and Shitalakhya rivers are now lifeless receptacles of human waste and toxic industrial effluents. Reports show that in Dhaka, an average of 15,000 metric tons of human waste is generated daily, but only one-third of it is treated by Pagla waste treatment plant. About 80% of Dhaka is out of the Wasa sewerage network, which leads to dumping of untreated wastes into rivers and water bodies in and around the city.



Fig-3.6: Pitch black water to Shitalakhya at Godnail Wapda Khal.

In figure – 5, Industrial waste polluted the Shitalakhya river Godnail Wapda Khal of Narayanganj, carrying pitch black water terribly to the river.

A DoE source said around 350 dyeing, tannary, chemicals, paper and food processing and other industries are polluting the water saverly.

Waste from these industries is connected with the sewerage system that directly goes into the Shitalakhya river around the city. In fact, the river has become a dumping ground of all kinds of solid, liquid and chemical waste of bank-side population.



Fig-3.7: Untreated industrial waste to Shitalakhya by nala.

In figure-6 it seen a pipe, dumps untreated industrial waste into a canal that leads to the Shitalakkhya river in Narayanganj. Neyamatullah Bhuiyan, director, DoE Dhaka Division. According to statistics from DoE, the number of polluting textile mills is 365, tanneries 198, pharmaceutical units 149, engineering workshops 129, chemical and pesticide factories 118, jute mills 92, rubber and plastic units 63, food and sugar 38, paper and pulp 10, cement and fertilizer five each and distilleries four.

Most industries in and around the capital release untreated effluents directly flowed into the Shitalakhya.Said Hasin Jahan, policy advocacy director of Water Aid Bangladesh.

The four rivers around the capital have become virtual dumping grounds for all kinds of solid, liquid and chemical waste, as hundreds of textile factories are situated by these water bodies, according to Mujibur Rahman, who has worked extensively on environmental issues.

The four rivers still give off a horrid smell, as industries keep polluting them.

The government has done little to plug the sources of river pollution. A recent study by World Bank and the Institute of Water Modelling (IWM) shows that major effluent discharge units in Dhaka and Narayanganj continue dumping industrial and household waste into the rivers in and around the capital.

3.6.4: Ejection of fuel, dust and poisonous liquid:

Meanwhile, completely unabated, the tanneries and thousands of other highly polluting industries keep discharging millions of gallons of toxic wastes into the rivers. Dhaka Wasa (Water Supply and Sewerage Authority) dumps over 90 percent of its untreated wastes, which flow through its network of sewerage lines and canals, into the rivers around the city day and night. Even worse, the Narayanganj City Corporation keeps dumping truckloads of kitchen wastes into the river along city really. The four rivers that surrounded Dhaka city from four sides are polluted by industrial wastes to a dangerous level. The rivers Buriganga, Shitalyakra, Turag, and Balu have been so extremely polluted that these have turned into the rivers of poison. The poisonous waters of these rivers have not only been killing all its aquatic life but also been posing health hazards to the dwellers of the city. Cross-sections of people in Narayanganj sometimes congregated in the streets with the demand of saving the Shitalakhya from pollution and encroachment.



Fig-3.8: Toxic water flow into the Shitalakhya.

It should be taken punitive actions must be taken against the encroachers. It is maintained that a huge number of industries--stretching from Ghorashal to Munshiganj--had been built on the riverbanks, which dump effluents and other waste in the river. The biodiversity and ecology of the river are at stake due to the rampant pollution, they said. "If they dump it in the sewerage lines it would end up in the river anyway." Despite widespread consensus among people from all walks of life, and a firm commitment by the government, especially Prime Minister Sheikh Hasina, to save the rivers around Dhaka, the picture along the Buriganga, Turag, Balu and Shitalakhya remain unchanged. The only difference between the flood season and the lean period regarding pollution is that during flood season the huge volume of floodwater and strong current hide the pollution from public view. The Sitalakhya is on the verge of losing its very existence as wastes of dyes of mills and factories fall at random into the river polluting the water and endangering its fish resources. The Shitalakhya is losing of ecological balance and surroundings environment.

3.6.5: Dredging Sand illegally:

The pavement demarcating the Demra bank of the river Shitalakhya shows how the river is grabbed by sand traders. They have made sand piles well inside the river's boundary. They continue to narrow down the river by around 100 feet from the shore even though the BIWTA conducted several drives over the years to evict the river encroachers and demolish illegal structures.

Not much later, it got the answer for where the sand laden vessels were heading. Our vessel came to a halt amid deafening noise coming from dozens of huge vacuum dredgers unloading sand into the vast low lying areas on the eastern side. A huge signboard announced the making of a city by Bashundhara group, the giant of the real estate developers.

BIWTA sometimes started eviction drive at the foot of some place on the Shitalakhya at Narayanganj following the media report on encroachment and unauthorised sand trading on the flood plain of the river. Bangladesh Inland Water Transport Authority (BIWTA) head office entered into a 30-day contract with Maria Traders, a sand extraction company, for excavating the river filled up with sand by illegal sand traders. Most of the traders there are local political activists belonging to the ruling Awami League, locals said. BIWTA chairman said they started the sand excavation as part of the ongoing drive against river grabbers.



Fig-3.9: Lifting sand on river bank of Shitalakhya.

Fig-3.9: The red flag marks the territory sand traders were supposed to use. But workers were seen piling up sand outside the perimeters during a drive against encroachment by BIWTA in the Shitalakhya near Kanchpur Bridge in Narayanganj.

A total of around 60 unauthorised sand traders have been identified to be running their business under and around the bridge at Shimrail. Most of them belong to Siddhirganj Thana Awami League

The contractor, Mantasha Dredging Company, has engaged five excavators. The company will excavate grabbed portions and take sand as compensation as per a deal with the BIWTA.

But when the water transport authorities plan to dredge the channel for up to 37 metres (120 feet) wide as locals have already encroached on either bank of the river and managed to take out land documents, said BIWTA Secretary.



Fig-3.10: Sand traders erect a fence and fill up a section of the Shitalakhya to stock sand near the Kanchpur Bridge.

Not only the Buriganga, industrialists and local influential people are encroaching on the Shitalakhya river indiscriminately as the administration is apparently doing nothing at all. Just under the Kanchpur Bridge, sand traders and stone crushing companies are doing business occupying the river banks, while industries have encroached on the other side. One report received from Narayanganj says a ship building engineering company has grabbed around 500-foot land towards the river on the west bank of the Dhaleshwari, just beside Mukterpur Bridge, to make its dockyard. In Gopchar, Haji Jainal, popularly known as Jainal 'Kosai' (butcher), has demarcated around 2,000 square feet on the riverbed and is making preparation to fill up the land.

3.6.6: To build parks:

Without permission of authority, there are some parks on river side of Shitalakhya which is generally harming the river. These are trying to broaden their land boundary on the river side. This attempt is a worthy threat to Shitalakhya.

3.6.7: Human waste to the Shitalakhya:

Of the 80,000 tonnes of human waste generated a day in the country according to Hasin Jahan, policy advocacy director of Water Aid Bangladesh. The destination is ultimately on river or river side.

The Shitalakhya is such river that is naturally passing maximum place covering of Narayngonj. This city is another Metropolitan City where people stress is increasing and their daily waste are to being fill up the small or big both khals. These khals are very important to the Shitalakhya for flowing and navigability.

3.6.8: Liquidity pollution:

In terms of quality, the river water of the Sitalakhya is vulnerable to pollution from untreated industrial effluents and municipal wastewater, runoff from chemical fertilizers and pesticides, and oil and lube spillage in and around the operation of river ports. Water is the most vital element among the natural resources, and is crucial for the survival of all living organisms including human, food production, and economic development. Today, nearly 40 percent of the world's food supply is grown under irrigation, and a wide variety of industrial processes depends on water (BCAS, 2000). Moreover, in Bangladesh, the environment, economic growth, and developments are all highly influenced by water - its regional and seasonal availability, and the quality of surface and groundwater. Some toxic metals and essential elements in water samples from the Sitalakhya and the Balu river, Bangladesh. Surface waters turn pitch black for industrial waste, human excreta; govt warning blatantly overlooked The Water and Sewerage Authority (Wasa), is supplying stinky water by purifying it with chlorine and ammonia sulfate.

The government over the years has allowed industrialists to pollute the rivers, canals and wetlands in and around the city to such an extent that surface water turned pitch black in several spots. It is quite optimistic about saving the rivers around the capital which have long been subjected to various assaults including pollution and encroachments. Take appropriate measures to save the rivers around Dhaka. “As a natural resource, sweet water is as valuable as minerals like coal and natural gas,” Hasin Jahan, policy advocacy director of Water Aid Bangladesh.

“The rivers, the prime sources of sweet water, are being contaminated heavily with lethal effluents,” she observed. More than 300 rivers in Bangladesh are polluted the same way, said Mujibur, who has worked extensively on environmental issues. Such pollution makes river waters unsuitable for agriculture, fishing, household chores, and bathing. Dhaka Wasa, which serves around 12.5 million people in a 360-square-kilometre area, uses water of only the Shitalakkhya at a pre-treatment and treatment plants at Sayedabad to meet 22 percent of the total demand for 230 crore litres of water. The rest is extracted from underground.

Prof Mujibur Rahman of Bangladesh University of Engineering and Technology said river water is turning unsafe for drinking because of rampant release of untreated human waste and industrial effluents that contain heavy metals like chromium, cadmium, lead and mercury, and toxic chemicals. Taqsem A Khan, managing director of Dhaka Water Supply and Sewerage Authority (Wasa), said, “Unfortunately, the rivers around Dhaka are so polluted that their water is almost impossible to treat.”

Water pollution also ruins the riverine ecological system and biodiversity. The waters of the Shitalakhya have meanwhile also become severely polluted. Institute of Water Modelling (IWM) and Aqua Consultant and

Associates surveyed and tested the water of Shitalakhya in 2006 and recommended relocation of water intake point of Wasa from Sarulia point of Demra as the water over there is severely polluted.

Water of the Shitalakhya rivers has become difficult to treat due to high level of pollution, said Dr MA Taher Khandker, director general of Bangladesh Haor and Wetland Development Board at a seminar. “Water in the Buriganga and Turag rivers have literally turned into poison,” said Khandker in his presentation at the seminar titled 'Pollution of Rivers around Capital Dhaka: Mitigation Options' at Water Development Board (WDB) office. Dissolved Oxygen (DO) level, an indicator of measuring river health and aquatic life in its water, stands at zero milligram (per litre) at different points of Buriganga, and Shitalakhya during dry season, he said. Besides, the waste, organic, inorganic, plastic, paper, food waste, natural waste etc are major pollutants in the river. According to the Environment Protection Act (Amendment) 2010, the minimum required level DO for any water body to sustain aquatic species including fishes and others is 5 mg/l. In Shitalakkhya no DO found at Demra ghat point from January to March in 2010. In 2011 DO varied from 0 to 6.5 mg/l.

3.6.9: To establish new city or residential area:

Rajdhani Unnayan Kartripakkha (Rajuk) has filled a portion of the Shitalakhya along the bank at Rupganj in Narayanganj for developing its Purbachal New Town Project. On a recent visit to the project area it was seen that the Rajuk authorities filled up to 30-50 metres inside the river at the eastern side of the Kanchan Bridge.

The Water Development Board had drawn Rajuk's attention to the matter but Rajuk authorities did not seem to care much.

The government later approved the project, which violates environmental laws. On the other hand, if some leaders, industrialists, occupying class possess the land, it is nothing to say.



Fig-3.11: ThePurbachal New Town Project at Rupganj by Rajuk.

In fig-3.11, Rajuk is filling a portion of the river Shitalakhya along its bank at Rupganj, Narayanganj for the Purbachal New Town Project. In reality, however, the government agency has set an example of grabbing an important river. Rajuk started filling the Shitalakhya from the Kanchan Bridge point where the river has taken a sharp bend. It is clearly visible from the bridge how the project is killing the river, violating environment law. Two satellite images of the Centre for Environmental and Geographic Information System (CEGIS) show the river before and after the earth-filling activity in 2005 and 2006. The images show that the much wider Shitalakhya of 2005 shrank in 2006 because of Rajuk's earth-filling activity in Shimulai union of Rupganj while its bank-line changed. Locals told The Daily Star that the Shitalakhya was a mighty river at Shimulia but it has now shrunk to half its former width. The Purbachal New Town Project stretches from Shimulia up to Kaliganj upazila of Gazipur between the Balu

and Shitalakhya rivers. Rajuk started the project in July 1995 and is supposed to finish it in 2012, developing 6,150 acres of lowland and wetland.

The total project area is divided into 30 sectors out of which 1, 2, 4, 11-14 and 17 have been completed, Rajuk officials said. Rajuk has filled up 30-50metres inside the river Shitalakhya at the eastern side of the Kanchan bridge for the purpose of developing its Purbachal Town project. This is in clear violation of the existing laws on rivers and canals that up to 50 metres from the point where the river water reaches during the high tide should be regarded as river bank.

3.6.10: Throwing garbage from side of river:

There are many people place like hat-bazar, school-college-madrasha, mills-factories, garments, dyeing and knitting companies, walk roads, car roads etc are on the Shitalakhya river. In importance or less importance the people throw their household, officeial and individual waste into the river.



Fig-3.12: Unlimited garbage on Shitalakhya river.

3.6.11: Slum dueling in river:

The people who have no residential facilities are trying to find free and open ownerless land where they can set up their head. They live usually beside rail stations, bus stations, and river banks.

There are some duellers are living on Shitalakhya river side specially in densely populated area like Ghorashal in Narsingdi, Kaligonj in Gazipur Gazipur and Bandar, Kanchpur Bridge, Siddirgonj etc in Narayngonj. They always pollute river's water in their daily necessities if it unhealthy for them.

3.6.12: Water vehicles polluting Shitalakhya:

It is a common scenario in our country that unfit and harmful for environment these kinds of water vehicles run through the rivers of Bangladesh. They pollute the water and with it they are accused for polluting air and sound too. People around this river bank area face this sound and air pollution regularly which is harmful for the children and older people too. They suffer from TB, pneumonia, bronchitis, cancer for this kind of pollution of air, sound, and water. Immediate action must be taken to help these people who are still living in these river bank areas.

3.6.13: Presence of none to observe the pollution:

Thousands of families living beside this mighty Shitalakhya river depend on it for livelihood. Because, river port like- Narayangonj, Kapashia and Boromi Bazar grew up depending on this river. But, harmful chemical wastes of different industries are endangering the river day by day. It has become like Buriganga river which is not good for us. Many people are talking about saving this river but still no one has come to visit the area around this river to observe the situation and think of something to reduce the pollution. Many seminars, conferences took place to save this river but still nothing fruitful result came out which could help to save it to preserve

its extinction. And it seems like a festival for everyday those influential and powerful individuals occupying the river more and more without any obstacles in both side of the river.

No one care about this Shitalakhya river which plays vital role in our daily life activities and business trades of export and import etc. We need people to be awake and think about saving our beloved Shitalakhya.

3.6.14: Endangered Shitalakhya River:

The disposable wastes of mills and factories are going through canals and getting mixed with Shitalakhya every day and that result in the water is poisonous right now. This river flows beside Dhaka and Narayangonj. People use it to throw dump in it. Dead animals like dogs and cats, household and industrial wastes are floating in this water. The above picture shows that the canal of Narayangonj “Rupshi” is just seems like a canvas of a painter which is full of colors. It ensures that how much chemicals and industrial waste going through this canal every day. Even the clinical wastes from different clinics and hospitals also getting mixed with it. So it is getting polluted in many ways that already endangered the river and the environment. Apart from that, because of this polluted water, people living beside this river bank area are becoming sick . Water contaminated diseases and skin diseases are common in this area. Now, people can hardly live here due to odour from this water and cannot use this water without water treatment plant facilities. Bangladesh government still has not taken any initiative to save Shitalakhya. However, the government can ask for help from local and foreign organization to solve this problem. Later on, Shitalakhya River can be used for tourism business spot if it can regain its beauty like before.

3.6.15: Reduce disposal of industrial waste in this river:

Mills and factories built just beside the river bank dispose their wastes without following any rules and regulations. They do not have any plan for this disposal process. Ministry of Environment have announced that they will take actions to reduce pollution to save this river but still there is no action plan they have introduced yet to save it.

They were suppose to introduce (Effluent Treatment Plan)ETP for every industries in that area to save river and environment but still they have not made it mandatory for those industries. According to the law every industry must have (Effluent Treatment Plan) ETP to operate their business further more or Ministry of Environment (MoE) will not provide them any environment certificate which will hamper them to continue their business in that area. So, it is mandatory for all to establish this facility immediately. On other hand, Ministry of Environment is still allowing these industries to continue their operation without having ETP illegally. Instead of allowing them, the Ministry of Environment must force the mills and industries to establish effluent treatment plan (ETP) in their factories as soon as possible.

There are some factories which do not have functional ETP yet. Such as:

ACI FLOUR MILLS, (sister concern of ACI GROUP)
ACI SALT INDUSTRIES LTD (sister cocern of ACI GROUP)
DHAKA INDUSTRIES LTD (BEXIMCO GROUP)
CITY GROUP,
AKIJ CEMENT,
SINHA TESTILES,
ADAMJI EPZ,
SHAH CEMENT,
PREMIER CEMENT,

METROPOLITAN CEMENT,
SUPER SALT,
SD FLOUR MILL,
PUBALI SALT,
UTTARA SALT,
POPULAR JUTE EXCHANGE etc.

Table-3.5: Functional ETP less industries.

Ministry of Shipping has a list of companies and factories which are destroying Shitalakhya River.

They are:

NARAYANGONJ SALT,
AZIMUDDIN BHUIYA TRUST,
JAMAL SOAP FACTORY,
AMIN BROTHERS JUTE AND CO.,
PARITY FASHION,
PN COMPOSIT, and
IBRAHIM NITEX,
SUNNY KNITTING,
KNIT CONCERN,
FLOCK PRINT,
SIDDIK FOOD,
LAKSHMI NARAYAN COTTON MILL,
REX KNIT WORK,
RAZ KNIT WORK,
SOHAGPUR TEXTILE MILLS,
PRITOM FASHION.

Table-3.6: List of destroying structures on the Shitalakhya river bank.

Moreover, some factories have ETP but they do not use it, they do not run the system. Such as:

SHIUL TOWEL FACTORY,
IBRAHIM TEXTILE,
STAR PARTICLE BOARD,
AMPER PAL PAPER MILL,
KONIK PAPER MILL,
MALEK JUTE MILLS,
KAHPUR DYEING AND PRINTING,
JOYA GROUP DYEING AND PRINTING,
BENGAL PACKAGES, SONALI PAPER MILL,
RAHMAN CHEMICAL FACTORY,
SHABNAM VEGITABLE OIL MILLS,
CRYSTAL SALT, LINA PAPER MILLS,
ANAR PAPER MILLS AND JALAL JUTE BOLING AND CO.

Table-3.7: Some factories have ETP but they do not use it, they do not run the system.

Ministry of Environment must take action regarding this issue before it is too late save Shitalakhya River.

3.6.16: Lack of proper visit and monitoring:

According to the Environment Conservation Rule, 1997, every industry should have in-house ETP. Otherwise, they would not get environmental clearance from the DoE which is mandatory to obtain power and gas connections. The DoE has the authority to implement the law but shortage of manpower prevents it from taking action.

3.6.17: Break-fields on the river bank:

Almost breaks fields directly founded on the rivers in our country. The owners of these break-fields is likely to set up their fields for easy bringing of water, open place etc. there are about hundred break fields are on the Shitalakhya river. Their burn coal, dust and waste throw out the river.

3.6.18: Chemical from cultivated lands:

Lac of hector of fertile lands is on the two stockpiles of Shitalakhya. There are various seasonal harvests on the river sides such as paddy, jute, banana, bean, tomato, potato etc. Paddy and jute are main harvests on the river. The farmers use pesticide, urea etc which fall into the nearest Shitalakhya river and pollutes the its water.

3.6.19: Cutting river side trees:

Without obstruction cutting river side trees is an anti-environment activity which is violating the law. In this activity has been occurred more by local power party men. As a result river side is to face erosion.

3.6.20: Using current nets to catch fish:

There are sweet water fishes in the river so fishermen always catch fishes with current net. Current net is a barrier and indicator to natural procreation of fish and another aquatic.

3.6.21: Depletion of ground water waste generation:

Debris of illegal structures is also being dumped into rivers, which would reduce navigability. The groundwater table in Dhaka city depletes by around three meters a year with roughly 1.5 meters of annual recharge, according to an official estimate.

Taqsem said, “Replenishment of the groundwater table is obstructed due to unplanned concrete coverage of the surface, and destruction of wetlands, open space and rivers.”

3.6.22: Arsenic level in ground water increased:

Incessant pollution in river water increases the arsenic level in the water. Besides, when the sediment of water decreases then it can expand the level of arsenic. This situation already has been shown in to the experts.

3.6.23: Soil fertility declined:

If the river is not navigable enough there fertility can reduced. The shrink of shitalakhya is horribly escalating by filling up river bank throwing waste into the river etc. The quality and fertility of Shitalakhya river are declining.

3.6.24: Court Stay orders:

Whenever authority went to drive or demolish the illegal structures on the river bank of Shitalakhya, the victims want to bring stay order. As a result, Authority is to stop the drive or running mobile court. Another BIWTA official engaged in the eviction drive along Shitalakhya river said that they also would not be able to evict Ekota Samobay Samity and Samata Samobay Samity and their 42 small structures opposite to Narayanganj river port terminal. The encroachers have obtained court's stay order, as assistant commissioner (land) of Narayanganj leased out foreshore land to them although they were once evicted during caretaker government in 2007. Sometimes it is barrier for driving on the river for getting final judge.

3.6.25: Bounderies on the river bank:

There are many bounderies on and beside the Shitalakhya river which are illegally founded. Bangladesh Inland Water Transport Authority (BIWTA) and Narayanganj district administration carried out the drive on 11th day in Shitalakhya and destroyed the remaining portions of the boundary wall erected by Al-Noor Paper Mills encroaching around 14,000 square feet of the river in Dhakeswari area. "It's astonishing that such a huge boundary wall was constructed in the river," said Executive Magistrate Abdul Hai of Narayanganj.

3.6.26: Increase level of pollutants:

Pollutants in the river are curse for any river which is caused to die itself. The Shitalakhya is in crucial moment for increasing level of pollutants.

3.6.27: Violence of laws:

The Shitalakhya river, taking advantage of the authorities' lax attitude towards enforcing environmental laws and regulations according to Hasin Jahan, policy advocacy director of Water Aid Bangladesh. In this matter, some political leadrs, power holding people and occupiers are seen to break the laws.

3.6.28: Land erratic or river bank erosion:

During the sand lifting, lifted water along with sand back to or fall down again in the river. As a result flow of that water wear out the river land. Rainwater, the purest form of natural water, is callously wasted by letting it run off and merge with polluted rivers in the absence of a harvesting system. Rainwater, which is supposed to recharge the water table, runs off the concrete surface and merges with polluted water of rivers. Industrial chemical flows, nonstop rainfall water are the erratic characters of Shitalakhya.

3.6.29: Manpower mismanagement:

Manpower mismanagement is an implementing typed problem for the protecting, monitoring and supervision for the rivers. Every river is now occupying in the country. The Shitalakhya is not anomaly. There is no enough investigation, monitoring, protection, enforcing law by BIWTA, DoE, Mobile court of District and upozila magistrates and others on Shitalakhya river saving from the political and power people' possession. "We have only two inspectors to cover industries in 16 districts. They also don't have vehicles for field-level inspection. How can you expect the inspectors will work properly?" said Neyamatullah Bhuiyan, director, DoE Dhaka Division.

3.6.30: Lack of co-ordination:

Co-ordination is a fruitfully indicator for successful jobs. If there is no co-ordination in the activity there is no out come from that attempt. During the driving expedition on Shitalakhya river, sometimes there is no or less co-ordination among the govt. organizations like BIWTA, DoE, Mobile court of District and upozila magistrates and others.

3.6.31: Environmental risk to public health:

Water quality is an important factor for safety issues associated with public health and also for aquatic life. More and more water quality issues are becoming a significant concern due to the growth of population, urban expansion and development. Thus assessment of surface and ground water quality has become an essential criterion for overall description of the quality of water used for different purposes. Chemical-mixed dusts and poisonous waters coming out directly from various mills and factories on the banks of Sitalakhya River posing is serious threat to health hazard.



Fig-3.13: Chemical-mixed dusts and poisonous waters in Rupganj area.

In figure -12, Chemical-mixed dusts and poisonous waters coming out directly from various mills and factories on the banks of Sitalakhya River posing serious threat to health hazard in Rupganj area.

It is said Dhaka and Narayangaonj cities are approaching a public health crisis and even bottled water will not be safe enough for drinking because of the amount of background pathogen Prof Dr Mohammad Ali, who has carried out the first liver transplant in the country, said excessive accumulation of heavy metals through regular consumption of contaminated food and water might damage brain, liver, kidney and the nerves.

Contaminated water could cause deadly hepatitis-A and E and typhoid, and eventually lead to liver failure, particularly in children and pregnant women, said Prof Ali, also founder secretary general of National Liver Foundation of Bangladesh. According to the findings of Water Aid Bangladesh, more than 7,000 children under five die from diarrhoea while waterborne diseases cause nearly a quarter of total deaths a year in the country.

3.6.32: Shitalakhya as a Crime zone:

It is seen the mysterious things has been occurred on the river Shitalakhya river. There are some spots where some people deal in drugs, fensidil, heroin and so. Otherwise, stirred up killings have been occurred in this river.

As an example, Killing of Toki, seven murder case etc. Toki, a meritorious A-level student and son of cultural activist Rafiur Rabbi, was killed at the office of in College Road area of the city. His body was put in a sack and dumped in the Shitalakhya river at Charargope.

Another case is Nazrul islam's killing along with some which is call seven muder. The court framed charges against 35 people including prime accused Nur Hossain and three sacked Rab officials in the sensational seven-murder case on, almost two years after the incident.



Fig-3.14: people are seeing the deadbodies of seven murders on the bank on Shitalakhya.

On 27 April, 2014, Narayanganj panel mayor Nazrul Islam, his three associates and driver were abducted by miscreants from Fatullah area of Narayanganj. At the same time, senior lawyer at District Judge's Court Chandan Kumar Sarker and his driver were also abducted on their way to the capital, Dhaka. Three days into their abduction, the bodies of six people,

including that of Nazrul and Chandan Kumar, were recovered from the river Sitalakhya on 30 April. A day later the body of Jahangir, car driver of Nazrul Islam, was also recovered from the river. Police recovered arms and drugs from Nur Hossain's residence during the drives to arrest him. The arms licences of Nur Hossain and his family members were also cancelled. Police also demolished all of his illegal establishments including the truck stand. Agitated people of Siddhirganj set fire to the office of Nur Hossain. All of his associates fled. Known- unknowh many illegal activities has been occurred on and in shitalakhya sometimes.

3.6.33: Flood time in Shitalakhya:

Types of floods:

Four types of floods take place in Bangladesh-

- i. Flash floods
- ii. Rain floods
- iii. Monsoon floods
- iv. Floods due to high tide and storm surge

i. Flash floods:

Such types of floods are marked as the torrential flood. Due to heavy rainfall in the monsoon season and torrential flood from the hillside causes the rise of water and makes floods. The water from this sort of floods declines very sharply.

ii. Rain floods:

The rain flood takes place when there occurs a heavy downpour for a long period of time in the rainy season. It causes severe water logging in the area as there are not enough spaces for water discharging process. Its type flood is seen sometimes in Shitalakhya.

iii. Monsoon floods:

Devastating floods submerged normally in the big rivers especially in the month of July-September due to heavy inundation in the monsoon season. It is observed too occurring shitalakhya river.

iv. Floods due to high tide and storm surge:

This sort of flood stays for very short time. It is caused huge by cyclone in the coastal region. It is rare to see in Shitalakhya.

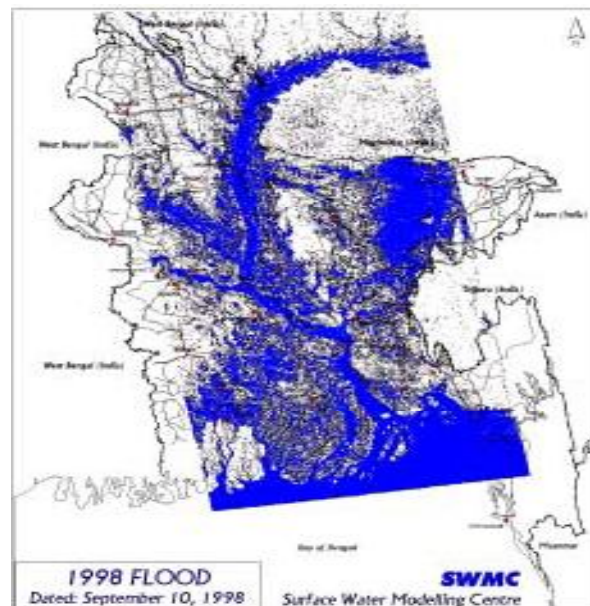


Fig-3.15: Area affected by 1998 flood.

The raging Sitalakhya river threatened to submerge houses of about one million people when it overflowed the Dhaka-Narayanganj-Demra (DND) Dam. Elsewhere, about 2,50,000 people became shelterless as the flood situation worsened.



Fig-3.16: Overflowed water on DND embanks.

The Sitalakhya spilled over the dam at Kadamtali point in Shiddhirganj, swamping the low-lying areas inside the irrigation project. Gushing floodwaters carried away homes on wetlands in 15 districts, forcing people to flee home. Over a million of people, who have been marooned, are facing acute crisis of food, drinking water and medicine.

The Narayanganj district administration has thrown itself into a frenzy of activities to prop up the vulnerable DND Dam, which was leaking over the last four days, with the help of people. As the irrigation floodgates of the dam were opened to ease pressure, the low-lying areas of Sanargar, Mizmizi, Kaari, Kadantali and Kalamtali went under water immediately.

Panic-stricken villagers shifted to higher ground along with their belongings. Hundreds of locals were trying to save the embankment, dumping sandbags at weak points till dead of night. Locals said they informed the Water Development Board of the dam leakage from the beginning, but the authorities were aloof. Reports from the flood-hit areas said sufferings of the affected people are mounting in the absence of adequate relief operation. The district administrations distributed relief materials, which were insufficient. Flood experts predict that the *rivers* surrounding Dhaka would continue to swell in. The *Sitalakhya* at Narayanganj also rose by 9 cm and was flowing 105 cm.

Thousands of marooned people have taken shelter on flood protection embankment and roads and in educational institutions. About 13 tons of rice and Tk 30,000 were sanctioned for the affected people in the two upazila, officials said.

3.6.34: Thermal Pollution:

Thermal pollution is heavy industrial pollution which pollutes the normal and natural river water. Every industry emerges this kind of pollution but Ghorashal power station, Siddirgonj power plant, Palash and ghorashal urea fertilizers do almost of thermal pollution in Shitalakhya.

3.6.35: Fish-killing situation:

Besides wastes from Dhaka urban population the river receives untreated industrial wastes from urea fertilizer plants, textile mills and other industries. The principal polluting agent in the region is the Urea Fertiliser Factory of Ghorasal and the concentration of ammonia dissolved in water has increased over time causing fish-kills.

3.6.36: Sinking water vehicle:

Sometimes water vehicles sank into the river chest cause of various type accidents. Clash each other vehicle, driver' sleeping in a movable time, signal mishearing, disobey or showing, fitness less trawler boats, launch and ships etc are the common features of the sinking water vehicles in the Shitalakhya river. Life and wealth are ended up. It creates also pollution in the river because of these sinking.

From the spot, Kaliganj Thana officer-in-charge Tarikul Islam told specifically, it is not known how many passengers were on board the trawler. Of them, locals rescued 26 staff of 'Pran group'.

3.6.37: Pollution by some khals:

There are several different types of industries like textiles and dyeing, paper and pulp, jute, pharmaceuticals, fertilizers, etc of moderate to big size and several urban developments along the entire stretch of the river. These establishments contribute to the pollution load to the Sitalakhya river directly or through a number of wastewater khals (canals) like DND drainage khal, Majheepara khal, Killarpul khal, Kalibazar khal, Tanbazar khal, etc.

No	Name of Some Khals	Name of District
1	DND khal	Narayangonj
2	Majeepara khal	Narayangonj
3	Killarpul khal	Narayangonj
4	Kali Bazar Khal	Narayangonj
5	Tan Bazar khal	Narayangonj
6	BK Road khal	Narayangonj

Table-3.8: Surrounding Khals of Shitalakhya river.

Domestic and industrial wastewater from Dhaka city through Norai khal and from the Tongi industrial area through Tongi khal are disposed of in the river Balu. This also contributes to the pollution load to the river Sitalakhya.

3.6.38: Mushrooming mill-factories and industries:

The mighty Shitalakhya River, which had once used as one of the major route of product transportations. Unfortunately, the river now on the target of corporate sectors who are grabbing the area of its and has been polluting in many ways in everyday.

No	Name of Some Industry	Name of District
1.	Pran Co. Ltd.-2	Narsingdi
2.	RFL	Narsingdi
3.	Janata Jute Mill	Narsingdi
4.	Palash Urea Fertilizer	Narsingdi
5.	Ghorashal Power Station	Narsingdi
6.	Ghorashal Urea Fertilizer	Narsingdi
7.	Co-Oerative Jute Mill	Narsingdi
8.	Bangla Jute Mill	Narsingdi
9.	Pran Co. Ltd.-1	Narsingdi
10.	Seven Rings Cement	Gazipur
11.	Capital Paper Mill	Narsingdi
12.	Purbachal Paper Mill	Narayangonj
13.	Ananta Paper Mill	Narayangonj
14.	Lina Paper Mill	Narayangonj
15.	SWTP Intake	Narayangonj
16.	Sonali Paper Mill	Narayangonj
17.	Bengal Paper Mill	Narayangonj
18.	Bangladesh Paper Mill	Narayangonj
19.	Dhaka Paper Mill	Narayangonj
20.	Shiddirgonj Power Station	Narayangonj

Table-3.9: Large industries on the bank of Shitalakhya.

Now, it turns out as garbage of industrial wastes which causes the severe damage in the biodiversity of the river. Recently, Ministry of Shipping listed around 70 small and medium business organisations and some individuals, which are involved in polluting and encroaching the land of the river. Among the polluters, Kanchpur Deying, Akij, BEXIMCO, ACI, Sinha and City group are on the list.

The industrial units such as chemicals, fertilizer, pesticides, textile, oil, PowerStation, ship repairing dock, cement and tannery are located in and around the Sitalakhya River (DoE, 1991)

3.6.39: Density of Populations:

Sitalakhya River is a stream in the country of Bangladesh with an average elevation of 3meter above sea level. The area is very densely populated with 2,705 people per km². The nearest town larger than 50,000 inhabitants takes about 2:04 hour by local transportation. Outside transportations from Various Godara Ghats water of Shitalakhya, water vehicle moves with thousands of people.

3.6.40: Chance of Earthquakes and Cyclones:

Sitalakhya River can have strong (vi) earthquakes (on average one every 50 years), with occurrences at 5-6 Richter. When a strong earthquake occurs, it will most likely be felt by everybody; people may be frightened and run outdoors, walk unsteadily. Windows, dishes, glassware may be broken, books fall off shelves. The damage will be slight. There is a medium-low occurrence of periods with extreme drought. Flooding risk is extremely high. There is a low chance of cyclones hitting Sitalakhya River.

3.6.41: Contamination and pollution of surface and ground water

Water Resources:

Water pollution is a serious environmental concern in the country emanating from industrial discharges, municipal wastes, agrochemicals, salinity intrusion and arsenic contamination. Pollution does not only compromise water quality but also affects health by accumulation of toxic substances in the food chain. Degradation of water quality worsens during dry the dry season where as during the monsoon remains with tolerable limits.

3.7.42: Land degradation:

Land degradation is a serious problem for Bangladesh because loss of topsoil through water erosion, river bank erosion, declining land productivity and gradual shift towards negative nutrient balance in the soil and mining or quarrying for extraction of stones, clay and sand. The food security, life and livelihoods of the marginal section of society are going to be further challenged due to land degradation exacerbated by climate change. Impacts of climate change on land are multifaceted. Impacts of land degradation include reduced soil productivity, loss of arable land, food insecurity, loss of ecosystems, goods and services and migration of population. The bank side of river Shitalakhya is degrading slowly.

3.6.43: Fund crisis:

For the durable Shitalakhya river it is urgent to ensure strong collection or fund nationally and internationally. Shortage of funds, impair the materialization of the long-term visions and commitments. Although the FD is intended to function with a long-term vision, it cannot be maintained, mostly due to non-commitment of funds. Concern authority does not give the extra care and importance if Burigonga is dead almost.

3.6.44: River bank erosion:

Riverbank erosion is a perennial problem in Bangladesh. This particular problem imposes significant social hardship due to the loss of homesteads and agricultural land. A majority of the rivers are now under threat from encroaching and illegal dredging.

3.6.45: Land degradation and loss of soil quality:

Land is a scarce resource in the country and there are conflicts from sectoral use and demand apart from unauthorized grabbing. Land zoning & proper land use planning is considered an utmost necessity. Land use in the country is diverse and often conflicting: it is intensively used for agriculture, settlements, and forests, shrimp hers, natural fisheries, salt production, industrial and infrastructural developments and tourism.

3.6.46: Pollution:

Pollution issues are most acute in urban and industrial areas. Concentration of people in urban growth centers simultaneously increase the concentration of domestic and industrial activities that lead to pollution problems. The major pollutant concern for rural areas is the runoff of agrochemicals from agricultural fields, which deteriorates water quality, primarily impacting the fisheries sector.

3.6.46.1: Types of Pollution:

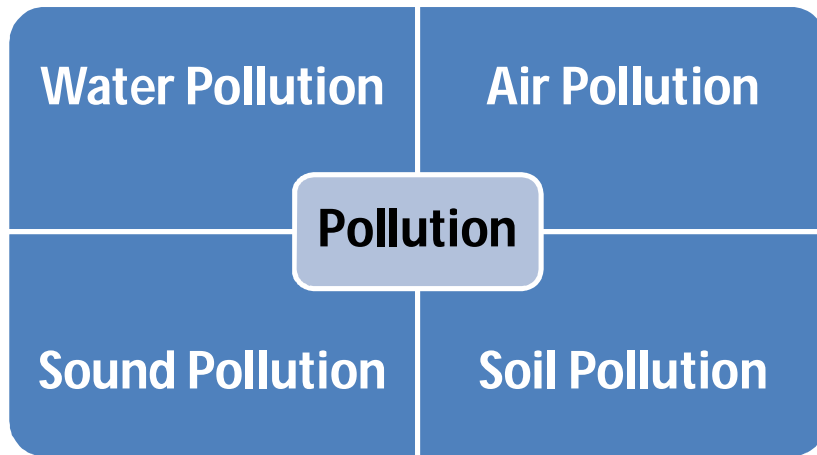


Table-3.10: Types of Pollution

3.6.46.2: Water pollution:

Water pollution is mostly concentrated in urban growth centers and industrial belts. Pollutants from municipal, industrial and agricultural waste enter into the inland water systems due to lack of compliance, inadequate regulatory measures and no institutional systems for proper monitoring and control. Major causes of pollution that aggravate water quality are industrial effluents, agrochemical, fecal pollution, spillage, and low water flow in dry season. (ECAs) are in very poor condition, especially in the dry season when dilution of contaminants is drastically reduced. For some months in dry season, dissolved oxygen (DO) become completely void in these rivers. It appears that surface water quality clearly varies in a spatio-temporal context. The findings of the DoE monitoring study presented in Tables 3.11 and 3.12 provide a comparative picture.

Name of River	DO (mg/l)	BOD (mg/l)	COD (mg/l)	TOS (mg/l)	Chloride (mg/l)	pH
Buriganga	0.5	26	76	554	26	7.4
Shitalakhya	3.8	9	-	223	11	7.2
Balu	0	29	-	883	33	7.5
Turag	0	29	-	906	37	7.6
Rupsha	5	0.9	66	5250	3227	7.6
Mathavanga	3.6	70	1076	344	101	7.6
Halda	6.7	1	6	255	68	7.3

Table-3.11: Dry season (Nov-May) Water Quality of Selected Rivers for 2010

Source: Compilation of surface water quality monitoring results of DOE divisional labs.

Trace Element	Location	Season			
		2010	2011	2012	2013
Lead	Narayanganj	20.27	22.60	<17.96(DL)	<17.96 (DL)
	Khanpur	20.27	<17.96(DL)	<17.96(DL)	<17.96(DL)
	Adamjee	20.27	22.60	<17.96(DL)	<17.96(DL)
	Kanchpur	20.27	22.60	<17.96(DL)	<17.96(DL)
	Demra	<17.96(DL)	<17.96(DL)	<17.96(DL)	<17.96(DL)
Cadmium	Narayanganj	<3.00(DL)	<3.00(DL)	<3.00(DL)	<3.00(DL)
	Khanpur	<3.00(DL)	3.17	<3.00(DL)	<3.00(DL)
	Adamjee	<3.00(DL)	<3.00(DL)	<3.00(DL)	<3.00(DL)
	Kanchpur	<3.00(DL)	<3.00(DL)	<3.00(DL)	<3.00(DL)
	Demra	<3.00(DL)	3.72	<3.00(DL)	<3.00(DL)
Cobalt	Narayanganj	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Khanpur	<4.05(DL)	<4.05(DL)	7.91	<4.05(DL)
	Adamjee	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Kanchpur	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Demra	<4.05(DL)	<4.05(DL)	6.32	<4.05(DL)
Nickel	Narayanganj	<10.66(DL)	<10.66(DL)	<10.66(DL)	<10.66(DL)
	Khanpur	<10.66(DL)	<10.66(DL)	23.84	<10.66(DL)
	Adamjee	<10.66(DL)	<10.66(DL)	<10.66(DL)	<10.66(DL)
	Kanchpur	<10.66(DL)	<10.66(DL)	12.71(DL)	<10.66(DL)
	Demra	<10.66(DL)	<10.66(DL)	15.10(DL)	<10.66(DL)
Chromium	Narayanganj	<4.05(DL)	9.25	<4.05(DL)	<4.05(DL)
	Khanpur	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Adamjee	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Kanchpur	9.57	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Demra	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)

Table-3.12: Concentration of toxic metals in the sitalakhya river water at different sampling sites in different month of the year

3.6.47: Other problems:

Without above problems, there are some problems of Shitalakhya River which are embankment on river, catching with current net, lack of dissolved Oxygen, lack of consciousness for protecting and saving Shitalakhya River, disobey the laws etc.

Chapter 4

4: Data collection and Data Analysis:

Data collection and data analysis is most part of any research or study. The success of the study fully depends on data collection in good process and then it is need to analysis or explain.

4.1: Data collection:

Data collection is a field level collecting material which is very essential for any kind of study or research. It is a practical task to improve and develop my research content. It will be done two categories: one is data collection and other is collected data analysis. It is mainly quantitative and informative dependent. The Shitalakhya river is 110 km long and 300 m wide. Most of the river and its surrounding people is not possible to survey and questionnaire assessment. For this reason, I have to collect case study and questionnaire from definite and marking places from all category type people.

I have made two kinds of questionnaire for my survey. One is Questionnaire of Survey Part- A (For general people: boatman, passenger, bank livelihood etc) and another is Questionnaire of Survey Part- B (For Specialist, Media man, journalist, local leader, other professional). I have taken opinion, think and concern from various people observing their age, educational quality, status of society, and their direct or indirect experience about Shitalakhya by those two parts questionnaire.

The downstream portion of the Sitalakhya river from Ghorasal highway bridge to confluence with Dhaleswari river was selected as the study reach to assess the existing case study and survey with two sets of questionnaires.

4.1.1: Survey Location:

The survey of two questionnaires was collected and analyzed from twelve sampling locations along the Sitalakhya river as shown in Fig.15 (Surveyed Location:1to12). It is starting from Ghorasal Bridge, then respectively Kaliganj Town, Kanchan Bridge, Rupganj Ferry Ghat, Paragoan Village, Tarabo, SWTP Intake, Siddirganj, Narayangonj 5 no Ghat and at last to Shah Cement Factory. Besides these pacific locations, I have surveyed on some people who know specially about the river Shitalakhya.

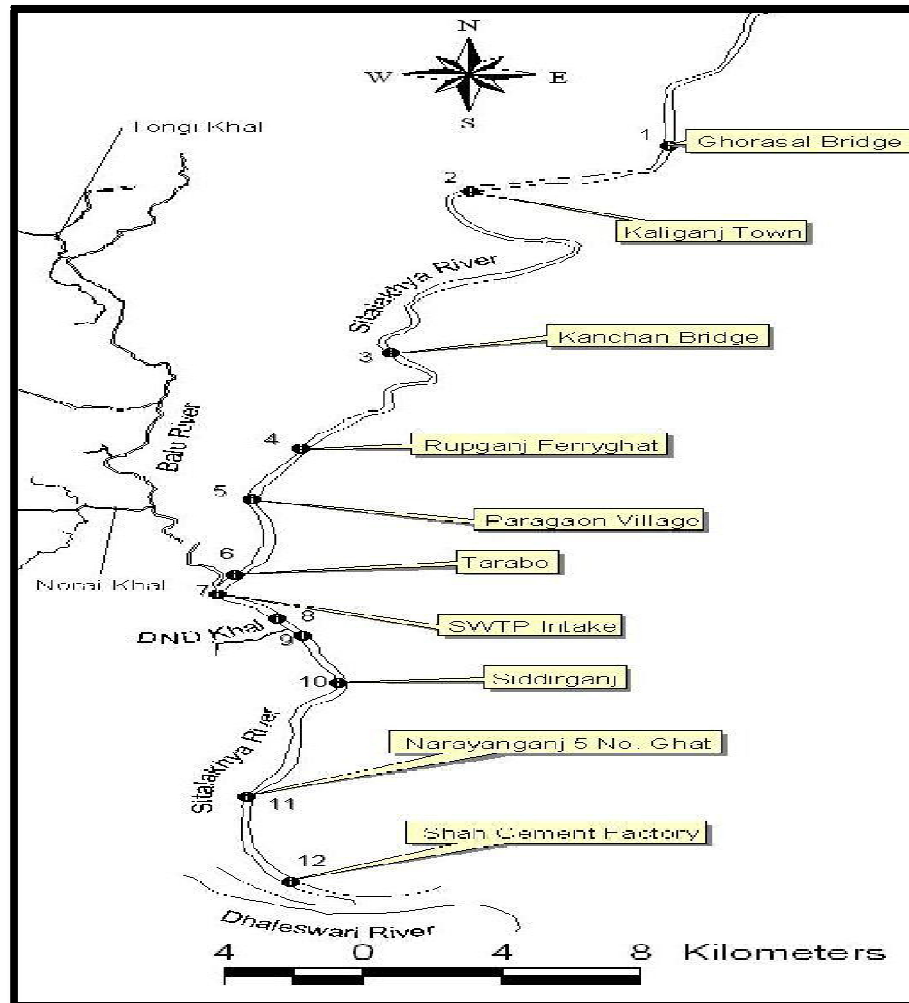


Fig-4.1: Location map of questionnaire survey and case study on Shitalakhya river.

4.1.2: Questions of Questionnaire Part-A:

Part-A

(For general people: boatman, passenger, bank livelihood..)

Q: 1) What is main problem of Shitalakhya River's pollution?

Sl	Option	Percentage (%)
a	Industrial excreta	72.5%
b	Man throwing waste	17.5%
c	Burn oil, fuel and garbage from vehicle	7.5%
d	Aquatic rot	2.5%
Total		100%

Table-4.1: Survey on question no-1 from Part-A

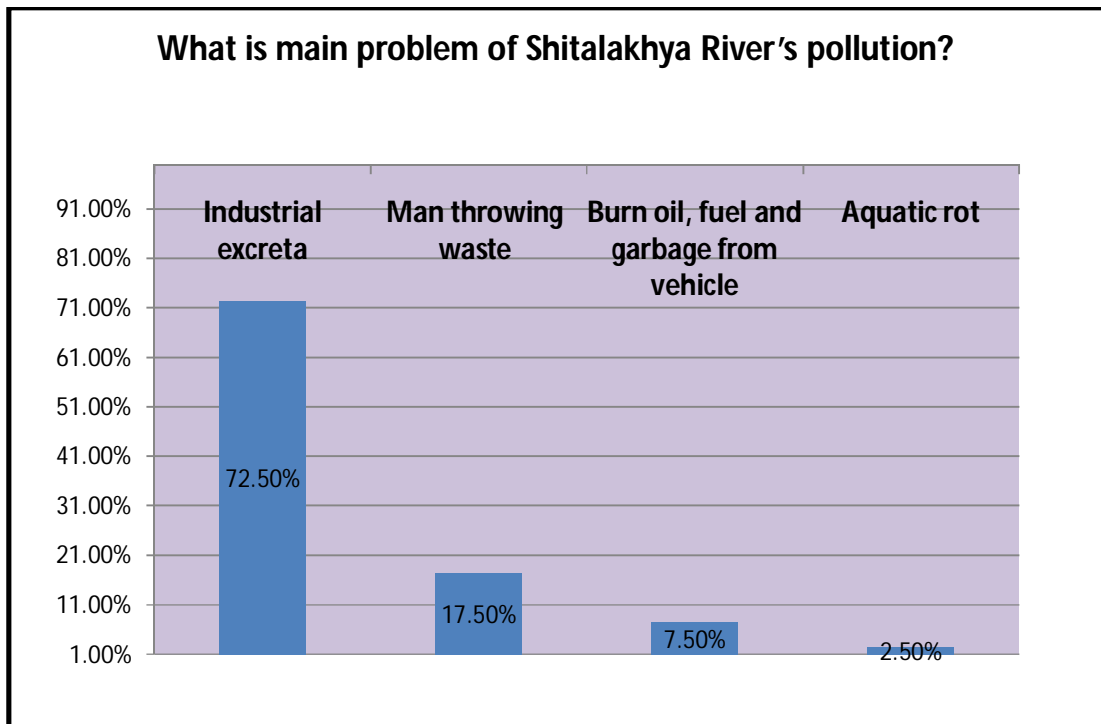


Figure-4.2: Column chart of Survey on question no-1 from Part-A.

Q: 2) What is serious threat for the Shitalakhya?

Sl	Option	Percentage (%)
a	Public unconsciousness	5%
b	Illegal Sand lifting	7.5%
c	Industrial chemicals	47.5%
d	Bank erosion	5%
e	Forlornness of authority	35%
Total		100%

Table-4.2: Survey on question no-2 from Part-A

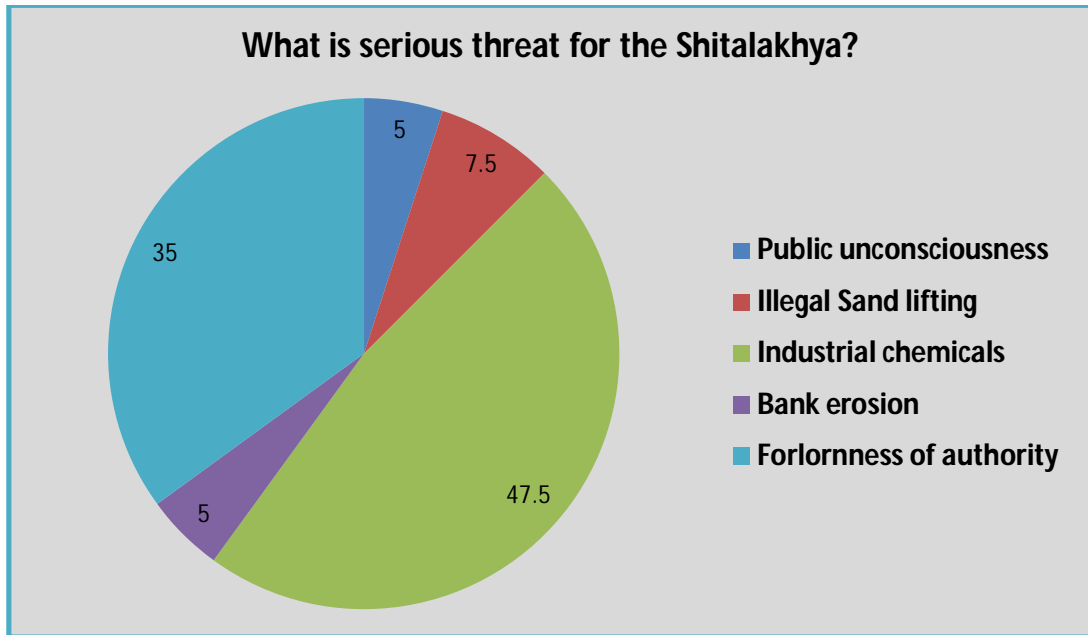


Figure-4.3: Pie chart of Survey on question no-2 from Part-A

Q: 3) Who are liable more to fill up river bank?

Sl	Option	Percentage (%)
a	Some Govt. Officers	15%
b	Owners of mill-factories	20%
c	Local political leaders	55%
d	Housing companies	10%
Total		100%

Table-4.3: Survey on question no-3 from Part-A

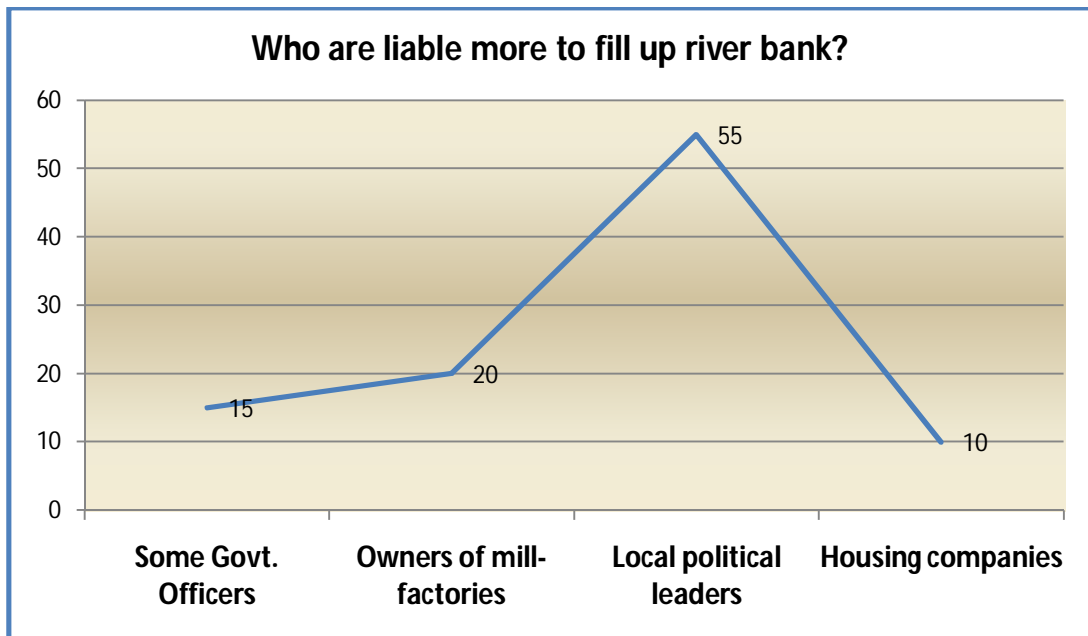


Figure-4.4: Line chart of Survey on question no-3 from Part-A

Q: 4) Do you think the trading and economical importance Shitalakhya River is decreasing or increasing?

Sl	Option	Percentage (%)
a	Increasing	75%
b	Decreasing	25%
Total		100%

Table-4.4: Survey on question no-4 from Part-A

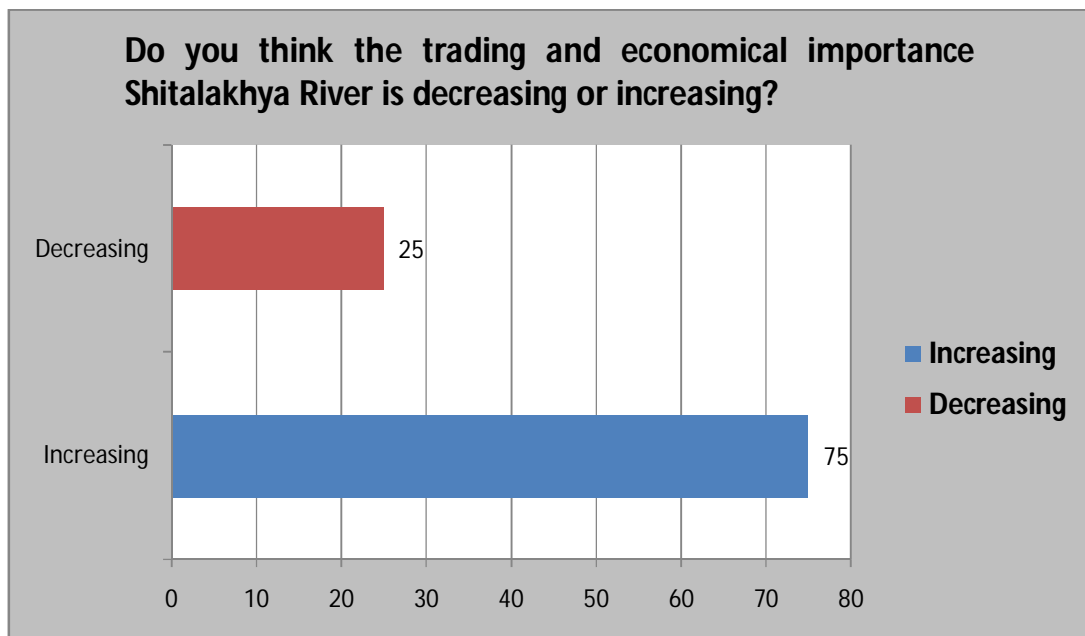


Figure-4.5: Bar chart of Survey on question no-4 from Part-A

Q:4.1) Along with the trading and economical importance Shitalakhya River's decreasing or increasing, is pollution of this river increasing or decreasing?

Sl	Option	Percentage (%)
a	Increasing	80%
b	Decreasing	20%
	Total	100%

Table-4.5: Survey on question no-4.1 from Part-A

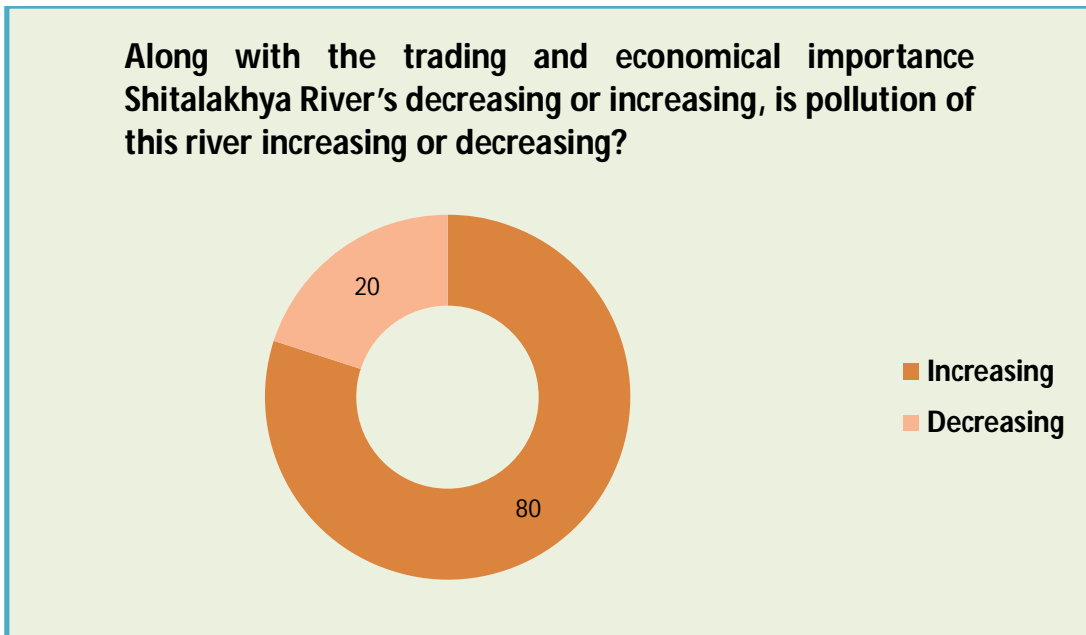


Figure-4.6: Doughnut chart of Survey on question no- 4.1 from Part-A

Q: 4.2) How the role playing of Govt. officials to reduce this type of pollution is?

Sl	Option	Percentage (%)
a	More	15%
b	Less	50%
c	Expected	25%
d	Least	10%
Total		100%

Table-4.6: Survey on question no-4.2 from Part-A

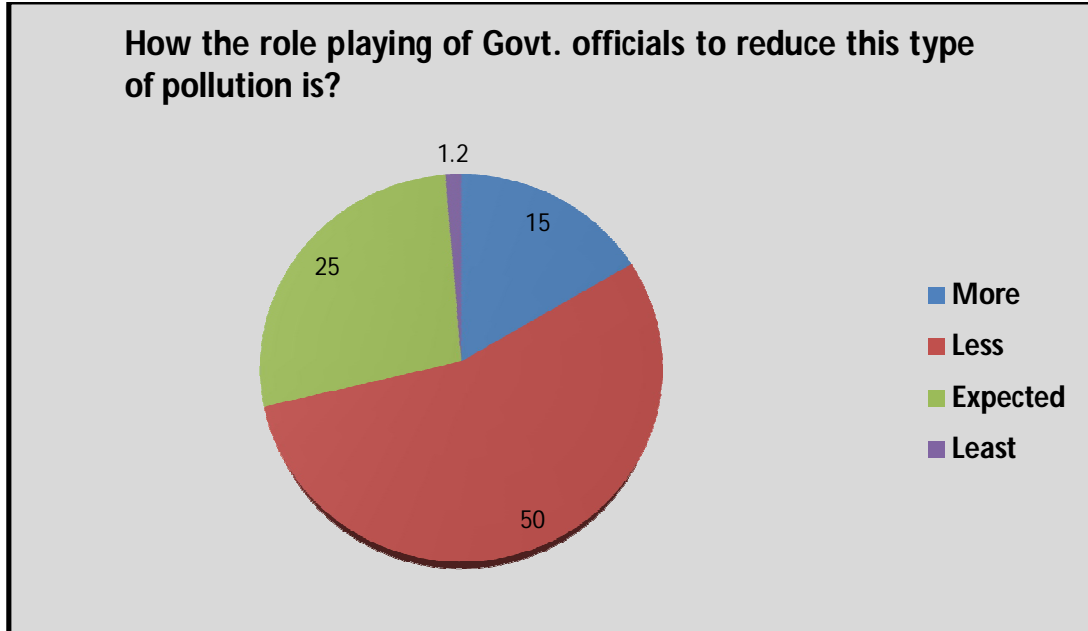


Figure-4.7: Pie chart of Survey on question no-4.2 from Part-A

Q: 5) Who can ensure Shitalakhya more as a clean, pollution free and durable river?

Sl	Option	Percentage (%)
a	Related govt. institutions	50%
b	Related non-govt. organizations	17.5%
c	Foreign donors	7.5%
d	Conscious mass people	25%
Total		100%

Table-4.7: Survey on question no-5 from Part-A

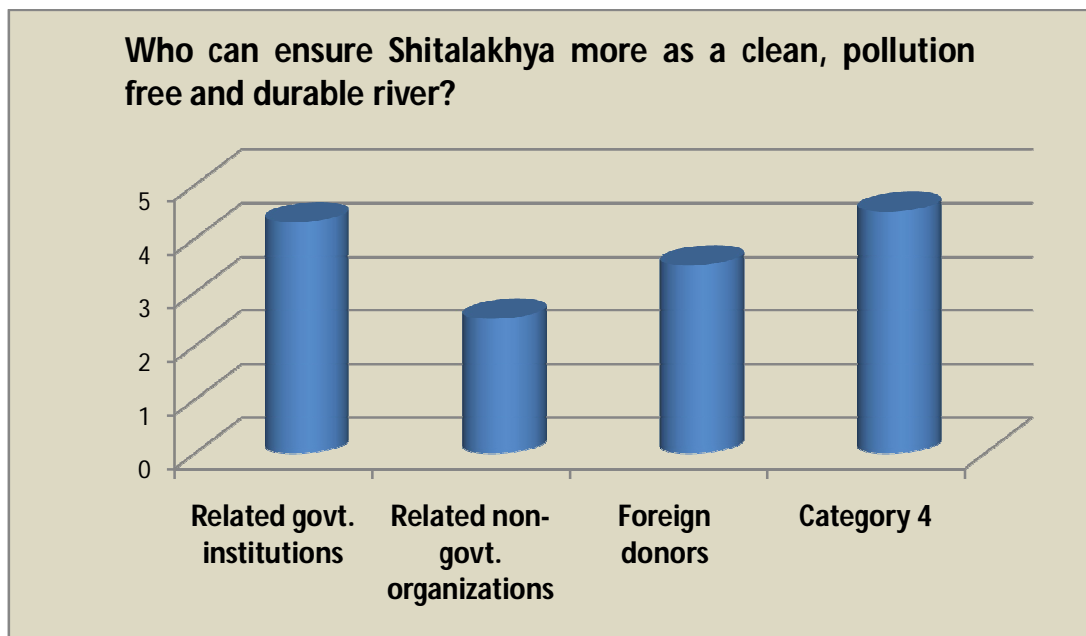


Figure-4.8: Column chart of Survey on question no-5 from Part-A

Q: 6) Do you think water of Shitalakhya is being lethal like Burigonga River?

Sl	Option	Percentage (%)
a	Yes	82.5%
b	No	17.5%
Total		100%

Table-4.8: Survey on question no-6 from Part-A

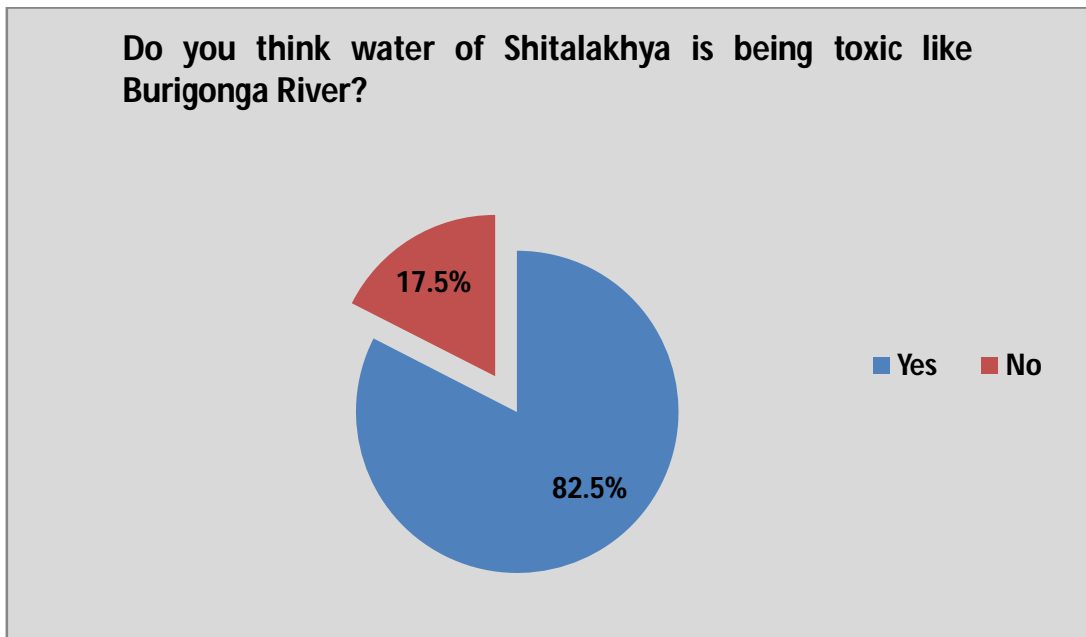


Figure-4.9: Pie chart of Survey on question no-6 from Part-A

Q: 7) Do you think mushrooming of residents, mills, factories, industries etc on the bank of river is the main factor Shitalakhya River?

Sl	Option	Percentage (%)
a	Yes	87.5%
b	No	12.5%
Total		100%

Table-4.9: Survey on question no-7 from Part-A

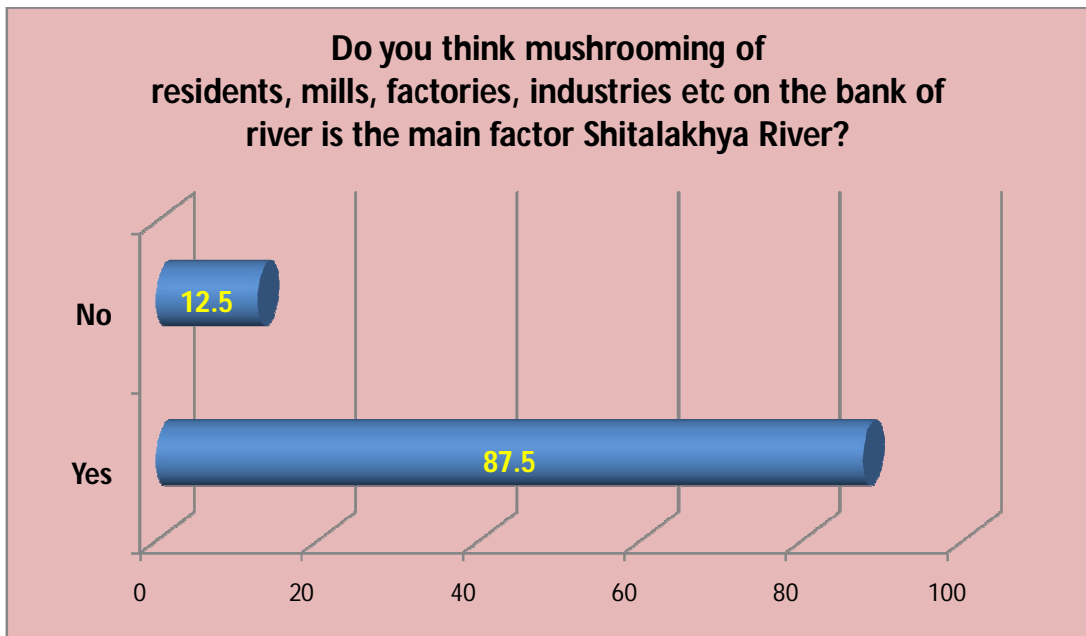


Figure-4.10: Bar chart of Survey on question no-7 from Part-A

Q: 8) How much is it essential to look after and monitor by concerned authority?

Sl	Option	Percentage (%)
a	More	75%
b	Much more	12.5%
c	Less	5%
d	Least	2.5%
e	No comment	5%
Total		100%

Table-4.10: Survey on question no-8 from Part-A

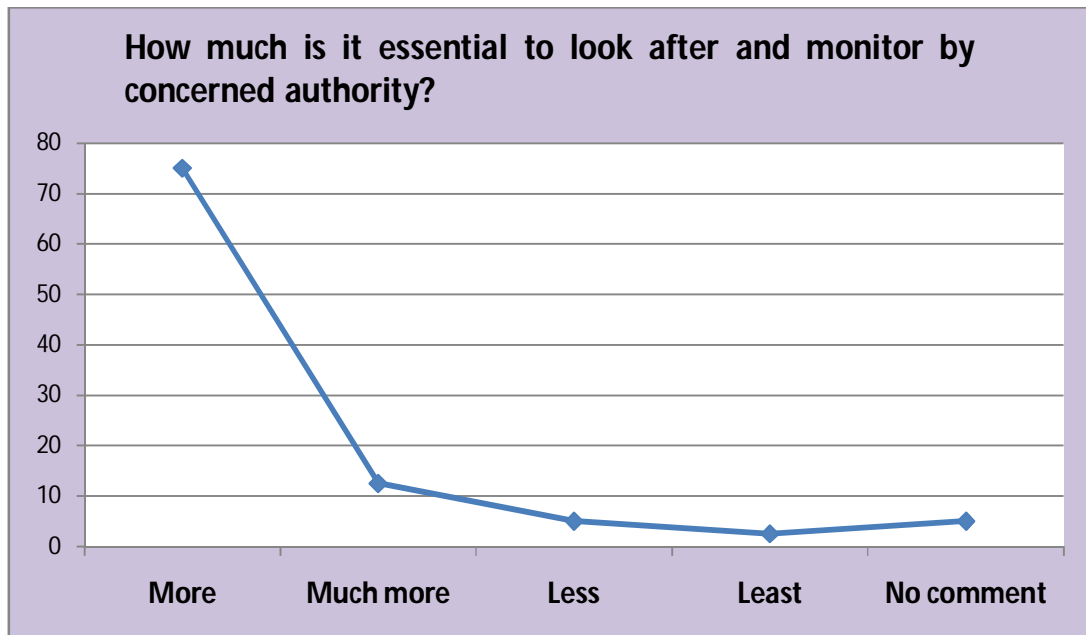


Figure-4.11: Line chart of Survey on question no-8 from Part-A

Q: 9) Which is important initiative to be taken as an advanced step?

Sl	Option	Percentage (%)
a	Increasing navigability	15%
b	Form river laws	40%
c	To stop emerging industrial waste	25%
d	To stop and free of Occupying river bank	17.5%
e	No comment	2.5%
Total		100%

Table-4.11: Survey on question no-9 from Part-A

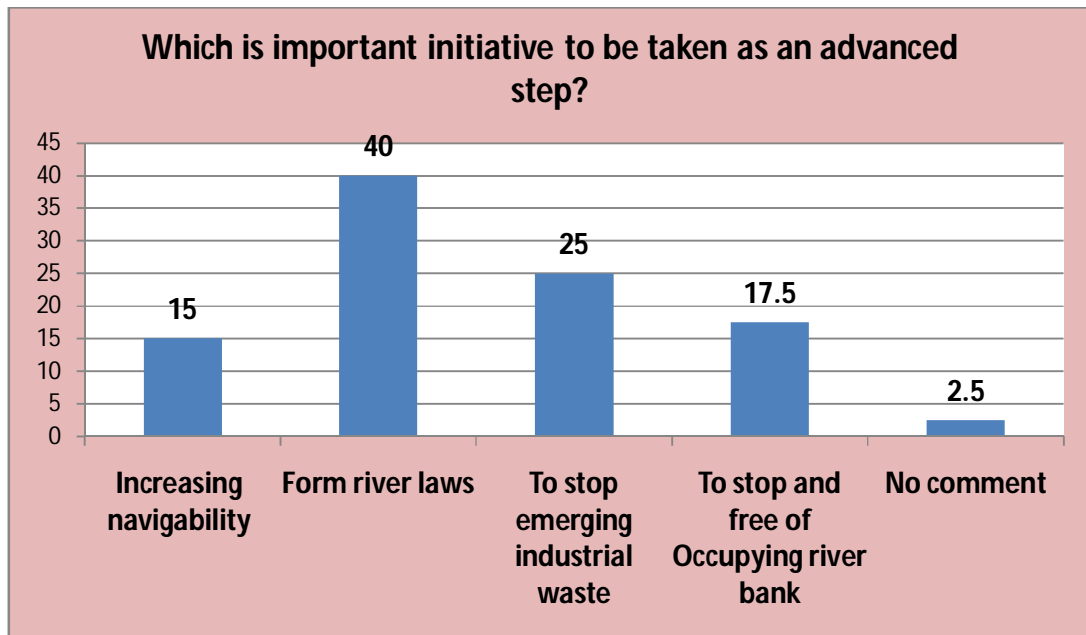


Figure-4.12: Column chart of Survey on question no-9 from Part-A

Q: 10) Does the water of Shitalakhya River still qualitative and purified?

Sl	Option	Percentage (%)
a	No	80%
b	Yes	12.5%
c	No comment	7.5%
Total		100%

Table-4.12: Survey on question no-10 from Part-A

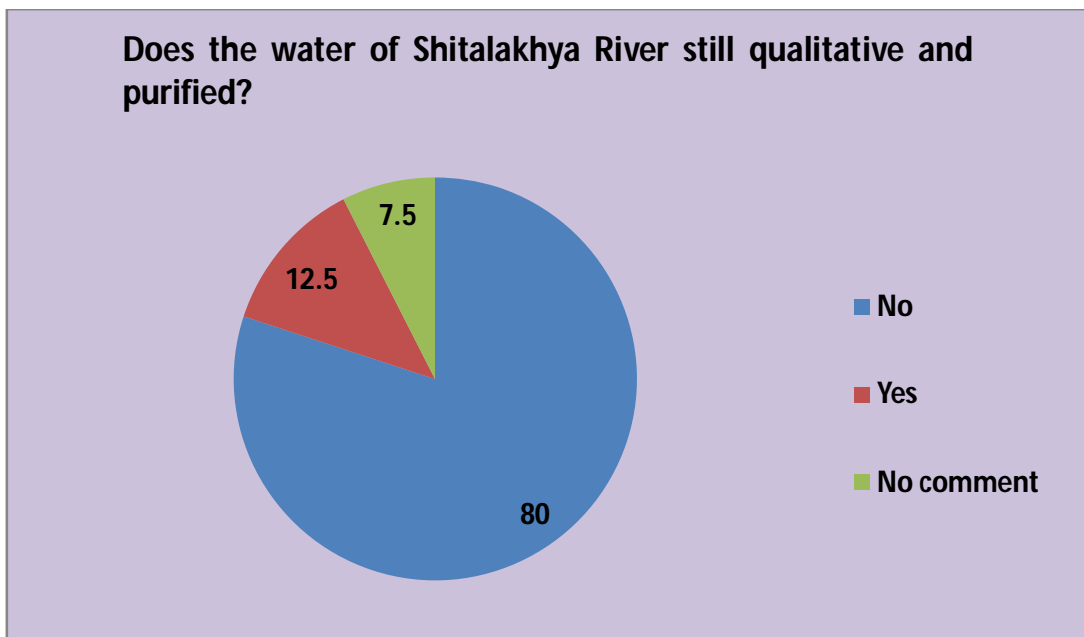


Figure-4.13: Pie chart of Survey on question no-10 from Part-A

4.1.3: Questions of Questionnaire Part-B:

Part-B

(For Specialist, Media man, journalist, local leader, other professional..)

Q:1) Why river are dying?

Sl	Option	Percentage (%)
a	Losing of navigability	5%
b	Increasing urbanization	30%
c	Indifference of authority	30%
d	River grabbers	35%
Total		100%

Table-4.13: Survey on question no-1 from Part-B

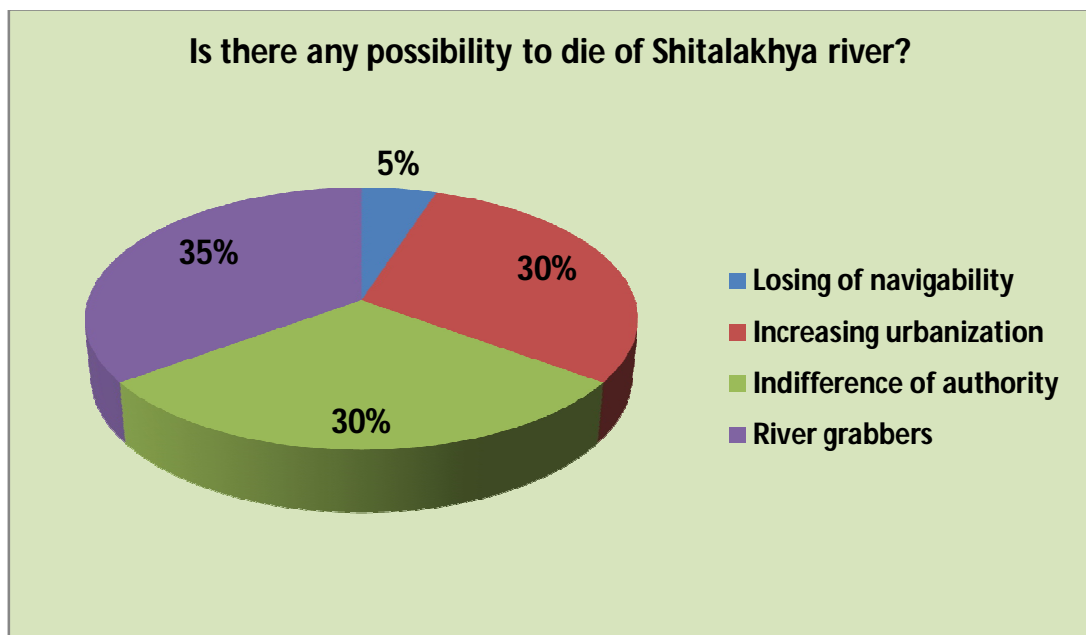


Figure-4.14: Pie chart of Survey on question no-1 from Part-B

Q:2) Is there any possibility to die of Shitalakhya river?

Sl	Option	Percentage (%)
a	Yes	80%
b	No	20%
Total		100%

Table-4.14: Survey on question no-2 from Part-B

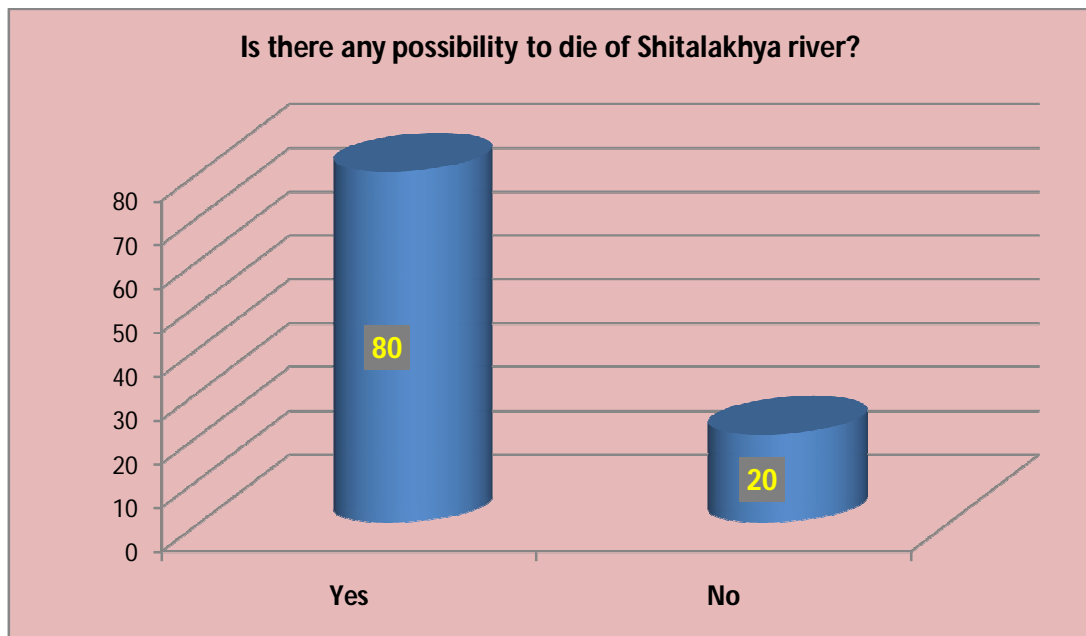


Figure-4.15: Column chart of Survey on question no-2 from Part-B

Q: 2.1) If yes, within how many years it is likely possible to die?

Sl	Option	Percentage (%)
a	100 years	10%
b	200 years	32.5%
c	300 years	42.5%
d	500 years	15%
Total		100%

Table-4.15: Survey on question no-2.1 from Part-B

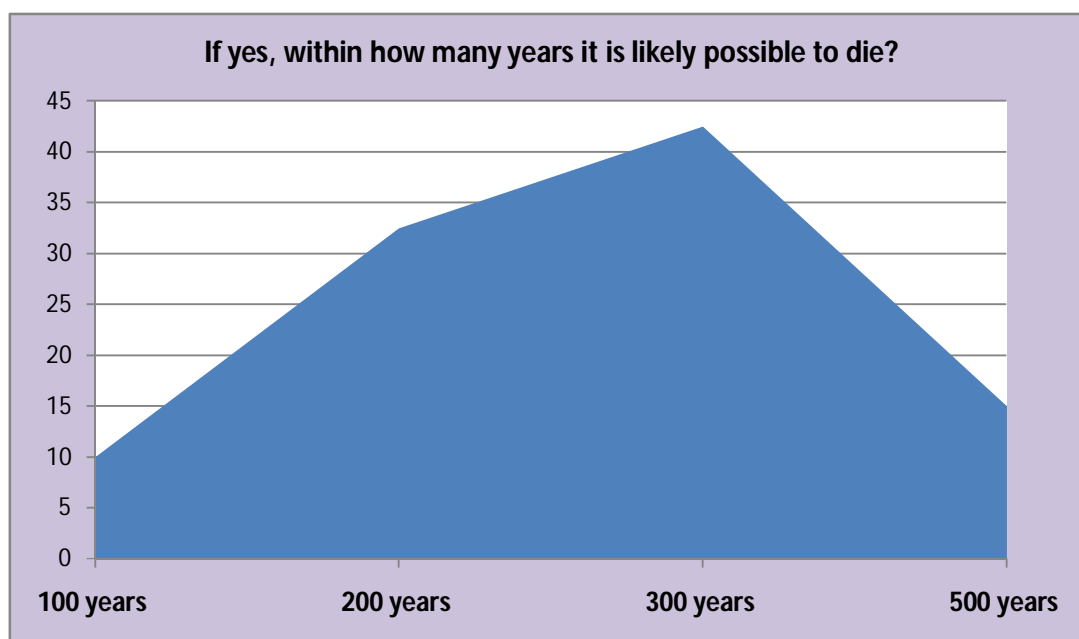


Figure-4.16: Area chart of Survey on question no-2.1 from Part-B

Q:3) Why Shitalakhya is more important in your opinion?

Sl	Option	Percentage (%)
a	Water Supplier	25%
b	Eco-balance	5%
c	Centre of trading	55%
d	Water transportation	15%
Total		100%

Table-4.16: Survey on question no-3 from Part-B.

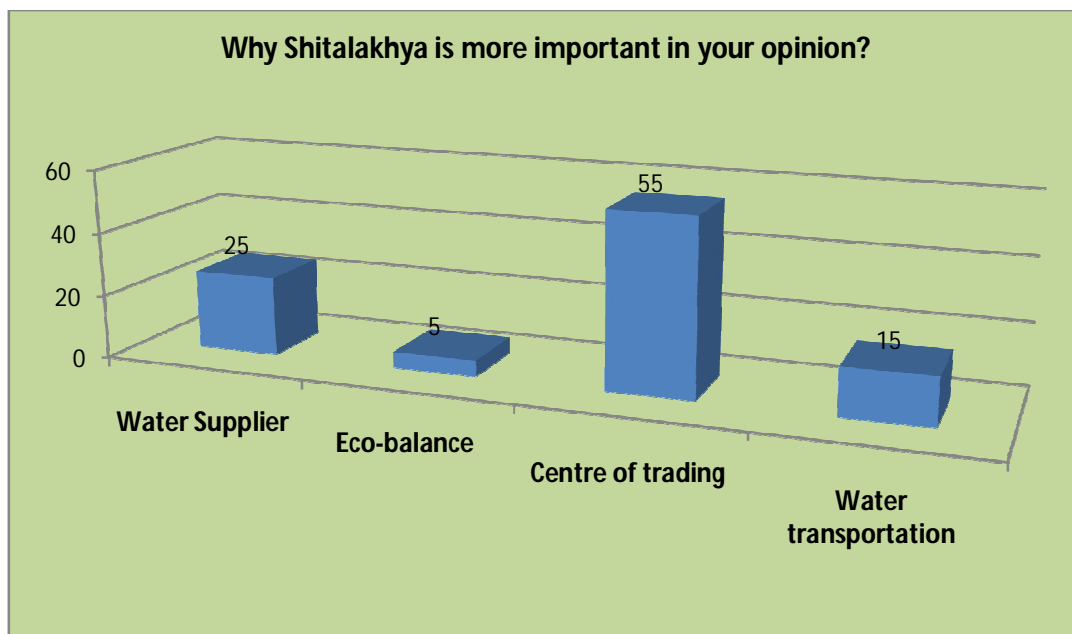


Figure-4.17: Column chart of Survey on question no-3 from Part-B.

Q:4) What initiative has to be taken to save Shitalakhya river?

Sl	Option	Percentage (%)
a	Properly dredging	7.5%
b	Laws for river protection	42.5%
c	Active river commission	17.5%
d	Stopping Pollution	32.5%
Total		100%

Table-4.17: Survey on question no-4 from Part-B

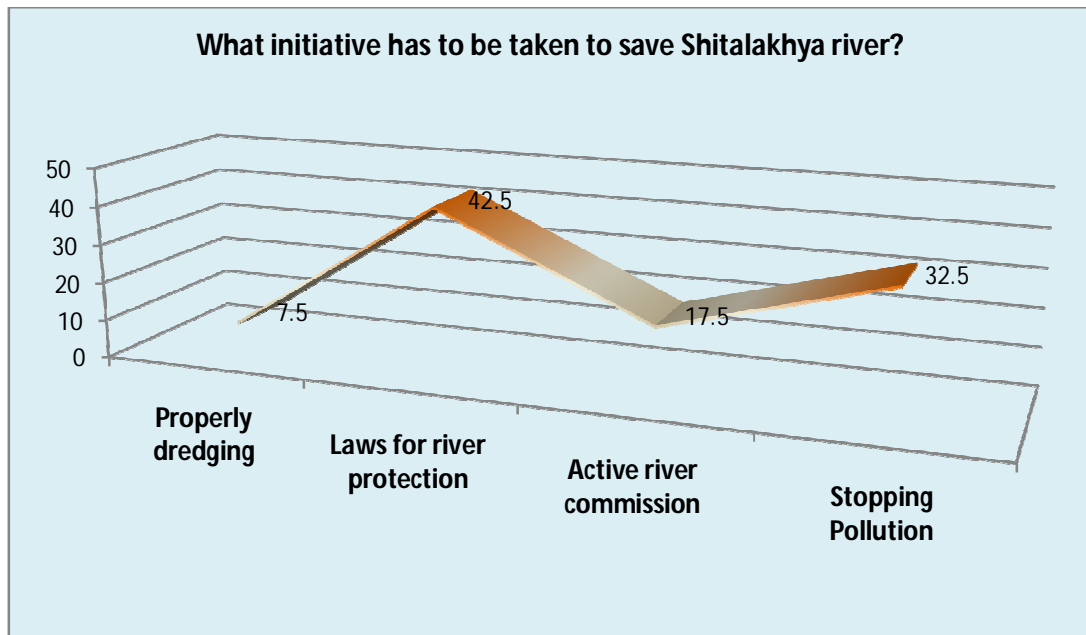


Figure-4.18: Line chart of Survey on question no-4 from Part-B

Q:5) Is Political Commitment necessary for saving Shitalakhya?

Sl	Option	Percentage (%)
a	Yes	82.5%
b	No	17.5%
Total		100%

Table-4.18: Survey on question no-5 from Part-B



Figure-4.19: Pie chart of Survey on question no-5 from Part-B

Q:6) Why the water of Shitalakhya is being turned untreatable?

Sl	Option	Percentage (%)
a	Industrial Waste	72.5%
b	Lack of dissolved Oxygen	12.5%
c	Lack of Iron	7.5%
d	Increasing alkalinity	7.5%
Total		100%

Table-4.19: Survey on question no-6 from Part-B

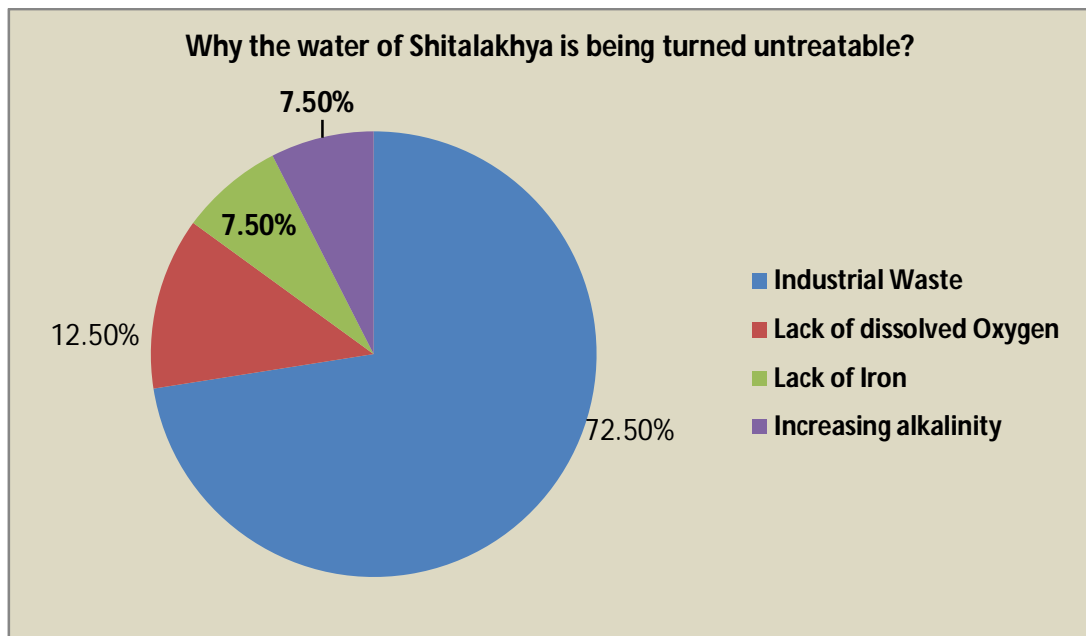


Figure-4.20: Pie chart of Survey on question no-6 from Part-B

Q:7) Who are responsible more to dredge sand illegally?

Sl	Option	Percentage (%)
a	Sand traders	10%
b	Some local Politicians	65%
c	Housing companies	12.5%
d	Sand contractors	5%
e	No comment	7.5%
Total		100%

Table-4.20: Survey on question no-7 from Part-B

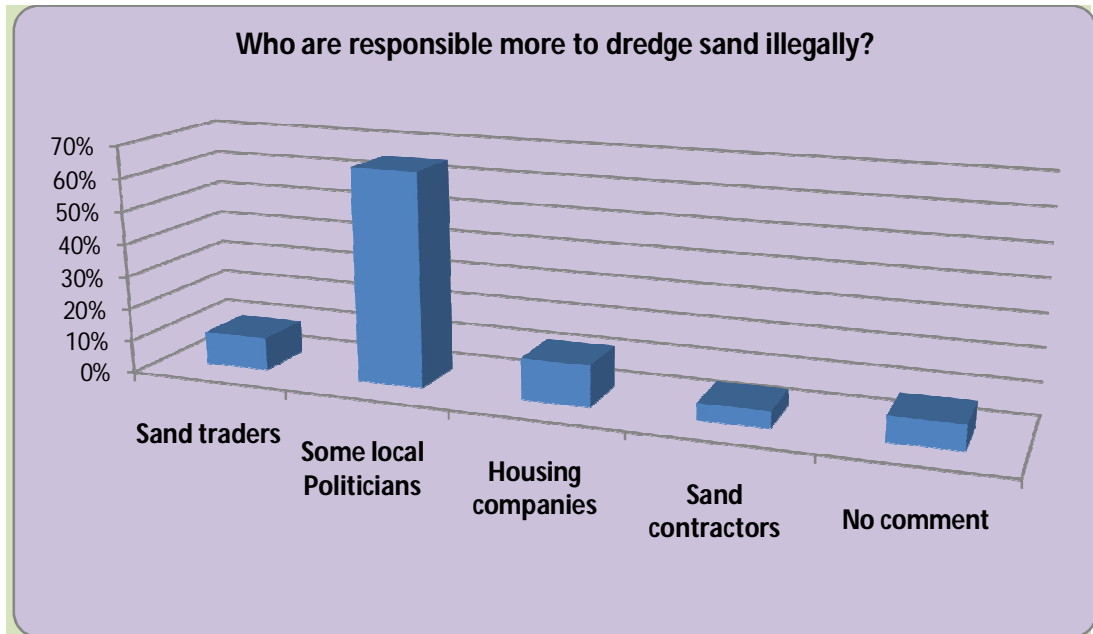


Figure-4.21: Column chart of Survey on question no-7 from Part-B.

Q: 8) What type of pollution is very common to the Shitalakhya River?

Sl	Option	Percentage (%)
a	Water Pollution	75%
b	Thermal Pollution	7.5%
c	Soil Pollution	7.5%
d	Bank erosion	10%
Total		100%

Table-4.21: Survey on question no-8 from Part-B

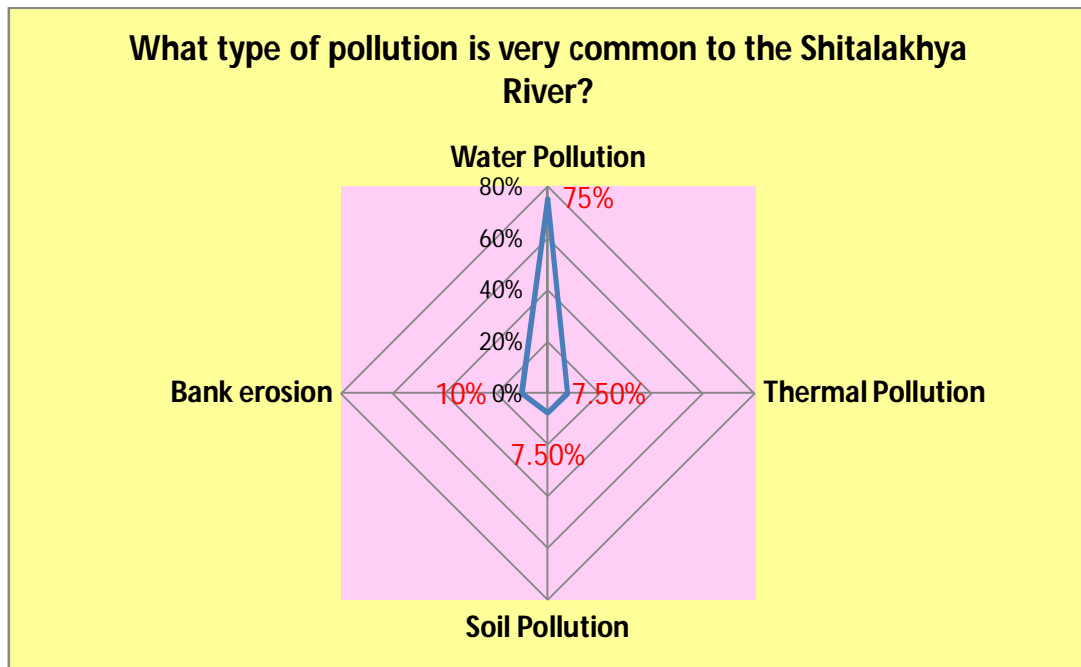


Figure-4.22: Radar chart of Survey on question no-8 from Part-B.

Q: 9) Who are directly sufferers by stinky water of this river?

Sl	Option	Percentage (%)
a	City dwellers	55%
b	People of mills-factories	12.5%
c	Its bank people	20%
d	Its aquatics	12.5%
Total		100%

Table-4.22: Survey on question no-9 from Part-B

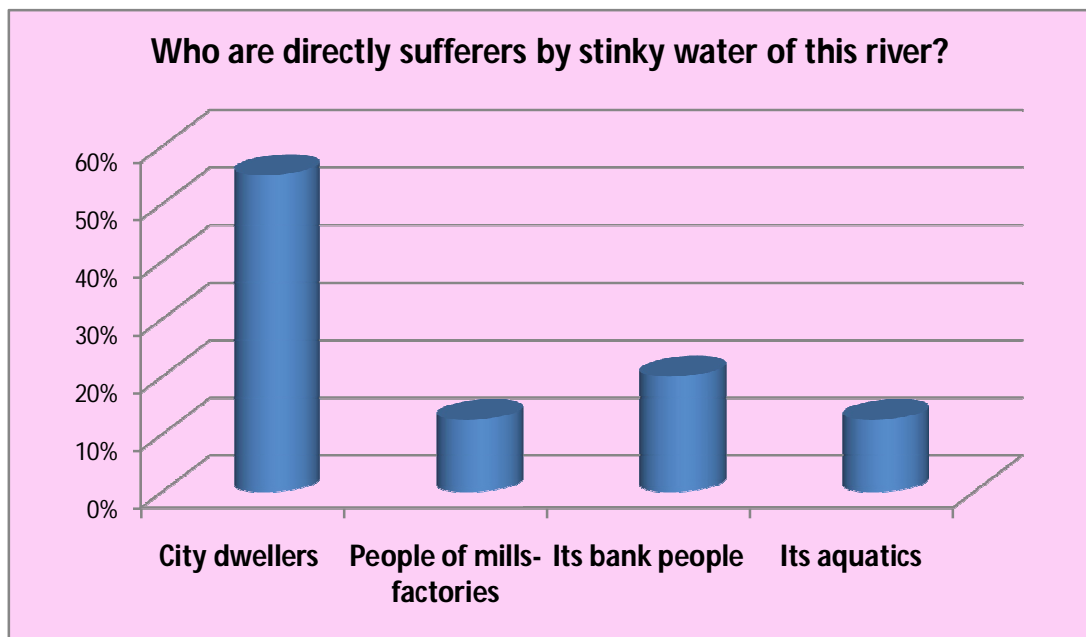


Figure-4.23: Column chart of Survey on question no-9 from Part-B.

Q: 10) How is the role of NGO on this river?

Sl	Option	Percentage (%)
a	Adequate	17.5%
b	Excess	5%
c	Inadequate	62.5%
d	Expected	12.5%
e	No comment	2.5%
Total		100%

Table-4.23: Survey on question no-10 from Part-B

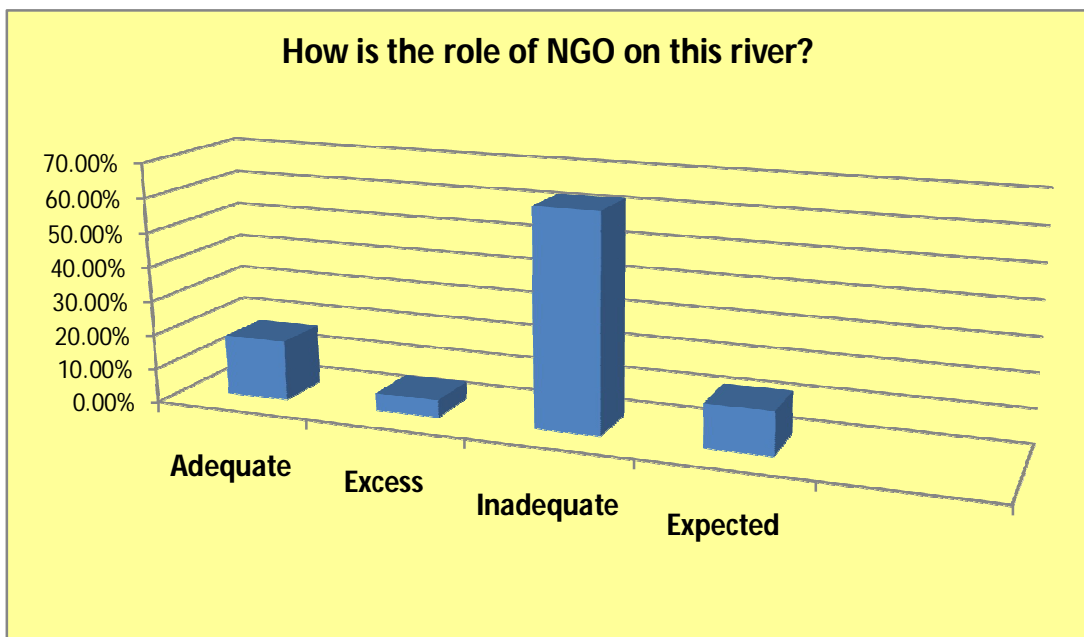


Figure-4.24: Column chart of Survey on question no-10 from Part-B.

Q: 10.1) How is the role of Govt. institutes on this river?

Sl	Option	Percentage (%)
a	Adequate	7.5%
b	Excess	2.5%
c	Inadequate	65%
d	Expected	17.5%
e	No comment	7.5%
Total		100%

Table-4.24: Survey on question no-10.1 from Part-B

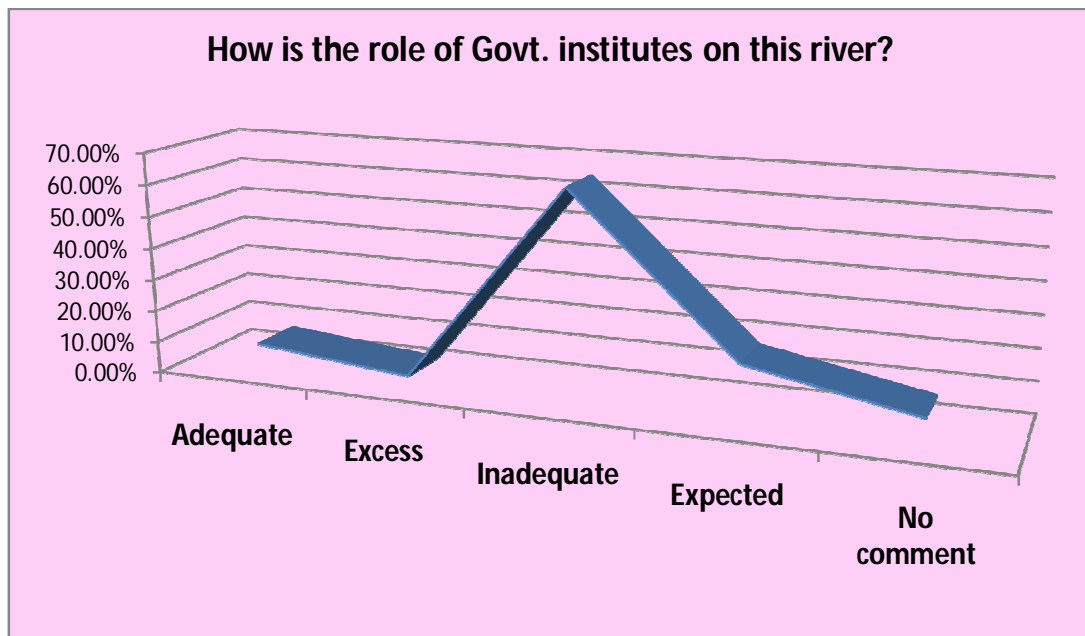


Figure-4.25: Line chart of Survey on question no-10.1 from Part-B.

Q:11) How quantity of river crime in Shitalakhya is?

Sl	Option	Percentage (%)
a	Less	7.5%
b	More	12.5%
c	Controlled	12.5%
d	Uncontrolled	62.5%
e	No comment	5%
Total		100%

Table-4.25: Survey on question no-11 from Part-B.

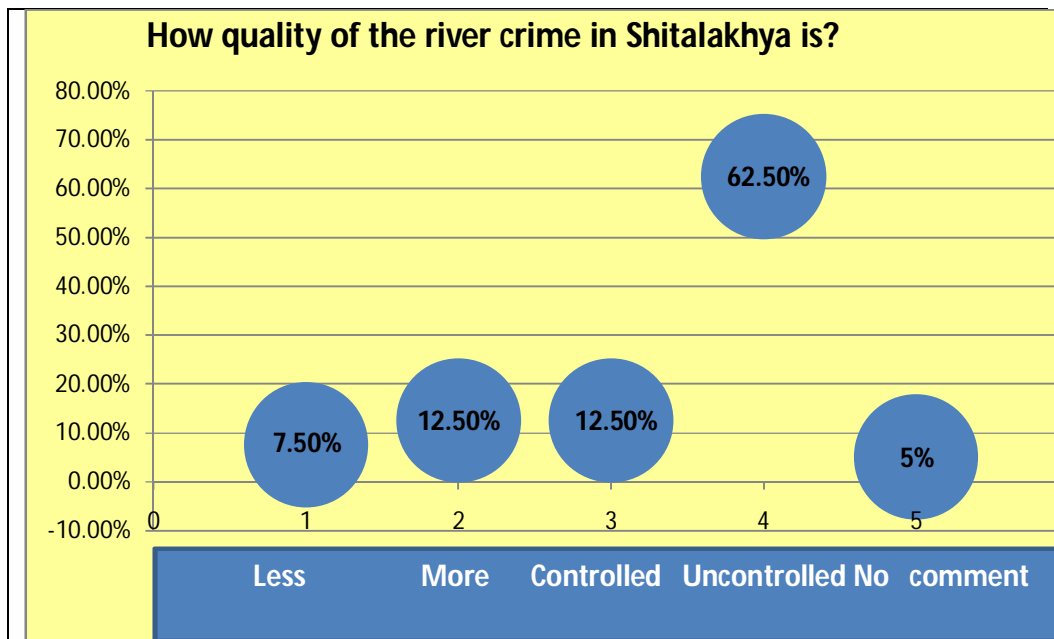


Figure-4.26: Bubble chart of Survey on question no-11 from Part-B.

Q: 12) What will be the future possibility of Shitalakhya River if properly take care of?

Sl	Option	Percentage (%)
a	Clean Water Supplier	50%
b	Green River Project	15%
c	Water Safe Transportation	20%
d	Abundance of Aquatic Resources	12.5%
e	No comment	2.5%
Total		100%

Table-4.26: Survey on question no-12 from Part-B.



Figure-4.27: Radar chart of Survey on question no-12 from Part-B.

4.2: Data Analysis on Survey Questions (A+B):

There are three categories of data collections. They are two type questionnaires' survey data, formed data means data from concern authorities as primary data and case study. There are eighty several aged and professional persons who are the responders of my questionnaire survey. The best part of responders lives directly on the Shitalakhya river bank and its surroundings and some of them live outside of the river. Outsiders are observing group who has the clear concept and concern about the Shitalakhya river well. Two groups response their valuable and significant opinions and information that develop my study. They have tried their best to answer the questions frankly if somebody were hesitated bounded to answer some questions.

These questions are related to the occupying class, political person and governmental authorities. On the other hand, some have cordially answered the questions deliberately. In the consideration present view of Shitalakhya, there are many causes of polluting this river. But among of those, specific some vital causes are more predisposed for the Shitalakhya river such as industrial excreta, aquatic rot, vehicle's pollution and men throwing waste etc. Maximum answerer or repliers (72.5%) shows their opinion that industrial excreta is major problem for the river Shitalakhya and minimum answerer (2.5%) shows aquatic rot is major problem which is not man created. Another two options are also man created problems. Same looking is to be seen as serious threat for this river is industrial chemicals. Besides, forlornness of authority is second choice of the responders along with illegal sand lifting and bank erosion. Filling up many portions of Shitalakhya seen by indirectly involved some officials, owners of industries, local political leaders and housing companiesn etc. Above all fifty-five percent responders chose local political leaders involvement to fill up shitalakhya. All time they are under shelter of some influential national leaders. Economical interest and grouping are the factor for illegal job.

Trading and commercial importance of Shitalakhya (75%) and pollution of Shitalakhya (80%) are increasing in parallel way. 87.5% of survey people think mushrooming of residents, mills, factories, industries etc on the bank of river is the main factor endangering Shitalakhya river. According to 80% people think that the water of Shitalakhya river is not qualitative and purified right now. With same alarming like Burigonga, the water of Shitalakhya is being toxic according to 82.5%. 50% of responders have optioned that the role playing of govt. officials to reduce that type of pollution is less. Optimists of survey people (50%) said that related govt. organizations can ensure more as a clean, pollution free and durable Shitalakhya. Otherwise, it is much more essential to look after and monitor by concerned authority, opinioned by 75% responders. Majority (40%) supports that forming river laws should be is important initiative to be taken as an advanced step whereas minority (2.5%) does not agree to answer this question.

If forming river laws and implementation is ensured, other options like increasing navigability, to stop emerging industrial waste and to stop and free of occupying river bank will be ensured.

From part-b questionnaire was water and river specialist, journalist, local leaders and other professionals. There are some strategic asks in this part for the selected people. Indifference of authority, increasing urbanization and river grabbers are respectively come from 30%, 30% and 35% of answer givers for the question about river dying. Losing navigability option was 5%. Once there was flowing river Dholai khal on chest of Dhaka but today is no more. It is formed with bricks-sand layer. Is there any possibility to die of Shitalakhya? 80% of survey people answered 'yes' and there is a possibility may be within next 300 years by 42 out of 100, 200 years by 32.5% out of 100%. Shitalakhya is on danger zone so it may be possibility of that.

The Shitalakhya is more important as water supplier of 25% opinion, eco-balance of 5%, trade and commerce of 55% and water transportation of 15%. For the importance of trade and commerce, the river is under pressure always if there is no proper treating of industrialization.

From human illegal and unethical activities, it is urgent to save the Shitalakhya to follow proper dredging, river protection laws, active river commission and stopping pollution etc. 42% people of survey has ticked river protection laws option. It is essential political commitment for saving Shitalakhya by majority (82.5%) answer.

Water is the main element of any rivers. Rivers either live or dry-dye for only water or without water. The water is being turned untreatable cause of human activities. They are industrial waste (72.5%), Lack of dissolved oxygen (12.5%), lack of iron (7.5%) and increasing alkalinity (7.5%). The Shitalakhya is suffering for dredging sand illegally hither and thither. It creates imbalance underground of river. Sand traders, some political men, housing companies and sand contractors are usually benefited with river sand. But 65% of surveyed people think that local powerful political persons are involved in this activity.

Water pollution, thermal pollution, soil pollution and river bank pollution are common pollutions. 75% of people said, water pollution is very common to the Shitalakhya river. There are three power stations on the river bank of Shitalakhya. They are Gorashal power plant, Siddirgonj power plant and Adamjee power plant. Two urea fertilizer such as Palash Urea Fertilizer Factory and Ghorashal fertilizer Factory are also situated on bank of river along with some cement factories. These flow out thermal water into the river Shitalakhya. City dwellers, people of mill-factories, its bank people and its aquatics are directly suffered by stinky water of Shitalakhya. According to 55% surveyed people' opinion, city dwellers are directly suffered and affected with stinky water of Shitalakhya river.

The role of govt. institutions and NGOs for affected Shitalakhya river is not anticipative and hopeful. Maximum 65% and 62% of two questions support that their role on river is inadequate. PPP (public private partnership) attempt can be approached to the Shitalakhya so that it is not to face the condition of deadly Burigonga river.

There is no river like Shitalakhya as a river centralized occurring crime and terrorism. The Shitalakhya river is main river port and many multi-purpose industries are situated two sides of this river. Narayangonj city is very busy and run by the Shitalakhya river. City criminal activities are seen in this city by using Shitalakhy. Sometimes Shitalakhya is to face various type criminal activities. Smuggling, drug business and killing are common on the river banks. 62.5% of responders think that the crimes of the river Shitalakhya is uncontrolled. Taki killing and seven murders case are the best examples.

The future possibilities of Shitalakhya river are clean water supplier, green river project, water safe transportation and abundance of aquatic resources if properly take care of it. Among these fifty people out of hundred supports that the river Shitalakhya may be safe and clean water supplier for Dhaka and Narayangonj city. Although Saidabad water treatment plant fully depends on Shitalakhya, the water quality is not healthy.

4.2: Formed Data Collection along with Data Analysis:

Formed or formal data collection meant data from secondary source. Some important data is collected from recognized institutions like DoE, BIWTA, BUET, NGOs etc.

4.2.1: Selection of locations:

The significance of data analysis depends to a large extent on the sites of data collection. An ideal data collection should be one which is both valid and representative. These conditions are met by collection of data and survey through a process of appropriate location selection. This ensures that the composition of survey is identical to that of the people from which it is collected and survey shares the same discussion and characteristic with the survey at the time and site of information. The locations of survey of problems, probabilities and all side influence of the Sitalakhya river were selected on the basis of (1) Sites of industrial complexes, mainly chemical industries along the stretch of the two rivers; (2) Sites of the rivers where drainage effluents like domestic, municipal and hospital wastes were discharged.

4.2.2: Description of sampling locations:

The Narayanganj site is situated by the side of main Narayanganj city. Municipal and industrial sewerage are directly dumped into this site. In the Khanpur location only some sand loaded tracks are loaded and unloaded there. The municipal sewerage is also discharged there. The side of former Adamjee Jute Mills Ltd. locates the Adamjee location. Now an EPZ is being constructed in this location. Different ships are repaired there and the liquid effluents of some dyeing textiles industries are mixed with the river water without any treatment. The Kanchpur location is located besides the Kanchpur bridge which connects the busiest road of Chitagong and Dhaka city. The ship breaking machines and the effluents from the Sinha Textile Ltd. are discharged into the upstream of this location. The Demra location is named as the Demra ghat. From that location Sitalakhya river is separated into two mainstreams: Sitalakhya river and Balu river. It is always crowded by sand loading steamers and transport boats.

4.2.3: Discussion of formed data and chart:

Parameters µg/L	WHO standard	EPA standard	Bangladesh standard	USPHS standard for domestic water supply
Lead	50	15	50	50
Cadmium	10	5	5	10
Iron	0.3	0.3	0.3	<0.30
Zinc	-	5000	5000	5000
Copper	1500	1300	1000	1000
Chromium	50	10	50	50
Manganese	50	50	100	100
Cobalt	-	-	-	-

Table-4.27: Trace elements of some drinking water standards

Name of River	DO (mg/l)	BOD (mg/l)	COD (mg/l)	TOS (mg/l)	Chloride (mg/l)	pH
Buriganga	4.5	5	28	198	11	7.2
Shitalakhya	5.8	4	-	117	8	7.0
Balu	5	6	-	324	8	7.2
Turag	5.1	8	-	302	9	7.4
Rupsha	5.2	0.8	39	1981	1211	7.7
Mathavanga	5.1	5	111	169	19	7.7
Halda	7	1	6	82	28	7.1
Karnafully	6.8	1	203	2141	1234	7.4

Table-4.28: Wet Season (Jun-October) Water Quality of Selected Rivers for 2010

Source: Compilation of surface water quality monitoring results of DOE divisional labs.

Trace Element	Location	Season			
		20.27	22.60	<17.96(DL)	<17.96 (DL)
Lead	Narayanganj	20.27	22.60	<17.96(DL)	<17.96 (DL)
	Khanpur	20.27	<17.96(DL)	<17.96(DL)	<17.96(DL)
	Adamjee	20.27	22.60	<17.96(DL)	<17.96(DL)
	Kanchpur	20.27	22.60	<17.96(DL)	<17.96(DL)
	Demra	<17.96(DL)	<17.96(DL)	<17.96(DL)	<17.96(DL)
Cadmium	Narayanganj	<3.00(DL)	<3.00(DL)	<3.00(DL)	<3.00(DL)
	Khanpur	<3.00(DL)	3.17	<3.00(DL)	<3.00(DL)
	Adamjee	<3.00(DL)	<3.00(DL)	<3.00(DL)	<3.00(DL)
	Kanchpur	<3.00(DL)	<3.00(DL)	<3.00(DL)	<3.00(DL)
	Demra	<3.00(DL)	3.72	<3.00(DL)	<3.00(DL)
Cobalt	Narayanganj	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Khanpur	<4.05(DL)	<4.05(DL)	7.91	<4.05(DL)
	Adamjee	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Kanchpur	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Demra	<4.05(DL)	<4.05(DL)	6.32	<4.05(DL)
Nickel	Narayanganj	<10.66(DL)	<10.66(DL)	<10.66(DL)	<10.66(DL)

	Khanpur	<10.66(DL)	<10.66(DL)	23.84	<10.66(DL)
	Adamjee	<10.66(DL)	<10.66(DL)	<10.66(DL)	<10.66(DL)
	Kanchpur	<10.66(DL)	<10.66(DL)	12.71(DL)	<10.66(DL)
	Demra	<10.66(DL)	<10.66(DL)	15.10(DL)	<10.66(DL)
Chromium	Narayanganj	<4.05(DL)	9.25	<4.05(DL)	<4.05(DL)
	Khanpur	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Adamjee	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Kanchpur	9.57	<4.05(DL)	<4.05(DL)	<4.05(DL)
	Demra	<4.05(DL)	<4.05(DL)	<4.05(DL)	<4.05(DL)

Table-4.29: Concentration of toxic metals in the shitalakhya river water at different sampling sites in different month of the year. Source: River water quality Report-2013 of DOE.

Shitalakhya river is a distributary of the Brahmaputra river. It remains navigable round the year. For monitoring water quality, samples were collected from three different location viz. Demra Ghat, Ghorasal Fertilizer Factory (GFF) and near ACI factory at Narayanganj.

Sample Location of Shitalakhya River	SS(mg/l)											
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Near ACI factory at Narayanganj					19							
Demra Ghat		5210	1143		36	18		36	37			
Ghorasal Fertilizer Factory (GFF)	422.8		598		3	17		42				
EQS for wastewater after treatment from industrial units 150 mg/l												

Table- 4.30: Level of SS at different sampling locations of Shitalakhya river in 2013. Source: River water quality Report-2013 of DOE.

SS (Suspended Solid) of Shitalakhya river water at different locations was within the (Environmental Quality Standard) EQS (150mg/l) except the month of February. Maximum SS concentration of Shitalakhya River was 5120 mg/l in February and minimum 3 mg/l in May. (Table-4.30).

Sample Location of Shitalakhya River	EC(μ mhos/cm)											
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Near ACI factory at Narayangonj				1044	598							
Demra Ghat		798	933	1064	514	519		127.4	37			
Ghorasal Fertilizer Factory (GFF)	376		622		469	136.4		139.1	139.1			
	EQS for wastewater after treatment from industrial units 1200 μ mhos/cm											

Table-4.31: Level of EC at different sampling locations of Shitalakhya river in 2013. Source: River water quality Report-2013 of DOE.

EC (Electrical Conductivity) of Shitalakhya river at different locations was within the EQS (1200 $\mu\text{mhos/cm}$) for treated wastewater from industrial units (Table-5) except in the month of April. The maximum EC (1064 $\mu\text{mhos/cm}$) was at Demra Ghat in April and the minimum EC (127.4 $\mu\text{mhos/cm}$) was at Demra Ghat in August.

Sample Location of Shitalakhya River	Total alkalinity (mg/l)											
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Near ACI factory at Narayangonj				220	142							
Demra Ghat		190	650	285	200	39		0	37			
Ghorasal Fertilizer Factory (GFF)	100		250		130	29			60			
	EQS for wastewater after treatment from industrial units 1200 $\mu\text{mhos/cm}$											

Table-4.32: Level of Total alkalinity different sampling locations of Shitalakhya river in 2013. Source: River water quality Report-2013 of DOE.

Maximum T. alkalinity (650 mg/l) was at Demra Ghat in March and that of minimum (0.0 mg/l) was at sampling point in August (Table-4.32).

Sample Location of Shitalakhya River	Total alkalinity (mg/l)											
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Near ACI factory at Narayangonj						31			52		32	35
Demra Ghat	9	9		35		10		18	48		21	33
Ghorasal Fertilizer Factory (GFF)				22		8		22	124			
	EQS for wastewater after treatment from industrial units 150 mg/l											

Table-4.33: Level of Suspended Solid (SS) of Shitalakhya river in 2014. Source: River water quality Report-2014 of DOE.

SS (Suspended Solid) of Shitalakhya river water at different sampling locations was within the (Environmental Quality Standard) EQS (150mg/l). Maximum SS concentration of Shitalakhya River was 124 mg/l at Ghorasal Fertilizer in September and minimum 8 mg/l in June respectively. (Table-4.33).

Sample Location of Shitalakhya River	Total alkalinity (mg/l)											
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Near ACI factory at Narayangonj						311			160		412	589
Demra Ghat	589	902		1370		1006		140.4	159.2		422	423
Ghorasal Fertilizer Factory (GFF)				518		153.4		478	120.3			
	EQS for wastewater after treatment from industrial units 1200 μ mhos/cm											

Table-4.34: Electrical Conductivity (EC) of Shitalakhya river in 2014. Source: River water quality Report-2014 of DOE.

EC (Electrical Conductivity) of Shitalakhya river at different locations was mostly within the EQS (1200 μ mhos/cm) for treated wastewater from industrial units (Table-4.34) except in the month of April. The maximum EC (1370 μ mhos/cm) was at Demra Ghat in April and the minimum EC (120.3 μ mho/cm) was at Ghorasal Fertilizer Factory in September.

Sample Location of Shitalakhya River	Total alkalinity (mg/I)											
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Near ACI factory at Narayangonj						25			49		36	141
Demra Ghat	1.8	190		20		10		28	52		29	155
Ghorasal Fertilizer Factory (GFF)				90		29		34	38			
	EQS for wasterwater after treatment from industrial units 150mg/I											

Table-4.35: Total alkalinity of Shitalakhya river water in 2014.

Maximum T. alkalinity (190 mg/I) was at Demra Ghat in February and that of minimum was (1.8 mg/I) at Demra Ghat in January (Table-4.35).

Name of river	Year	Season	pH	Do	BOD
Shitalakhya River	1975	Dry	6.9	7.1	1.85
		Wet	7.35	6	1.72
	1976	Dry	7.36	5.5	2.23
		Wet	7.2	6.5	2.2
	1977	Dry	7.1	3.8	2.3
		Wet	-	-	-
	1978	Dry	7.36	5.16	2.8
		Wet	7.05	3.8	1.35
	1979	Dry	7.02	6.1	3.8
		Wet	6.83	3.5	2.6
	2010	Dry	7.22	3.77	9.58
		Wet	7.05	5.53	4.67
	2011	Dry	7.14	3.80	10.62
		Wet	7.22	5.63	3.983
	2012	Dry	7.22	2.18	11.17
		Wet	7.37	3.56	5.21
	2013	Dry	7.7	2.69	22.83
		Wet	7.11	4.10	5.75
	2014	Dry	7.19	0.66	16.8
		Wet	7.43	3.86	6.64
EQS for Fisheries			6.5-8.5	≥5mg/I	≤6mg/I

Table-4.36: Level of different parameter of Shitalakhya river during 1975-1979 and 2010-2014. Source: River water quality Report of DOE.

Note: Value in each cell is seasonal (Dry: November-April, Wet: May-October) as well as average of sampling locations.

During 1975-1979 and 2010-2014, pH of Shitalakhya river water was within the EQS (6.5-8.5) for inland surface water for fisheries. DO content was below the EQS (≤5 mg/I) and did not vary between 1975-1979 and 2010-2014 period. BOD was lower than EQS during 1975-1979 but BOD was exceeded EQS during 2010-2014 though water quality slightly improved during wet season.

This may be due to increase of flow in the river. Direct discharge of untreated effluent from industries, loading construction materials, municipal and human waste pollutes river water. Some textile dyeing industries, consumer item producing industries and jute mills are located around the sampling locations and all of those industries waste into river water.

According to a survey, around 55% of pollution of Shitalakhya is caused by toxic industrial wastes and the rest by domestic waste water.

No	Waste Type	Percentage (%)
01	Toxic industrial wastes	55%
02	Domestic wastewater	45%

Table-4.37: The ratio of toxic and domestic waste.

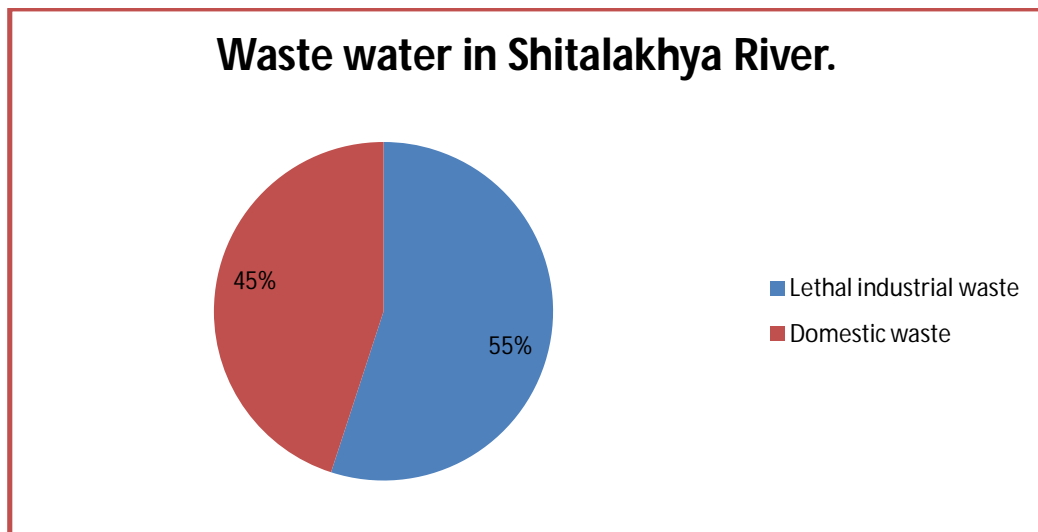


Fig-4.28: Pie chart on the ratio of toxic and domestic waste.

4.3: Case Studies:

Case study is that method which can help to bring from life-experienced and interactive discussion. By this process, real information and shape of study material is possible to gain. It is one kind of interview also.

4.3.1: Case Study Location:

Shitalakhya river bank situated Rupgonj, Narayanganj Bandar, Ghorasal, Kanchpur Kaligonj, Tarabo, Siddirgonj and Kapasia are locations of my Case Study.

4.3.2: One to ten Case studies:

One to ten case studies of interviewee is noted follow:

Case Study-1

Monir Hossain, a 55-year-old local resident and a local farmer of Rupganj. Unending encroachment and pollution of Sitalakhya River has not only changed its physical feature but also forced much of its fish and aquatic into disappearance. Major portions of both banks of the 110-kilometre river, which flows through Narsigndi, Gazipur and Narayanganj districts and falls into Dhaleswari River in Munshiganj district, has been brought under industrialization over the years. Hundreds of large, medium and small industries, including a urea fertilizer factory, thermal power plant, textiles and dyeing factories have been set up along the river from Ghorashal to Munshiganj through encroachment and they are now contributing to heavily polluting the river.

Renowned factories like Ghorashal Fertiliser factory and ACI factory are a major source of incessant pollution of the river. 'We used to swim and take a dip in the river at least once in a day. But for the last 10 years this has become impossible because of polluted water,' said Monir Hossain. He also said that in his early life he saw a vibrant Sitalakhya River free from pollution. But now the river, he said, has turned into a cesspit. During a recent visit to the river it was found that the Rajdhani Unnayan Kartripakkha had encroached upon a large portion of the river near Kanchon Bridge for developing its Purbachal New Town and even its project office has been constructed on its bank.

The Bangladesh Inland Water Transport Authority has constructed 15.60 kilometers of walkway on the western part of the river from Kanchpur Bridge to Tanbajar in Narayanganj to keep the bank free from further encroachment. But the encroachers have encroached upon a vast area under the Kanchpur Bridge for the sand and stone trade and the eastern part of the river in Narayanganj are still under occupation of hundreds of encroachers, including some big factories and dockyards.

Case Study 2

Abul Khair (53), a local boat runner of Narayangonj Bandar Gdara Ghat, has been waging his 6-member family since he was eight years old. He was in his early life an accomplice to his father as they were boat runners by generation.

He lamented while talking to me that the river of Shitalakhya was very streaming and abundant of fishes in the river. A number of people were fishing by rowing the boats in the river and sold them in the bank-side *hats* (village market). The local residents bought the fishes which were very tasty and hygienic for the public health because the water was very clean, clear and fresh for the *flora and fauna*.

The average per day income has also been sloped down, Khair said, as the youngsters were not seen to have their pastime in the river by boat. Decades ago, each boat runner would earn Tk. 1200 to Tk. 1500 even. Nevertheless, the small traders would have also carried their business goods through the boats.

But, the road communication and traffic system has been tremendously developed resulting the decrease the flow of passengers by boats. On the other hand, the number of boat-runners is increasing to keep their professions living. The size of the river has become narrower as of today because the influential land grabbers are indiscriminately taking away the river-side lands and filling up with sands and soil to set up many other commercial establishments such as brick-kilns, illegal housing projects, fuel stations etc.

As a result, the people who were depending on the river-based livelihood are seemingly forced to change their professions. Thus this river has affected our lives and economy very negatively as a whole. Indicating me some industries, he said those industries were dumping the toxic chemical wastage to this river which caused the extinction many species of fishes over the years.

Thus, both of the fishermen and boatmen are the prime victims of this Shitalakhya's death. Nobody is there to oversight this cruel disappearing of the Shitalakhya today and nobody is for us, sighed Khair.

Case Study 3

Moriom Begum, 39, a slum dweller living on the bank of Shitalakhya at Gudaraghat, Ghorasal in Narsingdi. Taking two daughters and three sons she has been living there as two of her sons are paper pickers while rests are seasonal workers.

The Seven Rings cement factory, country's largest beverage company Pran Group and Rangpur Foundry Ltd (RFL) are located on the riverside bank. Moyna's family members are heavily dependent on the factories. Moyna along with her daughters is waging bucks contributing their labour at the RFL Company.

Moyna's husband Kalim Majhi employed his labour to fishing and ran his family by selling those fishes and carrying the passengers to the other side of the river. But when the industrial tycoons set up the mentioned industries, he was forced to shift his profession to the factory working, said Moyna sitting at her makeshift rented house.

At the new economic set up, Majhi's income came down because the concentration of fishes in the river had become very low due to the poisonous inflow of chemical garbage to the water. The color of the water turned into black and emptied the fishes as well as aquatic life too. The river turned into the reservoir of toxic water.

Kalim netted many fishes and sold them to the nearby hats at the wholesale rate and earned sufficient money to meet his household demand. At the evening hour, Moyna would sell the rice flour cake to the pedestrians. They also sold the drying fish too which are very much popular to the locals.

They were somehow passing the happy life by doing such petty wage earning works, Moyna continued.

Meanwhile, due to the huge cut of workers from the industrial factories as there arose labour unrest demanding salary hiking; her husband lost the factory job. Just months after joining to the new working setup, he became disguised unemployed person, grievingly said Moyna Begum. She also added, "Earlier we had the better days to run our family. At east, we had the minimum daily income to meet our daily family needs."

Case study 4

Sabbir Ahmed, 56 year-old local politician who lives beside DND barrage. He said that the river Sitalakhya is one of the most prominent rivers in the flood plain region of Bangladesh. It is located in Narayanganj City, the second most vital industrial zone of the country. Various types of industrial units have been established on the bank of the Sitalakhya River; most of these industries directly or indirectly discharging a huge quantities of wastes and effluents into the river without any treatment and also municipal and domestic sewage sludge's from Narayanganj urban area, find their way untreated into this river. Moreover, the river is the route of the communication with Chandpur, Chittagong as the port of cargo. Besides these, the people live on and around the Sitalakhya River utilizing its water for their household washing, bathing and other necessary daily works. Therefore, the risks of pollution impact are rising upwards sequentially. When it is asked about the political contiguity to encroach the river bank of Shitalakhya, He hesitated and said that some of leaders are involved in those activities. They are in sheltering of powerful leaders who gets the sharing of illegal money if he does not do like that.

Water is a unique molecule which is safe, easy to handle, widely available and inexpensive in the most industrialized regions of the world.

Groundwater extracted through deep tube wells is the main media for water supply system in Siddhirganj power plant. Sitalakhya river water (SRW) will be used as a makeup water for cooling purpose in the proposed Siddhirganj power plant.

Case study 5

Matin Mia (42), a local small trader, was talking to me when I was taking interview sitting in front of his tiny shop. Offering me to have a cup of tea, he told me that the sale rate has cut down than that of before. He pointed out behind the reason that Bangladesh Inland Water Transport Authority (BIWTA) has had a massive crackdown on the ashore illegal trading structures.

Abruptly hundreds of people became unemployed and indebted to the local NGOs, said Matin, a resident at Rupgonj area in Narayanganj. Asked why they built such illegal structures at the river-side. In the reply of my question he informed me, there are a number of big industries have been laid illegally and remained untouched they are polluting the arable lands and river water seriously. But the administration, BIWTA and the concerned authorities are shamelessly naive about the demolition.

I asked him with my curiosity why those conglomerates are still untouched. He answered me categorically that there has been a tri-partite nexus among the local politician-cum-traders, dishonest government officials and the BIWTA's staffs.

“Law is only enforced upon the poor and feasible class like us,” he said, “and the big fishes are completely behind the bar.” Before these big illegal trading activities, a number people were going to and coming from. As a result, the tiring people were thronged the shops and sale response was very vibrant, he concluded with frustration.

Like Matin Mia many a number of people are under huge economic pressure as their small but illegal shops are feared to have bulldozed any time. But big firms remain behind bar. The river banks are narrowing day by day while the illegal industrial, sand dune etc business is expanding in hand to hand.

River-centric trading has already been stopped as well as local employment system completely broke down resulting many locals are going away to Dhaka

city to maintain their family. Besides, they are the prime responsible to concentrate the demographic density in the metropolitan city. And the Dhaka city, according to the latest census report, is the shelter home for 1.06 million people which is roughly 15% of total Dhaka city dwellers.

Case study 6

The scene is in Kanchpur Bridge, Narayanganj. It was the early morning where some workers were coming to pay their labour in the stone crushing point, the prime trade activities on the river side at the outskirts area of Dhaka city. One of them, on condition of not to publish his name, was Rafiqul Haq (37) (Disguised name) working as the managerial responsibilities of a crushing firm.

He said, hundreds of trucks were coming from several parts of the country carrying the rocks there to crush them. Rafiqul explained that the workers were earning good amount of money from contributing labor there. Asked about the environmental bad impact on the river and the surrounding land, he was seemingly unanswerable to the matter. He expressed his attitude as if the matter had no matter to put importance on.

In his consideration - extortion, toll collection etc are the main problem there. There are subscriptions on those activities. Some crimes are seen here beside the river. Drug business, smuggling and subscription etc are available here. Small boats are used in these illegal activities. The criminals live both sides of the Shitalakhya river. Some of them die for quarrelling each other with share of money. This region is crime zone whenever dark comes after daylight.

Case study 7

Mohammad Zonaed Emran, a baker and Column writer is 35 years old who is conscious person. He brief on Shitalakhya following: Bangladesh is a riverine country. Rivers are the lifeline for the country. More than 153 rivers are flowing across the country. These rivers play a significant role for economic and political perspective. Many people are dependent on the rivers directly and indirectly for their livelihood. Rivers play pivotal role in the empowering peoples especially river bank people economically and politically.

However, Most of the rivers are dying due to destructive activities of some lustful people. Shitalkhya Rive is the striking examples of pollution and dying. Mindless Dumping of dyeing of garments industry, effluent of mills, Garbages, lack of dragging, sand extraction, River bank grabbing and throwing of chemicals etc. are some causes which are the threat to existence of Shitalakhya Rivers.

Shitalakhy river is one the well-known rivers due to its enormous business activities. Once upon a time, Narayangonj was known as the dandy of Bangladesh for commercial activities. All the commercial activities took place based on Shitalakhya River. River is the cheap and easy communication way and to explore these benefits many jute mills established both sides of Shitalakhya Rivers. Largest jute mill Adamji jute once situated in the bank of River Shitalakhaya River. Same many industries are founded on the river bank. Industrialization is essential for our country but it is urgent to hard eyes on that this process does not harm our natural resource like rivers. So I think that Govt. should allow the enterprisers to establish their industry to follow rules, regulations and laws.

Case Study 8

Mohammad Rezaul karim is an employer in Shah Cement Factory. He is 40 years old. From his childhood, he lived in Tarabo, Narayangonj and lived a colony beside Sitalakhya River. He used to bath, row boat, had rivers cruise etc. The river was healthier than and was a place to grasp natural scenarios. The water of the river was crystal clear then and it was so clear that they found the small fishes under the river water. However the river has lost its glorious past. Water of the Shitalakhya River has turned into blackish color and stinky.

The main reasons are mindless dumping of dying waste. There are many others reasons responsible for dying of Shitalakhya Rives. Among the political reasons lack of political commitment on part of the political parties to save the dying rivers, influence of local political leaders to run some harmful activities like river grabbing, sand extraction are responsible for dying of river Shitalakhya. Earlier various species fish was abundant in the river. However, due to throwing of dyeing, chemicals and garbage, fish habitat was destroyed.

Instead of throwing garments dyeing, consciousness should be built among the garments owners that throwing of industrial waste is harmful for a river which has a serious impact on environment and nature. Law enforcer must enforce law so strictly so that nobody show disregard to the law and dare not dumping the industrial waste in the rivers. Govt. must come forward to help the garments owners to implement effluent treatment plant (ETP) for safe disposal of industrial waste.

Political influence must be stop by the government on the bank of River with an iron hand. Land grabbing, sand extraction, silt extraction, extortion by local politician must be stopped. Mobile court can be enforced to prohibit any unlawful activities on the bank of river. Awareness campaigns need to be carried out on the

bank of the river as well print and electronic media to massive awareness of the people.

In the past, History, heritage and economy were developed based on Shitalakhaya River. World renowned Muslin was found in the bangla and to wash purpose maker usage Sithalakhaya rivers water as water contain purity. The river has shaped into a dying lake due to carelessness of some people.

We have to save Shitalakhaya Rivers because many people are dependent on this river for their livelihood directly and indirectly. It left a negative impact on our nature and environment. River is the cheapest way of transportation and good destination for tourism. We can earn huge revenue from water transportation and truism. By introducing water transportation around the Dhaka city, we can beat perennial Traffic. So government must take proper short term and long term initiatives to save Shitalakhaya River.

Case study 9

Mr. Sayeed Iqbal, a social worker and founder of Bijoy kinder Garden and High School is 35 years old who lives in Siddirgonj. He is also an environmentalist worker especially on Shitalakhya river. He is very concern about the future of this river because it is suffering a lot looking like Burigonga still. He thinks that Buriganga has been already dead. Its water is very lethal type that cannot be used for anybody or anything. It is time to lose itself like Dholaykhal.

The Shitalakhya is under crucial threat for human's unethical and unlawful activities. These activities are occupying river side, filling up river, pollution of industries, losing navigability and decreasing dissolved oxygen in the river water etc.

But Siddirgonj is being busiest city by using Shitalakhya river with legally or illegally. There are many industries on the river bank at Siddirgonj side which are very responsible for polluting the river water. The major industries of Siddirgonj are J.M.S Glass Industries Limited, Amber paper mill and Siddirgonj power plant etc. Not only are these but also there are many local industries which are polluting the water of Shitalakhya. Some industries are taking under line drainage system to throw out their waste and polluted water in the Shitalakhya cause of monitoring of authorities.

Case study 10

Md Ziaur Rahman (41), now serving as Sub-Editor, at The Financial Express, has been in the journalism for more than eight years and edited many reports related to river pollution and encroachment in Bangladesh.

He sought his observation about the condition of the Shitalakhya river and how to improve its condition. Here is below what he says. The river is being filled up and encroached from both sides, narrowing down the river way.

Water is pumped out in rainless times for cultivation of paddy, onions on lands nearby, drying up the river, a common scene all over the country. Once a rich hub of aquatic life, it is now almost devoid of fish. No more can it fully cater to the livelihood needs of fishermen. Untreated liquid industrial waste is being released into the river randomly, especially in its urban parts.

Most industries do not have effluent treatment plants (ETPs) though its use has been made mandatory for so long. If these ETPs can be installed and operated at all industries, the river pollution could be curbed significantly.

Of course, it is possible. One hundred years ago, the condition of the Tames or the Clyde or the Rhine was as bad as our river Buriganga. Those rivers were back to normalcy through proper enforcement of the law. Now, there only needs laws, rules and regulations and their implementation to bring back the river to normalcy.

Article 18(A) of our Constitution clearly states: “The State shall endeavor to protect and improve the environment and to preserve and safeguard the natural resources, bio-diversity, wetlands, forests and wild life for the present and future citizens.”

The government has also enacted a number of laws including Bangladesh Water Act 2013, National River Protection Commission Act, 2013 in favor of the river protection. These laws, however, could not save the river from any pollution or encroachment because those are not implemented well. So, strong enforcement of laws to save the rivers, including the Shitalakhya is a must.

4.3.2: Statistical Analysis of case studier People:

C.S No	Location	Man of Case Study	Profession	Age
1	Rupganj	Monir Hossain	Local Farmer	58
2	Narayangonj Bandar Gdara Ghat	Abul Khair	A local boat runner	53
3	Ghorasal Gudara ghat	Moriom Begum	Slum dweller	39
4	DND	Sabbir Ahmed	Politician	56
5	Rupgonj	Motin Mia	Small Trader	42
6	Kanchpur Bridge	Rafiqul Haq	Manager	37
7	Kaligonj	Mohammad Zonaed Emran	Baker and Column writer	35
8	Tarabo	Mohammad Rezaul karim	Employer	40
9	Siddirgonj	Sayeed Iqbal	Social worker	35
10	Kapasia	Md Ziaur Rahman	Sub-Editor	41

Table-4.38: Locations, men of case study and their age.

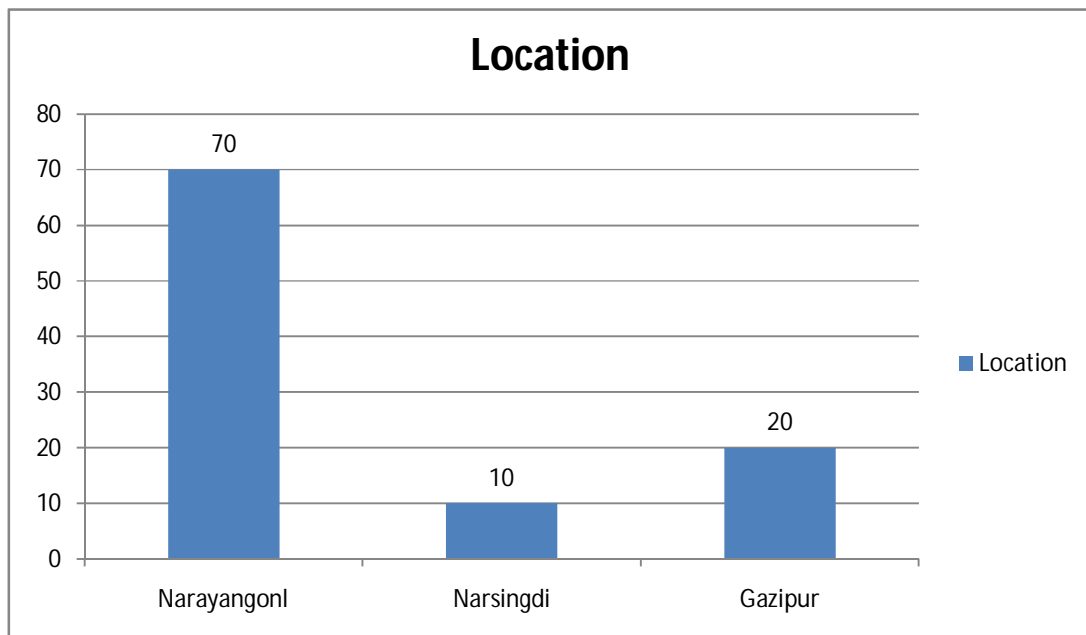


Fig-4.29: Location of case studies are shown in column chart.

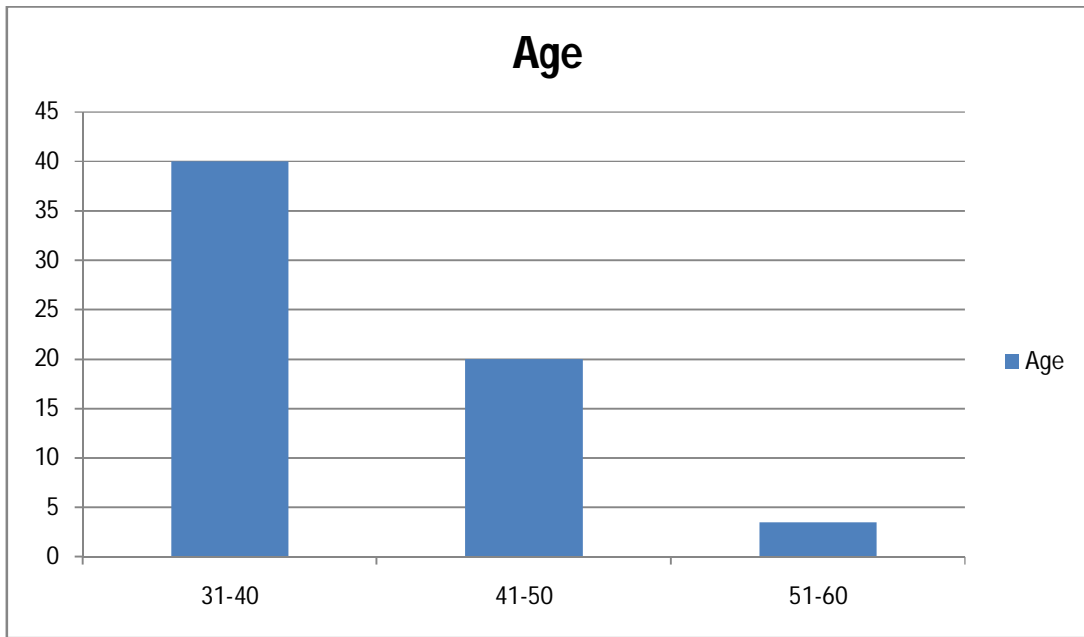


Fig-4.30: Age range of interviewee in case studies is shown in column chart.

4.3.3: General Analysis of case studies:

In my case study I have took ten-persons' opinion and open discussion about the Shitalakhya river. Their ages are various 31 to 60 and they have direct experience ins and outs of river Shitalakhy. Some of them have grown up along with this river from their childhood. Some of them live in the out side of river but their permanent resident is beside of river district. Everybody have given their opinion and all effects of river in present. But all of them are unanimous on single point that the Shitalakhya river is very injurious like almost Burigonga river. Two or three have said that the Shitalakhya has no river water but it has drainage water. It is clear that Shitalakhya is not Shitalakhya just it is a store of dust and waste of industries. It can be said easily that the Shitalakhya river is under serious threat.

Above discussion means formed and questionnaire data collection and case studies is not the whole shape of Shitalakhya or river related population. It is followed here by some sampled areas and some sampling persons. All expectations of the study would not come from driving survey, interviews and case studies etc.

But what are came or which is done of data collecting process is can be said ideal for this research. It has bloomed well real profile of the Shitalakhya river. Must be it has chance to find to extra something on Shitalakhya whenever it is possible to research again. Data analysis shows us that the condition of Shitalakhya river is fully in danger zone. In near future, full character of river Shitalakhya will be lost if still now we are not able to take proper care of Shitalakhy.

Chapter 5

5: Findings:

5.1: Finding of Study:

The finding is the output of the total study. It contains mix up of the formed or non-formed discussion of the background, literature review and data analysis of the study. But what are the demanded requirements for my research is the matter of findings. In my study, I have found new and basic concept and idea about the problems and probabilities of the Shitalakshya river in the perspective socio-economic and political side.

5.2 Brief of Shitalakshya:

Shitalakshya river originates from the old Brahmaputra and bifurcates into two courses at Toke in Gazipur district. One of the courses named the banar flows southwest and at Lakpur is renamed as the Shitalakshya. It then flows east of Narayanganj town. The Shitalakshya falls into the Dhaleshwari near Kalagachhiya. The length of the river is about 110 km and the width near Narayanganj is about 300 m but reduces to about 100 m in the upper reach. Its highest discharge has been measured at 2,600 cumec at Demra. The river is navigable throughout the year and shows little erosional tendency.

In the past, the famous muslin industry of the country flourished along the Shitalakshya. At present, a number of heavy industries including the adamjee jute mills, stand on the banks of Shitalakshya. There are three thermal powerhouses located at Palash, north of Ghorashal, and one at Siddhirganj, on the bank of the river. The important riverport of Narayanganj is also situated on its bank. The river was once famous for its clear and cool water. The river goes under tidal effect for about five months of the year but never overflows its banks. The Shitalakshya was famous for its clear and sweet water. It was also famous for trade and commercial business from far past. From British time,

Gazipur, Narsingdi and Narayanganj are well established districts as an industrialist zone by fair or good luck of Shitalakhya river.

In the cause of this river Narayanganj is familiar to all as Dundee of East. The prime river port in Bangladesh is also formed for Shitalakhy. Actually this river brings undisruptive and describe less good luck for its river bank people.

5.3: Real Condition of the Shitalakhya river:

But today what are the conditions of the Shitalakhy at least! The condition of Shitalakhya is very tragic and fatal that's for bad impact of the river influence on human being specially residents of Narayanganj, Narsingdi, Gazipur and Dhaka. There are some important natural khals of the Shitalakhya which always keep it over flow with natural water but still now it is overflowed with drainage toxic water. These khals are familiar to us as toxic channels those bring polluted water from industries and others. There are six major wastewater drains or khals falling into the Lakhya. These are: Majheepara Khal, Killarpul Khal, Kalibazar Khal, Tanbazar Khal, B. K. Road Khal (also known as Popularer Khal) and DND Khal. The first five drains/khals carry wastewater from the Narayanganj City. As there is no sewage treatment plant in Narayanganj, all wastewater originating from domestic and industrial sources drain untreated through these drains or khals. A number of industries have been established within the project area which discharges strong wastewater into the drainage channels. As a result of such human activities, drainage water being released into the Lakhya contains high concentration of organic or inorganic and toxic substances.

Besides the major point sources of pollution there are numerous indistinct sources which discharge into the peripheral river system around the Greater Dhaka. They are either of domestic origin or of industrial origin.

Some are combined wastes from domestic and industrial sources. The organic matters, pesticides and heavy industrial and domestic solid and liquid effluents are not treatable with traditional chlorination and disinfection process.

Surface water pollution in Shitalakhya occurs mainly by human sewage coupled with municipal garbage and industrial effluents. Industrial discharges along with municipal and urban wastes are creating special problems that completely destroy the microbial-based systems of decomposition. About 6,000 large and medium industries and 24,000 small industries are operating in Bangladesh which discharge effluents directly to the rivers or nearby canal or waterbed without any regard to environment.

The country has around 230 rivers and a clear majority of the 140 million people depend on rivers for safe water, transportation and fishing. The six major polluting outfalls discharging into the Lakhya (from the Narayanganj City area), there are still more discharge points which carry wastewater from industries as well as households. Another major fraction of non-point sources come mainly from some industries located at the left bank of the river. No significant point source could be found out along the river stretch from the confluence (of the Balu-Lakhya River) to upstream. However, the DO profile indicates that there are some pollutant loadings (at-least BOD) within 10 km of the river stretch from the confluence. This may be due to the effluents from a few industries seen at the left bank. Quantification and characterization of the pollutants may need to be taken in future.

The grabbers will not dare encroach on the Shitalakhya river. Encroachment is the main problem for all rivers of Bangladesh. Dholai khal is dead and lost totally by the encroachment. River Buriganga is the best example for us. The Shitalakhya is going to be next case of that. Encroachment occurred at more than 3000 locations of the rivers. BIWTA identified 7154 individuals and organizations as encroachers.

The occupiers are usually the influential section of the society and use their political and monetary power to manage the government machineries. Their network has infiltrated deep into the governance system and a section of the public institutions help facilitate such occupation through preparation of fake documents, without taking any action, etc. Though, Bangladesh Government has rules and regulations for saving rivers like Shitalakhya but it's not implemented or followed properly because of the influence of local powerful individuals. Many political representatives gave their commitments to save Shitalakhya which were just a courtesy in the political gestures before elections. These were only to impress people so that they can get vote from the citizens as much as possible. Later on, after being elected no one has raised their voice against the people who are occupying Shitalakhya. The Shitalakhya river water was contaminated with organic micro pollutants and non degradable heavy metals, making it untreatable. Surface water is extremely precious as the ground water is depleting.

The Shitalakhya is important in maintaining circular water route and natural environment of the Narayangonj city along with of Dhaka Metropolitan. Through the ages, this river has silted up and off takes from the main source with the Brahmaputra has been almost disconnected during the dry season causing obstructions to navigation in the surrounding rivers of Dhaka due to reduced drafts. As the flows of this rives is practically nil during the dry season, the pollution of the river water has become a chronic problem, degrading the natural environment. Indiscriminate disposal of wastes has added pollution level in the rivers. A mathematical model supported study has, therefore, been taken up to develop strategy towards augmenting the dry season flows of the river system and rehabilitation of the Lakhya river system to ensure circular navigation route around the city and improve the river water quality to mitigate the chronic pollution problems.

Maximum surveyed people said that political power is the indicator for occupying river bank, illegal sand dredging of Shitalakhya.

Two banks of Shitalakhya are shrinking that why it can be called a khal. Some origins of pollution of Shitalakhya river are:

1. Excreta of municipality
2. Excreta of busyness places and
3. Chemical excreta of industries
4. Lethal water of Dyeing and Printing
5. Excreta of water vehicle
6. Land and developer building waste
7. Excreta of Launch Ghat

Among of above pollutions, all are being occurred by using political influence in any way.

5.4: Impact of Cynical river Shitalakhya:

Natural resources like fish, aquatic life are greatly affecting in river Shitalakhya for black toxic water of industries and mill-factories. Social life of river bank people and citizens of Dhaka metropolitan is worrying to use this Shitalakhya river water unswervingly. This river is principal source Saidabadh Water Treatment Plant. This water is facing challenge of treating excessive ammonia. Besides, the excessive use of nitrogen and phosphate fertilizer is heavily polluting surface water as well. The deteriorating water quality of Shitalakhya, considered the life line of the capital now, has been a major concern to all. But the inclusion of this river around the capital has raised the level of concern. The people of these areas always suffer by Skin diseases, diarrhea, and dysentery etc. Besides, thousands of people are facing their daily income loss that is depending on Shitalakhya. The flowing of lethal polluted water is liable to change soil quality and to harm agricultural land-crops. The framers are obligated to supply this polluted water to their lands. As a result, crops production is not expected. They are inactive to cultivate the lands.

Water of Shitalakhya surrounding Dhaka cannot be treated for drinking particularly in dry season. But the water quality slightly improves during the monsoon. None of the rivers was found to have “blue” category water suitable for drinking even after disinfection as evident from the water quality analysis. “Yellow” category of water is suitable only for recreation, pisciculture and livestock. Besides, water of “green” category is suitable for aquaculture. It is very concerning to us that “blue,” “yellow” and “green” category is being very rare to the river Shitalakhya.

Besides, dissolved oxygen level, an indicator of measuring river health and aquatic life in its water, goes below 3 ppm (parts of per million) of the river during dry season which should never happen as per US regulation of river water quality.

It is a new finding and also alarming that the water of Shitalakhya river is treatable. It is extremely vital to stop polluting this river now and treat the existing pollution. The river foreshores were not saved during river demarcation and any encroachment on the Shitalakhya river must be demolished and evicted. The sustainable development goals (GSP) cannot be achieved without conserving water resource and bodies. Saving the Shitalakhya river should be major priority of Bangladesh Government along with other concerned bodies.

5.5: Present Institutional Set-up:

- There are a number of policies, acts and rules related directly or indirectly to the governance of the rivers. Some of these are for pollution control, some for regulation of development activities and some for control of river encroachments.
- The pollution control comes under the purview of the environment policy, environment conservation act and rules, environment court act and water body conservation act. The last act has hardly been utilized.
- Maintenance of waterway navigability and eviction of illegal occupation from river banks and beds fall under the port act and rules.
- NCC, BIWTA are run by their respective acts and it is not clear if the environment conservation act and rules can regulate those activities linked to water pollution of these organizations.

5.6: Policy, Act, Rules:

There are some policy, act, rules and regulations by which some activities are seen to play on the rivers. The Shitalakhya river is under this process. Some of policy acts and rules are following:

- 1) Environment Policy
 - 2) Environment Conservation Act
 - 3) Environment Conservation Rules
 - 4) Environment Court Act
 - 5) Water Body Conservation Act
 - 6) Port Act
 - 7) Port Rules
 - 8) National Land Use Policy
 - 9) National Agriculture Policy
 - 10) National Water Policy
-

7.7: Present Institutional Set-up: Govt. Line Agencies:

The Shiatalakhya needs protectors for keeping itself from all kinds of harmful activities forever. There are some governmental line agencies those are trying to solve the problems. These organizations are following below:

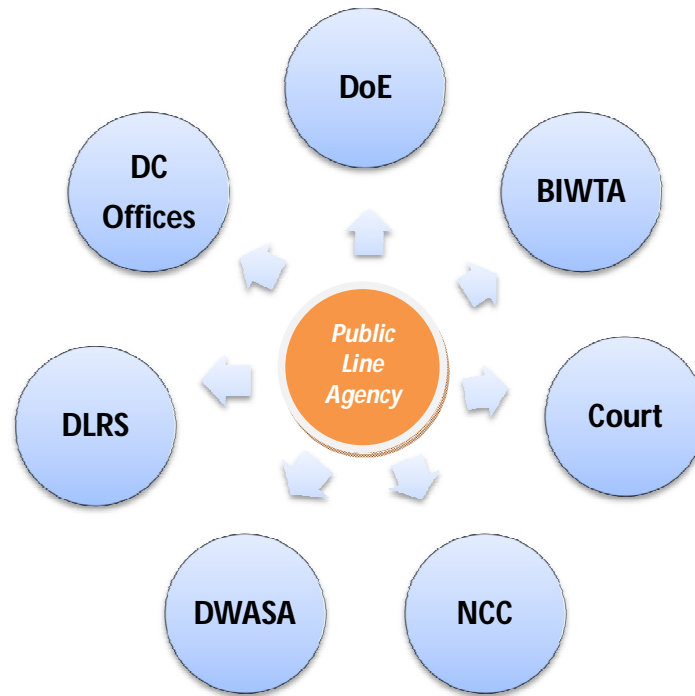


Fig-5.1: Government Line Agencies

Directorate of Environment (DoE), Bangladesh Inland Water Transport Authority (BIWTA), High court, Narayanganje City Corporation (NCC), DWASA, DLRS, concern DC offices like Gazipur DC office, Narsingdi DC office and Narayanganj DC office and Sewerage Authority (WASA) Dhaka Power Distribution Company (DPDC) Telephone and Telegram (T&T) State Gas Company (TITAS) Local Government Engineering Department (LGED) Department of Public Health Engineering (DPHE) etc are the stakeholders of doing something for the Shitalakhya river. They (DoE, BIWTA, DC offices) are seen to drive eviction on bank of river side sometimes. Again, some officials among of them are involved in corruption. They are willingly inactive to drive or move against the illegal mills, factories and industries to get bribery.

RAJUK is that governmental organization which is occupying the river land by name residential project like Purbachl, Rupnagar Residential Area etc. Highly respective Judge of High Court has given definite direction to demolish the illegal building on river bank of Shitalakhya. Then, sometimes, the authority doesn't take proper steps against that. Otherwise, powerful manage court stay order during eviction of authority. There is weakness in policy and strategic direction, Institutional and managing capacity of govt. organizations.

5.7.1: Weakness in Present Institutional Set-up:

a) Policy and strategic direction:

It is not clear about the broad objective of development on the Shitalakhya. Is the vision economic development with poor river condition, healthy river with limited economic development, or a tradeoff between ecosystem health and economic development? This basic question needs to be adequately addressed so that the implementing organizations have clear and unambiguous target in front of them. Pollution vs. employment and environmentalists vs. industrialists are

b) Effectiveness:

- Performance of the institutions
- DoE for pollution control
- RAJUK for regulation of development activities
- DCC & DWASA contribute about 40% to the pollution
- BIWTA and District Administrations to check encroachments
- DLRS is to maintain ownership of lands

c) Accountability:

- Transparency, responsiveness and compliance.
 - In none of these yardsticks, the institutions can be considered accountable. The institutions are not complying with their mandates; they are neither responsive to the public concerns and sufferings nor transparent about their activities and actions.
-

- Information available to the public is limited.
- Most of the public servants, and thus the institutions as a whole in general, are driven by self interest and personal gain.
- Personal accountability
- High Court verdict

5.8: Present Institutional Set-up: Local and foreign NGO Line Agency:

The NGOs organizations such as Bangladesh Poribesh Andolon (BAPA), Bangladesh Environmental Lawyers Association (BELA), Poribesh Bachao Andolon (PABA), United Nations Environment Program (UNEP), Bangladesh Nodi Bachao Andolon, Rivergiam School, Nodi Poribrajok Dal, JICA etc are involved in river related activities in the country. These organizations basically works for conscious and awareness program, survey, research etc. BELA works for law side of environment.

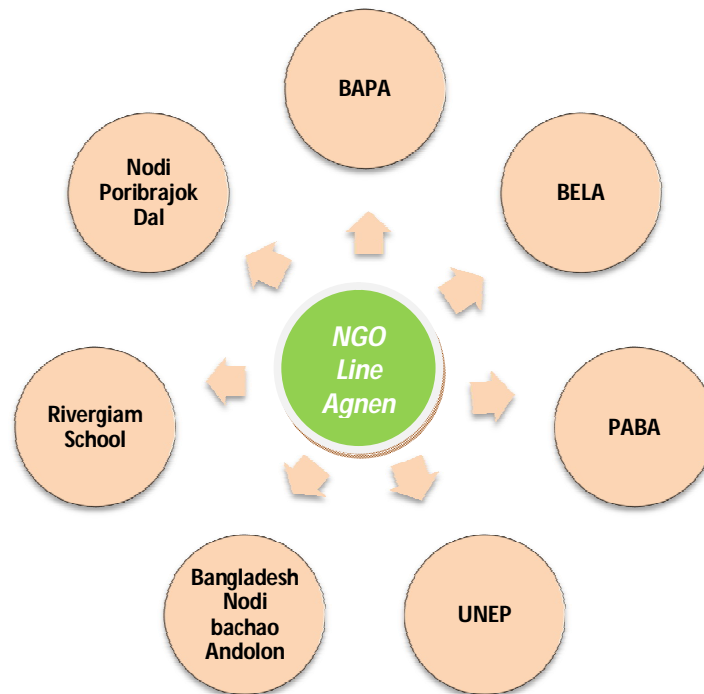


Fig-5.2: Local and foreign NGO Line Agencies.

Besides, newspaper, electronic and online media, foreign agencies and organization also are actively participate agenda about rivers.

Now the time, all kinds of non-governmental organizations are trying to work for Shitalakhya. The focus on river Shitalakhya is priority to these organizations. NGOs, Media have been playing a commendable role in case of being space for users, NGOs, CSOs, etc. is limited.

5.9: Towards a New Institutional Framework:

There are some strong role playing newly institutions which are following bellow:

- Commendable role of NGOs, Media
- High Court verdict
- Political regime
- Formation of a Task Force
- National River Commission

5.10: River Commission:

The function of river commission is following:

- To provide policy and planning framework to government for integrated management of rivers and allied systems.
- To integrate the development efforts of different agencies and enterprises for sustainable development in Dhaka watershed
- To coordinate and regulate the activities of government and nongovernment agencies and officials
- To establish a platform for dialogue of stakeholders to share their views.
- To undertake action and advocacy programs through existing agencies or itself to conserve river health and ecosystem
- To facilitate research and development in Dhaka watershed by maintaining liaison between the donors, government, IGOs, etc.

There is only one technology which can control the liquid excreta of industries. The name of this technology is Effluent Treatment Plant (ETP).

Liquid excreta producing industries are not permitted to open their activities without ETP.

Otherwise, it has taken already some initiatives to build suitable purification system in industries by the co-operation of Chambers and concern Sector Associations. 182 industries have run ETP already in 2014-2015 fiscal years.

The Shitalakhya can be economic river which support the river bank people and dependent residents of Narayangonj, Narsingdi environmentally and economically. Political transparency and social responsibilities are essential for this first.

Chapter 6

6: Recommendations and Conclusion

6.1: Recommendations:

1. A national consensus must be integrated and prioritized to conserve the natural resources.
 2. The Clean Water Act has been active in the developed countries. Such laws need to be enacted for our existence and proper implementation of the laws must be ensured.
 3. The river water should be purified from the pollution through establishing garbage/water treatment plant. The experience and technological knowledge must be taken from the developed nations how they have cleaned the water and adapted ecological balance for the locals living there.
 4. The amusement measure can be accepted in our traditional river area by erecting essential infrastructure through river management process.
 5. To impress for control or stop of money-mussel and political power so that negative involvement against Shitalakhya river decreases.
 6. Nevertheless, the Supreme Court of Bangladesh delivered 12-point directives following a writ petition of public interest litigation in 2009. The court mentioned in the order to build the forestation in the riverside area.
 7. The master plan should be immediately adopted to keep the river flow.
 8. By connecting to the big nearer rivers to increase water flow and navigability in the Shitalakhya.
 9. The waste management plant is to have established to keep the water fresh and clean.
 10. To keep water quality of this river by follows various techniques, technology, scientific formulae or methods and supervision.
 11. Effective, regular and active mobile court by DoE, BIWTA and DC offices have to drive with hundred transperecy and honesty.
-

12. It is essential to observe one who has responsibility but it is he who as if cannot consume self. That's why government institutions should be alert and dutiful.
 13. Those authorities should keep hard eyes on illegal dredging; occupy river land, underground drains system by industries' authority for saving river Shitalakhya.
 14. The information of Shitalakhya river eco-system needs to be conserved so that the census of the living aquatic life can be measured. And the following steps could be taken as an action plan if necessary.
 15. It is essential to run and continue actively ETP more to ensure environment friendly industry. Without permission of ETP no industry can run their business especially on river bank of Shitalakhya.
 16. For still now, there are how many acts, laws, policies and institutions are to run for save immediately motherly river Shitalakhya from various angles for present limited financial support, capacities and capabilities.
 17. To arrange more meetings, seminars, dialogues, symposium, workshops among concerned people where the role play of civil society, media wings, journalist, water-river specialists and other stakeholders is co-operative priority basis.
 18. The economic structure of the river need to be developed, beautified the embankment of the river dams, connected the either side by linking the bridge, established the walkway where the trees and grasses to be planted to make the scene green for the pedestrians.
To do such project, public-private partnership approach could be adopted to save the river. It is not enough to deliver some statement quoting 'Save River,' 'Save Man' etc rather the ethical mindset must be grown to the people as a whole.
-

7.2: Conclusion:

Bangladesh has one of the largest inland waterway networks in the world; connecting almost all the country's major cities, towns, and commercial hubs. Occupying about 11% of the country, some 700 of natural rivers & tributaries with an overall 24,000 km long network is crisscrossing the country. Dhaka and Narayngonj are the major cities in the country which are fully dependent on 110 km long traditional river Shitalakhya.

The water of the river Lakhya flowing around the capital city of Dhaka, is being polluted for quite a long time. Water quality of these rivers is too poor to be considered as safe for human consumption. The Shitalakhya, once the main artery of communication, has virtually been reduced now to a narrow canal of polluted slime. Dumping of solid and industrial wastes round the clock has not only changed the surgical aspect of the river but also diminished much of its fish and other aquatic life.

Collective measures should be taken within governmental authorities, non-governmental agencies, industry owners, political leaders and grass root people for future of the Shitalakhya river. This river is the lifeline for the bio-diversity in the nearby area. Political commitment, the role of Go, NGO, civil society, water and river specialists, social and mass media, responsibilities of polluters and conscious opinion are mandatory to affected river Shitalakhya.

Succeeding researchers who would like to feel interest to work majorly upon the issue need must focus the concern matter of killing the rivers. A bridge is expected to build over the Shitalakhya in the manifesto of Selina Hayat Ivy, the second term winner of Narayangonj City Corporation. If it is built upon the river, the number of spilling water vehicle would diminish affecting a better water colors.

If the action basing on accurate survey and public hearing of the local people could be taken, the waning river would return as it was before. Many developed nations in the world could have polluted the rivers in the early stage of their development but now they have overcome the issue surprisingly taking pragmatic action plan.

Although several works have been done of Buriganga and rivers around Dhaka city, these outskirts rivers are need to be focused in the policy making level of the concerned authorities of Bangladesh. Bangladesh was entirely dependent of riverine economy and our public life was also molded with river-based art, folksongs, play etc.

Some nature lovers have been noticed to be working with a view to developing the public awareness to remake the mindset of the people. *Amra Dhakabashi, Nadi Banchao, Dhaka Banchao*, BELA have been profoundly working for the betterment of the rivers in the country. The layers, judges, media men, common people, students, businessmen, traders are needed to be nature and river-friendly.

If we do not be alert or take urgent initiative for saving the Shitalakhya along with other rivers; we 160 million people may not be able to save our rivers. So private organizations, governmental institutions, private owners of mill-industries, river bankside people and conscious citizens have to come advance for saving the ravaged river Shitalakhya. We should know that if river does not live, the country would not sustain, if the country does not live, it is absolutely impossible to be alive on of its people. We can say according to the poet...

Your water of tide
Unknown colored muddy water
A bit touched softly
But it couldn't be...

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Appendix-A

Parameters of measuring water quality:

pH
Dissolved Oxygen (DO)
Biochemical Oxygen Demand (BOD)
Chemical Oxygen Demand (COD)
Suspended Solid (SS)
Total Dissolved Solid (TDS)
Electrical Conductivity (EC)
Chloride
Turbidity and Total alkalinity

Appendix-B

Name of Metals in Water

SL	Name of Metals
1	Lead
2	Cadmium
3	Cobalt
4	Nickel
5	Chromium
6	Manganese
7	Iron
8	Zink
9	Copper

Appendix-C

Name of Units

SL	Unit
1	pwd
2	Qmec
3	k.m
4	Sq.m
5	liter
6	lac
7	core
8	Cubic meter
9	mg
10	percent
11	feet
12	million
13	$\mu\text{g/l}$
14	$\mu\text{mhos/cm}$

Appendix-F

Questionnaire for Survey

Part-A

(For general people: boatman, passenger, bank livelihood)

Dear Sir/Madam

I am conducting a survey on Shitalakhya River. Your kind reply will be beneficial in serving and to broad me understand the interaction of related contents properly whether it is in fact interconnected or not. It would be appreciated if you could get across your valuable views, opinions by answering the questions bellow:

Thank you for your sparing your important time.

Name:**Age:**

Address:.....

Profession:.....**Gender:**.....

Q: 1) What is main one problem of Shitalakhya River's pollution?

- a) Industrial excreta
- b) Man throwing waste
- c) Burn oil, fuel and garbage from vehicle
- d) Aquatic rot

Q: 2) What is great threat for the river Shitalakhya?

- a) Public unconsciousness
 - b) Illegal Sand lifting
 - c) Industrial chemicals
 - d) Bank erosion
 - e) Forlornness of authority
-

Q: 3) What do you think, who are liable more to fill up river bank?

- a) Industry enterpriser
- b) Owner of mill-factories
- c) Local political leaders
- d) Landless people

Q: 4) Do you think the trading and commercial importance Shitalakhya River is decreasing or increasing?

- a) Decreasing
- b) Increasing

Q: 5) Who can ensure Shitalakhya more as a clean, free polluted and durable river?

- a) Related govt. institutions
- b) Related non-govt. organization
- c) Foreign donor
- d) Conscious mass people

Q: 6) Do you think pollution of water in Shitalakhya is being like Burigonga River?

- a) Yes
- b) No

Q: 7) Do you think mushrooming of residents, mills, factories, industries etc on the bank of river main factor?

- a) Yes
- b) No

Q: 8) How much it is essential to look after and monitor by concern authority?

- a) More
- b) Much more
- c) Not more
- d) No need

Q: 9) Which is important to take initiative as an advanced step?

- a) Increasing navigability
- b) Form river laws
- c) To stop emerging industrial
- d) Occupying river land/bank

Q: 10) Has it still contained qualitative and treated water in Shitalakhya River?

- a) No
 - b) Yes
 - c) Not applicable
-

Appendix-G

Questionnaire for Survey

Part-B

(For Specialist, Media man, journalist, local leader, other professional)

Dear Sir/Madam

I am conducting a survey on Shitalakhya River. Your kind reply will be beneficial in serving and to broad me understand the interaction of related contents properly whether it is in fact interconnected or not. It would be appreciated if you could get across your valuable views, opinions by answering the questions bellow:

Thank you for your sparing your important time.

Name:**Age:**

Address:.....

Profession:.....**Gender:**.....

Q:1) Why river die really?

- a) Losing of navigability
- b) Increasing urbanization
- c) Indifference of authority
- d) River grabbers
- e) All of above

Q:2) Have a possibility to die of Shitalakhya river is?

- a) Yes
- b) No

Q:3) Why Shitalakhya is more important on the view of you?

- a) Water Supplier
 - b) Eco balance
 - c) Centre of trading
 - d) Transport
-

Q:3) What is practicable to save shitalakhya?

- a) Properly dredging
- b) Laws for river protection
- c) Active river commission
- d) Stopping Pollution
- e) All of above

Q:4) Is Political Commitment necessary for saving Shitalakhya?

- a) Yes
- b) No

Q: 5) Why the water of Shitalakhya is being turned untreatable?

- a) Industrial Waste
- b) Lack of dissolved Oxygen
- c) Lack of Iron
- d) Increasing alkalinity

Q: 6) Whose influence is more to dredge sand illegally?

- c) Sand trader
- d) Some local Politician
- e) General people
- f) Sand contractor

Q: 7) What type pollution is very common to the Shitalakhya river?

- a) Water Pollution
- b) Thermal Pollution
- c) Soil Pollution
- d) River Bank Pollution
- e) All of above

Q: 8) Who is directly sufferer by stinky water of this river?

- a) City dweller
- b) Owner of mills-factories
- c) Its bank people
- d) Its aquatics
- e) All of above

Q: 9) How is the role of NGO on this river?

- a) Adequate
 - b) Excess
 - c) Inadequate
 - d) Expected
 - f) All of above
-

Q: 10) What may be the possibility of Shitalakhya River?

- a) Clean Water Supplier
 - b) Green River Project
 - c) Water Safe Transport
 - d) Aquatic Wealth
 - e) All of above
-