Use and Effectiveness of Effluent Treatment Plants (ETPs) in the Garments Industry of Bangladesh: a Water Sector Integrity Perspective

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List of Acronyms

ATU	Acute Toxicity Unit
BAWIN	Bangladesh Water Integrity Network
BCSIR	Bangladesh Council of Scientific and Industrial Research
BECA	Bangladesh Environmental Conservation Act
BGMEA	Bangladesh Garment Manufacturers and Exporters Associations
BIWTA	Bangladesh Inland Water Transport Authority
BOD	Biological Oxygen Demand
BSCIC	Bangladesh Small and Cottage Industries Corporation
BTMA	Bangladesh Textile Mills Association
BWDB	Bangladesh Water Development Board
CBD	Convention on Biological Diversity
CETP	Central Effluent Treatment Plant
CITES	Convention on International Trade in Endangered Species
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DoE	Department of Environment
DoF	Department of Fisheries
DoT	Department of Textiles
DPHE	Department of Public Health Engineering
DWASA	Dhaka Water and Sewerage Authority
EC	Electrical Conductivity
ECA	Environmental Conservation Act
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ENMOD	Environmental Modification Convention
ENRAC	Environment and Resource Analysis Center
EPI	Environmental Policy Integration

EPZ	Export Processing Zone
EQS	Environmental Quality Standards
ETP	Effluent Treatment Plant
FGD	Focus Group Discussion
FD	Forest Department
GIS	Geographical Information System
GIZ	German Development Agency
GDP	Gross Domestic Product
HSC	Higher Secondary School Certificate
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IPM	Integrated Pest Management
IWRM	Integrated Water Resource Management
KIIs	Key Informant Interview
LGED	Local Government Engineering Department
LGI	Local Government Institutions
MDG	Millennium Development Goals
MoEF	Ministry of Environment and Forests
MoWR	Ministry of Water Resources
MSc	Master of Science
NEC	National Environment Council
NEMAP	National Environment Management Action Plan
NGO	Non- Government Organization
NLSC	National Level Stakeholder Consultation
NSDS	National Sustainable Development Strategy
NWMP	National Water Management Plan
PaCT	Partnership for Cleaner Textile
PPM	Parts Per Million
RMG	Ready Made Garments
SSC	Secondary School Certificate

TC	Thermal Conductivity
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TSS	Total Suspended Solids
TWMZA	Territorial Water and Maritime Zone Act
USD	United States Dollar
WARPO	Water Resources Planning Organization
WASA	Water Supply & Sewerage Authority
WIN	Water Integrity Network
WDF	Washing Dyeing and Finishing

Executive summary

The Role of the Bangladesh Textile Industry as a Driver of the Economy and of Pollution

The textile and ready-made garments (RMG) industry is a major driver of the Bangladesh economy, accounting for nearly 80% of export earnings and contributing more than 12% of national GDP. 'Made-in-Bangladesh' is an internationally recognized badge of quality and has bolstered the country's image worldwide. Annual turnover of nearly 23 billion USD is predicted to more than double to 50 billion USD by 2021 and rise again to 87 billion by 2030 (Arup, 2014; BGMEA 2016). About 95% of the factories are Bangladeshi owned and about 80% of the 4.4 million employees are women.

Textiles contributes around 40% of this sector's value (PaCT, 2014) and comprises about 1,700 washing dyeing and finishing (WDF) factories manufacturing fabrics for export or as sub-contractors.

However, the textile industry plays a contradictory role in the socio-economic and environmental development of Bangladesh. On the plus side, textile firms are major employers that contribute to wealth and prosperity. On the debit side, they are destroying the surrounding environment on which marginal farmers and others depend for their livelihoods. It is evident from various reports and from the water quality of the rivers surrounding Dhaka city that wastewater including industrial effluents is discharged without any treatment or with inadequate treatment. Few textile factories in Bangladesh maintain wastewater treatment processes at a level to meet the Government discharge standards.

Water plays an important role in the economy and ecosystem natural resources. Agriculture, fisheries, commerce and navigation are all dependent on sustainable use of water resources. Deteriorating water quality has become a great concern, linked to population growth, untreated discharge of sewage, unplanned urbanization and industrialization.

The Buriganga, Shitalakkha, Balu and Turag rivers have been declared ecologically critical areas (ECA) by the Ministry of Environment and Forests (MoEF) of the Government of Bangladesh.

Water is used extensively throughout textile processing, but it is not used efficiently. Average Bangladeshi textile production consumes 200-250 litres (lt) of water per kilogram (kg) of fabric production, nearly five times more than international best practice. The industry discharges 12.7-13.5 million m^3 of wastewater annually, representing 85-90% of the groundwater it extracts for fabric processing. Overall, 20% of freshwater pollution comes from textile treatment and dyeing.

Water integrity is very important for the sustainability of the textile sector itself and for other development activities in the country. The Government of Bangladesh has formulated policies, plans, rules, regulations and strategies that recognize the importance of water quantity and quality for sustainability of the economic and environmental health, but they are not being enforced.

Effluent treatment plants (ETPs) should play the most significant role in meeting the industry responsibilities by removing pollutants from the wastewater. However, water governance and integrity remain without significant improvement in terms of effective monitoring, ETP inspections and enforcement.

Aim and Methodology of the Study

Transparency International Bangladesh (TIB) and Bangladesh Water Integrity Network (BAWIN) commissioned Environment and Resource Analysis Center (ENRAC) to conduct a study on the use and effectiveness of effluent treatment plants (ETP) in the garments industry of Bangladesh from a water sector integrity perspective and to make recommendations to improve governance to promote sustainable textile and RMG production in Bangladesh.

The study involved primary level data collection at 22 factories in Tongi-Konabari, Savar, Narayanganj and Chittagong and in adjacent communities. Secondary information was collected and a literature review conducted to examine technical features in selected textile factories, the environmental and social impacts of pollution and the status of sectorial policies and laws that are relevant to water governance. Interviews identified the scope of the water problems and the importance of reforming water management practices, as well as barriers to water integrity in the textile sector.

The specific objectives were to:

- Examine to what extent the government's existing regulatory framework is being implemented by the textile industry with respect to ETPs;
- Review sectoral policies and laws involved with protection of water quality and quantity;
- Identify key governance challenges in the use of ETPs;
- Assess the quality of wastewater treatment and its impact on downstream wetlands and communities;
- Make recommendations to improve the use and effectiveness of ETPs by the garments industry.

The Regulatory Framework

The government of Bangladesh has a broad ranging program to protect water bodies through laws, policies, strategies, plans, international treaties and conventions. Under the Bangladesh Water Act, 2013, all types of water (surface, ground, sea, atmospheric) within the territory of Bangladesh belong to the government on behalf of the people. The government can take legal action to protect rivers and other water bodies from encroachment, pollution and unscrupulous use through the National River Protection Commission Act, 2013 etc.

However, in practice most factories in Bangladesh withdraw groundwater free of charge and there is no regulation on how much water can be extracted.

The Department of Environment (DoE) is the regulatory body and technical wing of the government responsible for enforcing environmental laws. Effluent treatment plants are seen by the DoE as a major instrument in mitigating wastewater pollution, particularly in the textile industry. Industries that generate liquid waste with potentially polluting parameters must install ETP as a requirement for obtaining an Environmental Clearance Certificate and to comply with environmental law. Penalties for violations and noncompliance are in theory based on the polluter-pays principle.

Failures to Enforce Regulations and Impose Penalties

Fabric dyeing and chemical processing industries are categorized as "Red industries" that pose the highest environmental threats according to the 1997 Environment Conservation Rules (ECR). Environmental law mandates that all Red category wastewater producing industries, including textile dyeing plants, must use effluent treatment plants (ETP) to treat wastewater before discharge.

Factories must obtain an Environmental Clearance Certificate (ECC) by conducting an Environmental Impact Assessment (EIA) and having it approved by the DoE. Prior approval is also required from the DoE before designing and starting high polluting industry, including textile factories.

However, although this is required under the Environmental Conservation Act 1995, no effective EIA system has been put into place and the DoE has only published non-statutory guidelines for industrial projects. Without a proper EIA system, the compliance mechanism to ensure proper implementation of environmental laws will remain inadequate.

Environmental management plans are prepared within the scope of an environmental impact assessment report, but it is clear that the EMP is not followed in the day to day operations of a textile factory. There is only a low chance that a factory will in fact be penalized for failing to meet environmental standards.

The Dhaka Watershed Report from the World Bank, (2011) says that the DoE, as the national regulatory agency, is acutely short of manpower and logistics and is unable to fulfill its duties adequately. Potentially polluting factories require intensive monitoring and surveillance but are seldom inspected. **According to communities around industrial clusters, inadequate monitoring and inconsistent enforcement by the DoE are the main reasons for factories disposing of effluent into wetlands or rivers through channels or drains, without adequate treatment.** As a result farmers, fisherman, and others who rely on water bodies have seen a reduction in their livelihoods and in the beauty of the environment, and an increase in the prevalence of diseases.

In the absence of any well-defined methods backed by law to calculate economic and environmental loss from pollution, the DoE enforcement team has a discretionary power to impose a penalty. An enforcement cell headed by an Executive Magistrate sets up a mobile court wherever environmental pollution occurs, so that enforcement can be assured instantly with the polluter pays principle used to assess financial penalties**. Effective action is often taken, but appeals by polluters can lead to a withdrawal or reduction of punishment without proper justification. In community and stakeholder consultations, it was suggested that ambiguity and corruption may cause these irregularities.**

Legal weakness put the entire environmental law enforcement system at risk of inefficiency and corruption. As long as inspection and enforcement mechanism from the DoE is ineffective, polluters will try to bypass wastewater treatment to gain higher profits. It has been claimed that it is less expensive for factories to pay penalties if they are imposed, than to invest in preventing pollution.

As industry does not pay anything to extract and use water, there is no incentive to reduce water consumption and become more efficient.

The environmental impact assessment process for obtaining an environmental clearance certificate should involve people who are potentially affected in the decision making process. **However, in practice EIA for industry seldom follows participatory protocols and affected people are bypassed. Stronger EIA guidelines are needed to promote participation.**

ETP use by factories

An effluent treatment plant is designed to treat a variety of effluents coming from different areas of the plant. The main focus of ETP is to reduce the BOD in the effluent discharged to waters bodies.

Estimates of the number of factories with Effluent Treatment Plants (ETPs) vary from 40 to 80% although it is widely acknowledged that many of the installed plants are poorly designed or not operated in an appropriate and responsible manner. It is estimated that around 70% of the 1,700 WDF textile processing units, which are responsible for considerable portion of the water demand and water pollution, are located in the greater Dhaka area (Figure 9). The remaining units are located in Mymensingh (north of Dhaka) and in Chittagong. It has been reported that the volume of wastewater generated by factories is within the capacity of the ETPs used by the textile industry.

Wastewater treatment is mostly by primary and secondary ETP processes. However, these conventional treatment systems are not very effective in removal of pollutants such as dissolved solids, colour, trace metals etc. from wastewater. Some 72 toxic chemicals reach the water supply from textile dyeing. Many of these chemicals cannot be filtered or removed through treatment in the ETP.

More advanced treatment methods, while reducing these pollutants, also give scope to recover and recycle water and chemicals.

Pollution loads in wastewater typically vary with the chemicals and dyeing processes used and the fiber quality of the fabric. Approximately 6 kilograms of chemicals per 100 kilogram of textiles are typically needed to dissolve the dyes in water. Water is also used as a solvent in many pre-treatment and finishing processes, such as washing, scouring and bleaching. At the end of the dyeing process, an estimated 10–20 % of the dye typically remains in the wastewater. If untreated, or insufficiently treated, water is released into water courses water pollution occurs. As such, the elimination or reduction of process-water and chemicals is a key water management solution for textile dyeing and finishing.

Many ETPs are not performing to their potential level, mainly due to lack of knowledge and technical capability, lack of monitoring and poor record keeping. The owners are often reluctant to run the ETP

effectively full-time to minimize the costs of expensive chemicals consumed in the coagulation-flocculation process. As a result the biological treatment processes do not perform as they should.

Findings from Field Survey and Consultation

During the field survey researchers observed and analyzed effluent treatment plant operation by collecting quantitative data on water consumption, discharged effluent volumes of treated water and wet sludge, and the parameters tested to meet the DoE standards. Researchers also evaluated factory types, production capacity per day, types of chemical and hazardous materials used, types of ETP and effluent treatment facilities, the capacity of ETPs, the number of staff overseeing and monitoring ETP performance, the educational qualification of ETP personnel and questions relevant to environmental laws, compliance and enforcement.

The public consultation survey showed that about two thirds of people in affected areas think that untreated or poorly treated effluent from textile factories pose serious health threats for nearby communities. The vast majority (67-88 %) believe that pollution from textile industry has had a negative impact on their livelihood activities and their income. Still more believe that pollution from the textile industry has had a negative impact on their households. Participants at the public consultation in Kanchpur Union were convinced of the negative impact of polluted water on agricultural land and on terrestrial and aquatic plant and wildlife.

Key interviewees at the factories said that the top three actions needed to prevent pollution were to improve the sludge management system, train ETP operators and improve the frequency of monitoring. **However, some factory staff and interviewees reported that there is no incentive to prevent pollution effectively, since the penalties paid to the DoE for offences are less than the cost of running the ETPs. In some cases DoE officials seemed to have put pressure on company owners by creating false test reports of their ETPs. Such cases would not be possible if the owners had a clearer understanding of ETP treatment processes, sample collection protocol and testing**.

More than two-thirds of key interviewees at the 22 factories named the DoE as the responsible agency that should take action against water pollution. Just over a quarter said that the brand owner or buyer should be responsible.

Conclusions

The water sector in Bangladesh is threatened by uncontrolled discharge of effluents and solid wastes to rivers, lakes, natural canals and floodplains. A plethora of policies and laws have been enacted and institutional frameworks have been put into place to govern and guide water governance and management. These policy and institutional frameworks should provide stewardship in addressing corruption, transparency and accountability and ensure inclusive decision-making processes by involving different stakeholders.

However, water bodies have not been protected because laws have not been enforced against the polluters by agencies responsible for wetlands and groundwater sources. Furthermore, groundwater

extraction is free in the areas outside city or municipal areas, leading to uncontrolled extraction of groundwater for industrial and other purposes.

There is no advisory and regulatory watchdog in this sector to oversee activities, make critical comments and suggestions for improvements, undertake advocacy campaigns, and enforce action against violations.

This report shows a clear lack of transparency and accountability in environmental decision-making processes in Bangladesh. Weak political governance has resulted in undue influence on state institutions to achieve growth rather than sustainable environment management practices. An implementation strategy and action for environmental management integration is missing.

The DoE is understaffed and lacks resources in both operational funds and logistics. The low priority given by the Ministry of Environment and Forests (MoEF) to this institute has demoralized the working force of the DoE to work on EIA issues.

Recommendations

The protection of environmental resources (forests, hills, wetlands, rivers and biodiversity) and the urban environment remains one of the great challenges. Political commitment, skilled human resources and institutional capacity are all required to ensure proper enforcement of rules and regulations for pollution control and protection of the environment. **Environmental governance needs to be strong enough to ensure that institutions, businesses and individuals take responsibility for conservation of natural resources and the environment and avoid pollution of land, water, air and ecosystems**. Private sector businesses must uphold and promote corporate social and environmental responsibilities. The Government has to force them to maintain and comply with these responsibilities.

All agencies need to demonstrate fairness, responsiveness and transparency and act responsibly as key pillars of governance. Powerful groups should not receive privileges that allow them to destroy the environment. Those who grab land, wetlands and forest resources illegally and pollute the environment through discharge of untreated or poorly treated effluent from the ETP must be punished in accordance with law.

Ministries, departments and administrators must work independently and boldly to apply existing laws and the political process must demonstrate support for institutions.

The MoEF should proactively promote environmental good governance in the country and allocate resources for the DoE that matches their mandate and workload.

The National Water Act 2013 could be used as a strong legal instrument to protect water integrity across all sectors and geographical areas of Bangladesh. The global apparel brand H&M reviewed the provision of the law with a water sustainability perspective and identified a number of gaps and made

recommendations which may offer useful ways to improve water sector integrity through improved effectiveness of ETP in the textile industry.

The following recommendations from this report build on that review and specifically highlight those most closely related to issues of integrity, in terms of transparency, accountability, participation and anti-corruption.

Transparency:

Greater transparency requires strengthening rights to information and research about the extent of social and economic damage.

- Greater clarity and definition is needed on the responsibilities and licensing and enforcement powers such as those currently divided between the Departments of Textiles and the Department of the Environment.
- Adequate enforcement of water regulations requires full time monitoring of effluents and ETP functions.
- Awareness needs to be raised among textile owners and their Apex Organizations about pollution and their legal and social responsibility to prevent it.
- DoE should make Local Government Institutions (LGIs) aware of how to use their powers to minimize pollution and support Upazila Fisheries Committees in ensuring acceptable water quality in wetlands and fishery areas.
- DoE should accredit and appoint competent third party organizations to monitor textile companies regularly on its behalf in addition to conducting its own monitoring.

Accountability:

Greater accountability requires clearer lines of responsibility and stronger sector capacity.

- Greater integration of responsibilities by MoEF with related ministries will help to identify common goals and start a dialogue on strengthening institutional ownership.
- A review of the ECA 1995, the ECR 1997 and the Water Act 2013 is needed to establish a consistent approach to conduct EIA and issue project approval for water related project.
- The DoE needs the skills, staffing levels and resources required to perform its watchdog and enforcement roles, especially in monitoring Environmental Impact Assessments.
- The country should incorporate market based ‘polluters pay principle’ system with appropriate economic incentives, reward, disincentive and penalties
- The Water Resources Planning Organization (WARPO) requires a clearer mandate and the resources operate a project approval system with integrity.

Participation:

Participation must ensure places at the table for civil society, private sector and excluded groups to balance stakeholder interests.

- An appropriate system is required for public consultation to ensure informed decision making and grievance redress, especially for local people affected by water pollution.
- National and community level bodies should be established and validated to monitor water quality of *khals, beels* and rivers, and the results used to determine anti-pollution measures, operating permits and actions (including legal actions) against offending industries.

Anti-corruption measures:

Corruption can be tackled by ensuring a stronger role for regulators and making participation and transparency mandatory.

- A licensing system for industrial withdrawal from groundwater sources is required with a strong monitoring system by and DoE and the Water Resources Planning Organization (WARPO).
- DoE regulatory bodies should be decentralized and strengthened to monitor effluent treatment plants and systems.
- DoE and WARPO should create more effective mechanism for penalties, such as fines, loss of tax and duty concessions, blacklisting or even removing operating licences.
- Environmental courts should be strengthened to ensure punishment of polluters. Administrative interference should be minimized to decrease corruptions and increase transparency.
- The legal process should be simpler and quicker when action is taken against alleged improper extraction of water or pollution.

Chapter 1: Introduction

1.1 Overview of the Textile Industry in Bangladesh

Bangladesh is the world's second largest apparel exporter for western clothing brands. The textile and ready-made garments (RMG) industry accounts for nearly 80% of export earnings and contributes more than 12% of the national GDP. Annual turnover is nearly 23 billion USD, predicted to increase to 50 billion USD by 2021 and 87 billion by 2030 (Arup, 2014; BGMEA 2016). The RMG and textile sector employs about 4.4 million people, of whom 80% are women. About 60% of exports go to Europe and 40% to the USA[1]. Only 5% of the factories are owned by foreign investors: the rest are Bangladeshi owned. Apart from playing a vital role in Bangladesh's economic growth, the RMG sector has bolstered the country's image worldwide: the 'Made-in-Bangladesh' tag is internationally recognized.

Textiles make up a substantial part of the apparel and RMG sector, contributing around 30% of total industrial GDP of Bangladesh (PaCT, 2014) and supporting fast-growing demand from the RMG sector. The textile sector comprises about 1,700 washing dyeing and finishing (WDF) factories manufacturing fabrics for export or as sub-contractors (BGMEA). The exact number of companies is unclear. A market segmentation study conducted by PaCT2 in 2016 reported that 719 of 6,706 factories listed by the Bangladesh Garment Manufacturers and Exporters Associations (BGMEA) are WDF factories, 653 in Dhaka, 52 in Chittagong, and 14 in Mymensingh. As shown in Figure 1, 39% of the WDF have production capacities of up to 10 metric tons per day, 45% produce 10-20 tons per day and 16% produce more than 20 tons per day.

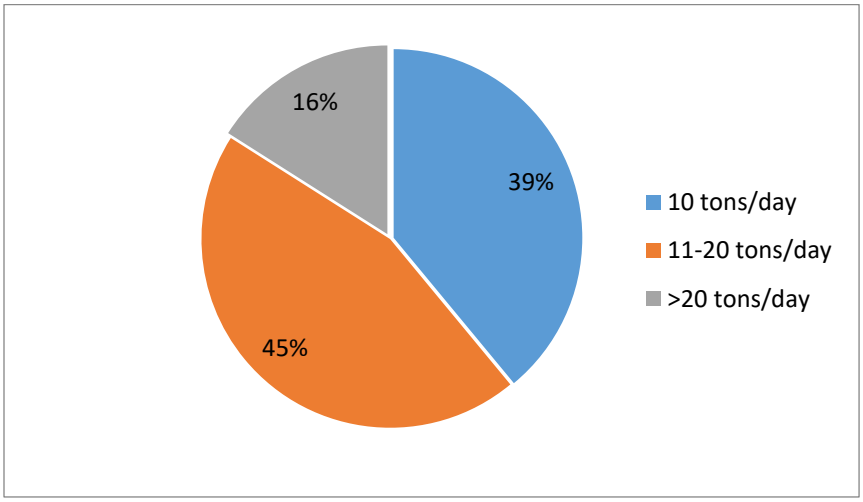

Figure 1: Production Capacity vs. Percentage of Textile Factories in Bangladesh (Source: Market Segmentation Study, (PaCT), 2016)

[1] Figures from the Bangladesh Garment Manufacturers and Exporters Associations (BGMEA)

[2] The Partnership for Cleaner Textile (PaCT) is led by the International Finance Corporation (IFC), and works in partnership with the NGO Solidaridad, the Embassy of the Kingdom of the Netherlands, 13 global apparel brands, and 2 technology suppliers, as well as with textile factories, leading technology suppliers, and the Bangladesh Garment Manufacturers and Exporters Association (BGMEA)

It is reported that textiles in Bangladesh extract 15 million m^3 of groundwater to process about 500 million tons of fabric per year. As PaCT reported, textile wet processing is extremely water intensive, typically consuming 200-250 litres of water for every kilogram of fabric production, equivalent to the daily water requirement of two people and nearly five times greater than the international best practice of about 50 lt water/kg fabric. There is no reliable data on total wastewater generation of effluent from the textile industry. Wastewater is discharged into water bodies through effluent treatment plants (ETP), but often at a substandard level, with the result that the quality of surface water in the wetlands and rivers has deteriorated (Dhaka Watershed Report). This not only leads to serious environmental degradation but also reduces income for communities whose livelihoods are traditionally dependent on these resources.

Konabari Industrial Cluster in Gazipur is one of the major textile belts of the country. Here 28 WDF units generate 51,000m^3 of wastewater every day of which the five largest units are responsible for 60% of the effluent. These 28 factories cumulatively use 120 tons of chemicals and dyes every day. As observed from the field survey and during community consultation in the Konabari area, wastewater streams are discharged into surrounding fields, irrigation channels, or as surface water irrespective of whether it has been properly treated. This discharge enters the Turag River from where it flows to the Buriganga and Shitalakhsya Rivers causing severe water pollution.

1.2 Water Consumption in Textile Processing Industry

Water is used extensively throughout textile processing, and effluent treatment plants should play the most significant role in meeting the industry responsibilities by removing pollutants from the wastewater. Almost all dyes, process chemicals, and finishing chemicals are applied to textile substrates from water baths. Most steps in fabric preparation, including de-sizing, scouring, bleaching, and mercerizing, use aqueous systems. Water is also consumed in washing fabric and in boilers to produce steam.

The amount of water used varies widely in the industry, depending on the specific processes at the factory, the equipment used and the prevailing management philosophy. Cotton yarn and fabric require the largest amount of water. Conventional preparatory processes (de-sizing, scouring, bleaching, and washing) are highly water and energy-intensive. Wastewater from dyeing creates the greatest pollution load. Water conservation techniques in textile processes would help to prevent pollution from the sector.

1.3 Water Governance in Bangladesh

Water plays an important role in the economy and ecosystem natural resources. Agriculture, fisheries, commerce and navigation are all dependent on sustainable use of water resources, with agriculture extracting and consuming the greatest amount of groundwater. Deteriorating water quality has become a great concern, linked to population growth, untreated discharge of sewage, unplanned urbanization and industrialization. The quality of surface water resources as measured by parameters like dissolved oxygen (DO) and biochemical oxygen demand (BOD) varies. Surface water quality in the wet season

(monsoon) is better than in the dry season. Surface water close to urban areas and industrial clusters is exposed to untreated or poorly treated sewage and industrial effluents (DoE, 2012). Rivers near major cities in Bangladesh face acute challenges in supporting the bio-ecological environment particularly during the dry season. Water quality is at a critical condition in a number of rivers including the Buriganga, Shitalakkha, Balu, Turag, Bangshai and Dhaleswari rivers near Dhaka and Gazipur; the Karnaphuli in Chittagong, the Surma in Sylhet, and the Jamuna near Sirajganj. The Buriganga, Shitalakkha, Balu and Turag rivers have been declared ecologically critical areas (ECA) by the Ministry of Environment and Forests (MoEF) of the Government of Bangladesh.

An Environmental Outlook report (2012) stated that water quality is affected by municipal waste, industrial discharges and agrochemicals used on crop fields. Significant drivers and associated pressures causing degradation of water quality, the impact of water pollution and policy responses are summarized in Table 1:

Table 1: Significant Drivers and associated Pressures causing degradation of water quality

Drivers	Pressures	States	Impacts		Policy responses	
			Natural impact	Human Social and economic	Capacities available	Lacking
Industrial and agricultural waste including unsustainable agriculture and excessive use of agro-chemicals	• Pollution from effluents and sludge • Discharge of heavy metals, • Dry season irrigation depletes ground water table • Excessive use of chemical pesticides and fertilizers	• Quality and quantity of surface and groundwater resources declined • Arsenic level in groundwater increasing • Soil fertility declined • Increased level of pollutants.	• Disappearance of aquatic life; especially edible fish which were once abundant in the open waters • Polluted surface and groundwater resources leads to drinking water scarcity • Impact on aquatic biodiversity	• Increased risk of water-borne disea • Accumulation of toxic and hazardous pollutants in river water and along river-beds • Arsenic contamination leading to kidney and lung damage • Loss of agro-production	• Conducting EIA and installation of ETP mandatory under BECA 1995 and ECR 1997 • NWMP 2004 • National Land Use Policy 2001 • National Agriculture Policy 2009 • National Policy for Arsenic Mitigation 2004 • Hazardous Waste and Ship Breaking Rules 2011 • Draft Bangladesh Water Act	• Awareness about installing and operating ETP • Adequate monitoring and enforcement to implement the polluter-pays principle • Appropriate zoning for industries

Source: Bangladesh Environment and Climate Change Outlook (DoE, 2012)

The Government of Bangladesh has formulated policies, plans, rules, regulations and strategies that recognize the importance of water quantity and quality for sustainability of the economic and environmental health.

The Department of Environment (DoE) formulated environmental policy in 1992 followed by the Environmental Conservation Act (ECA) in 1995 and the Environmental Conservation Rules (ECR) in 1997. The ECA 1995 gave direction to effluent treatment processes through the installation of effluent treatment plants (ETP). ECR 1997 set wastewater discharge standards, and penalties. Industries have been categorized based on their environmental risks and pollution intensity. Industries that generate liquid waste with potentially polluting parameters must install ETP as a requirement for obtaining an Environmental Clearance Certificate and to comply with environmental law. Penalties for violations and noncompliance are based on the polluter-pays principle.

However, although environmental laws and rules have been revised several times, water governance and integrity remain without significant improvement in terms of effective monitoring, ETP inspections and enforcement. The DoE still suffer an inspection capacity deficit to ensure proper implementation of the environmental laws and protect quality of surface water from industrial contamination. Water quality and quantity have also been deteriorating in Bangladesh due to management failures in preventing pollution from other sources, such as untreated urban waste and excessive agrochemical pollution from crop fields. This is made worse by the effects of unplanned development and encroachment without proper waste management (DoE, 2012).

Textiles is one of the largest polluters in the country. The industry discharges 12-13 million m3 of wastewater annually, representing 85-90% of the groundwater it extracts for fabric processing. It is reported in various reports (such as the Dhaka Watershed Report of the World Bank, 2011) and it is evident from the water quality of the rivers surrounding Dhaka city that wastewater including industrial effluents is discharged without any treatment or with inadequate treatment. Few textile factories in Bangladesh maintain wastewater treatment processes at a level to meet the Government discharge standards.

During stakeholder consultations, the DOE representative said the DOE has inadequate human and logistic resources to enforce legal instruments against the polluters. Community people added issues of integrity, transparency and corruption as contributing to the failure of ETP operations in local textile factories.

DoE as the national regulatory agency may be considered as well equipped and capable of enforcing compliance using existing environmental laws. However, the Dhaka Watershed Report from the World Bank, (2011) says that the department is acutely short of manpower and logistics and is unable to fulfill its duties adequately. Potentially polluting factories require intensive monitoring and surveillance but are seldom inspected. Another issue of concern is the lack of transparency in assessments of environmental damage. In the absence of any well-defined methods backed by law to calculate economic and environmental loss from pollution, the DoE enforcement team has a discretionary power to impose a penalty. This subjective judgment can lead to corruption and integrity failures. Legal weakness put the entire environmental law enforcement system at risk of inefficiency and corruption.

As long as inspection and enforcement mechanism from the DoE is ineffective and corrupt, polluters will try to bypass wastewater treatment to gain higher profits.

1.4 Rationale of the study

Few studies focus on the governance of ETP operations in the textile sector. In Bangladesh there is strong political will for quick development, in which business communities including the textile sector find ways to grow without maintaining wastewater discharge protocol and compliance to the required standard. Transparency International Bangladesh and Bangladesh Water Integrity Network (BAWIN) identified a need to examine and analyze potential areas of weakness with respect to transparency, accountability and integrity that reduce the effectiveness of ETP and to make recommendations to improve governance to promote sustainable textile and RMG production in Bangladesh.

1.5 Objective of the study

The overall objective of this study has been to identify transparency, accountability and corruption in implementing environmental laws and enforcing regulations for effective use of ETP in the textile sector of Bangladesh and to make recommendations to improve ETP operations and water sector integrity.

The specific objectives of the study were to

a) Examine to what extent the government's existing regulatory framework (laws, rules and policies) is being implemented by the textile industry in operating ETPs;
b) Review sectoral policies and laws involved with protection of water quality and quantity;
c) Identify key governance challenges in the use of ETPs;
d) Assess the quality of wastewater treatment and its impact on downstream wetlands and communities;
e) Make recommendations to improve the use and effectiveness of ETPs by the garments industry.

1.6 Scope of Work

The study focused on governance and integrity issues related to ETP operations in the Bangladesh textile sector, looking for loopholes in legal instruments, implementation and enforcement. The study has reviewed policies and laws of sectors directly or indirectly linked with water sector integrity. The study carried out primary data collection at 22 factories and adjacent communities in the pollution impact zones. Secondary information was collected and literature reviews conducted to examine technical features of textile factories, the environmental and social impact of pollution and the status of sectoral policies and laws relevant to water governance. More specifically, the study:

a) Examines the quality of ETP operations and management;
b) Assesses of how far sectoral policies and laws protect the quality and quantity of surface and groundwater;
c) Assesses water governance and management with respect to transparency, accountability and overall integrity perspective in the use and effectiveness of ETPs;
d) Maps the location of textile factories in Bangladesh, pollution intensity and the effect on people and livelihoods.

1.7 Study Area

The study area is the whole of Bangladesh. However, the focus was on major textile clusters, such as the Konabari cluster in Gazipur, Tongi cluster in Gazipur, and clusters at Savar, Narayanganj and Chittagong, which together contain 70-80% of the textile factories in Bangladesh.

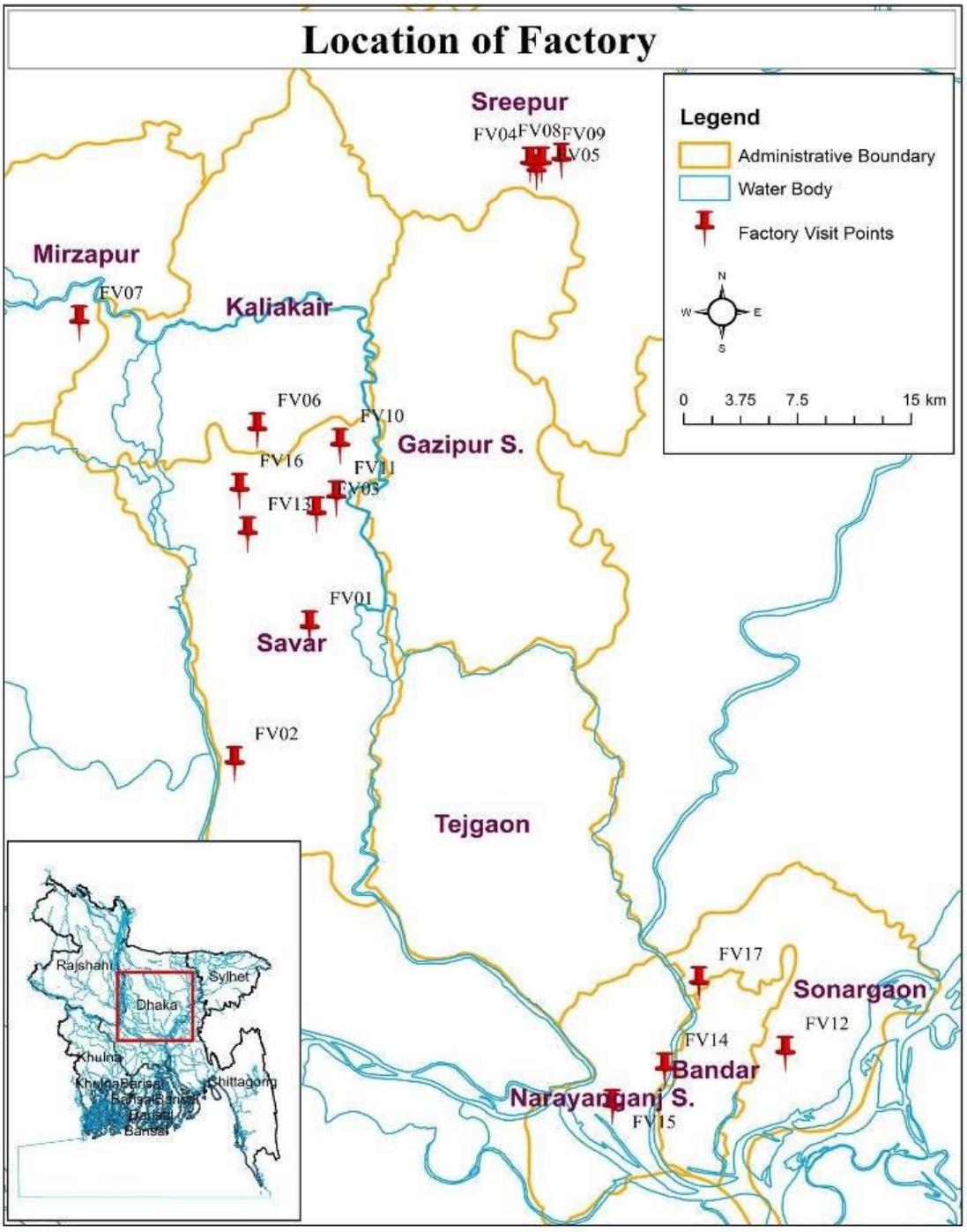

Figure 2: Location of Factories Surveyed in this Study

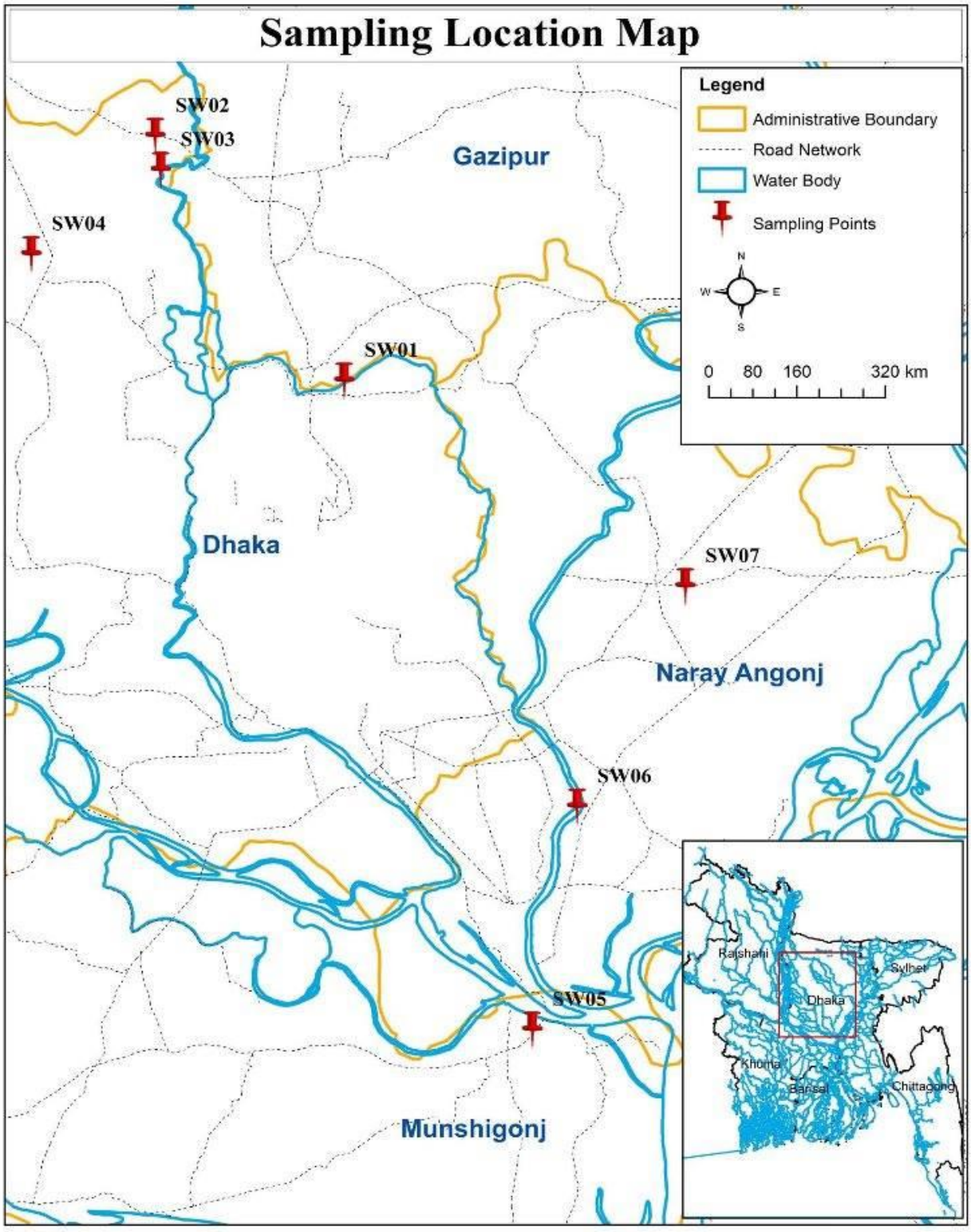

Figure 3: Water Sample Collection Locations

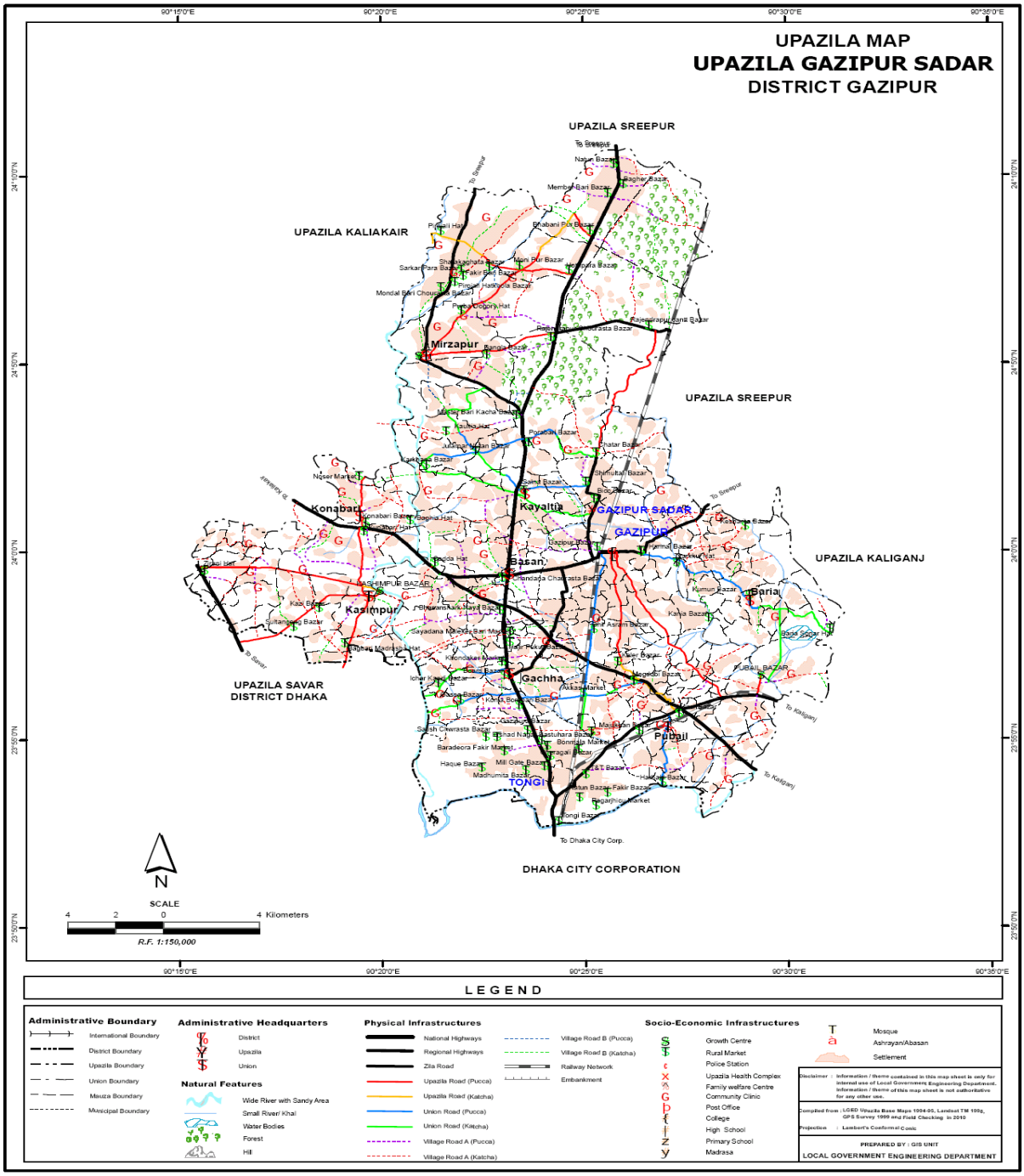

Figure 4: Tongi-Konabari Cluster Map of the Study Area

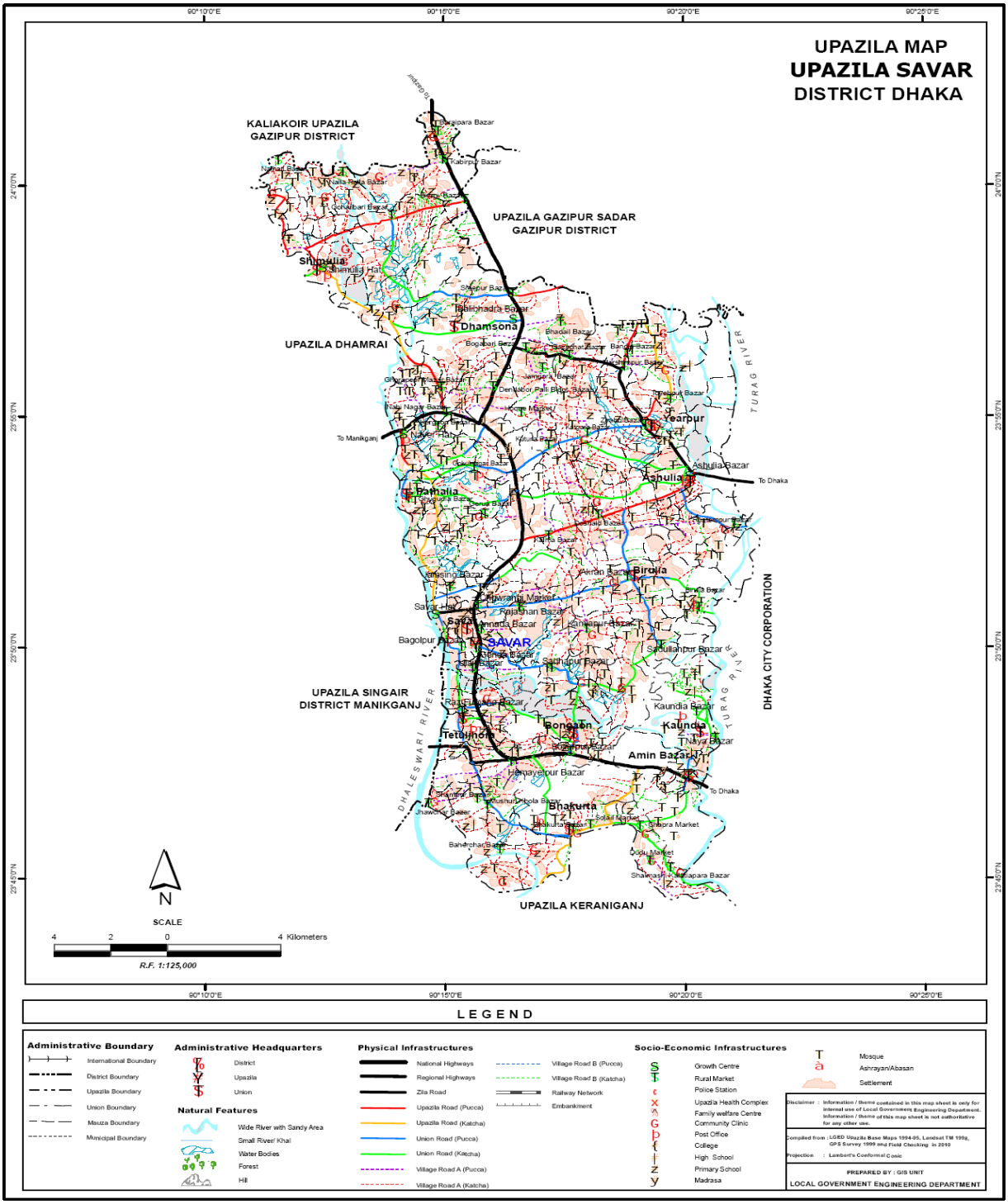

Figure 5: Savar Cluster Map

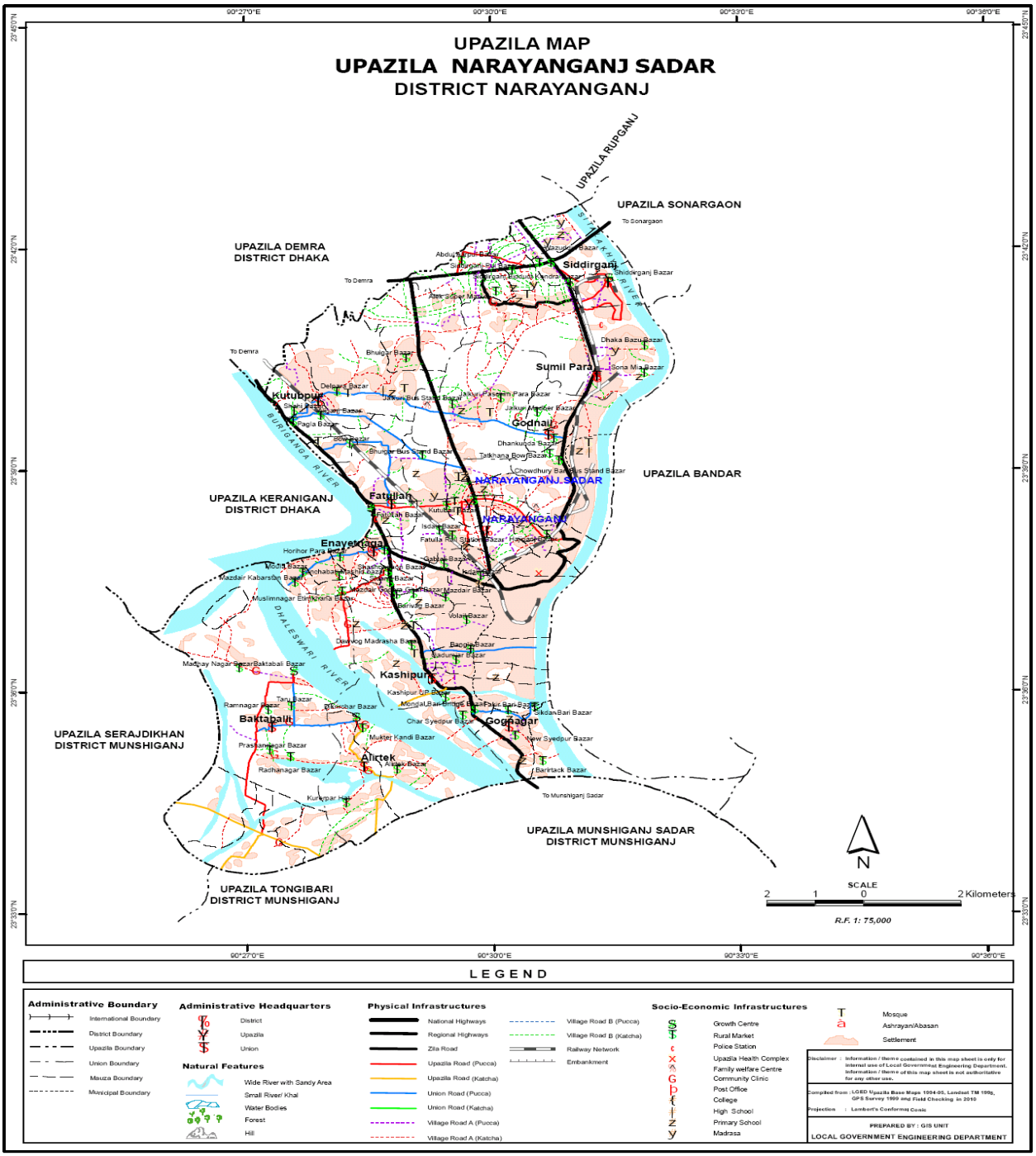

Figure 6: Narayanganj Cluster Map

1.8 Methodology

The methodology for this study included field observations and field level data collection through formal and informal interviews. A pre-coded, structured questionnaire (Annex-1) was used to create a baseline study. The field survey strategy for this study provided a mix of both qualitative and quantitative methodology: in-depth interviews, close-ended and open-ended semi-structured discussions with stakeholders from various sectors, including textile factories, community people, government agencies, water sector researchers and academics. Community people provided a greater depth of understanding about the study area. The study team comprised members with expertise on wastewater treatment technology, governance and integrity issues, environmental legislation, textile process technology and data management and analysis. The study included a review of secondary information, factory level data collection, community consultation, key informant interviews and stakeholder consultation.

Desktop assessment and gap analysis: A detail overview of the existing information and literature on ETP operation, management and governance issues was conducted to identify information and knowledge gaps. This secondary information review helped identify focus areas for primary data collection. The authors reviewed relevant laws and policies, including those relating to environmental, industrial, water and wetland, and agriculture, to identify whether these were consistent with sustainable and equitable development of the sector. Analysis identified contradictory or inadequate policies and laws which may need improvements for better water sector integrity.

Secondary sources of information included RMG and textile project reports from PaCT IFC, GIZ and from brands. These were studied to identify textile effluent management and treatment issues, pollution load, financial implications, operations and management challenges in ETP operations.

Factory selection and information collection: A total of 22 factories of various sizes with dyeing and wet processing facilities were selected (strategic and random sampling) for primary study and research. These were in the Konabari, Tongi, Savar, Narayanganj and Chittagong clusters. Textile and apparel industries in Gazipur, Narayanganj, Savar, and Chittagong were also identified for the study. Selected factories (Annex 2) were visited by the enumerators with a structured questionnaire (Annex 1) which was circulated to factory managements in advance. Email, phone calls and personal visits were conducted to get data sheets completed.

Focus group discussion and interviews: Consultants conducted focus group discussions (FGD), key informant interviews (KII) and stakeholder consultations with factory managers, representative of affected people, government regulatory agencies and the textile and apparels sector associations. They collected integrity and governance related information about water treatment, discharge, monitoring and compliance, violation of standards and penalties and compensation. Semi-structured questionnaires and checklists were used in some cases.

Sample collection, testing and analysis: Samples of effluent were collected from eight discharge channels of four textile clusters and tested in BCSIR and/or DPHE laboratories for parameters,

including pH, DO, EC, BOD, COD, TDS, TOC and TSS. Test results were analyzed to check pollution loads in the environment. It is assumed that pollution observed in the discharge channels came from factories of the respective clusters.

Community consultation: ETP effectiveness with respect to integrity and governance is under challenge due to rapid growth in the sector without a proper sustainability plan. In many industrial clusters, water bodies (rivers, canals, beels, etc.) have been severely polluted for many years due to untreated and poorly treated discharge from ETPs (Institute of Water Modeling, 2008). Community people including, farmers, fisherman, and others who rely on water bodies have seen a reduction in their livelihoods and in the beauty of the environment, and an increase in the prevalence of diseases. Five community consultations were conducted in Konabari, Savar and Narayanganj-Rupganj clusters.

Stakeholder consultation: Findings from the ETP research and study were shared with stakeholders and experts on the textile wastewater treatment process, environmental laws and inspection and enforcement through a stakeholder consultation in Dhaka level on 27 December 2016. This forum helped finalize policy guidelines and an action plan for the sustainability of the water sector from integrity perspective and the effective use of ETPs.

Mapping: GIS mapping was done to map textile clusters and locations of wastewater/effluents receiving wetlands and rivers. Maps also show the locations of effluent sample collections, community consultations and factory locations in the study.

Reporting: All data and information were analyzed and drawn together to demonstrate major facts and findings that have damaged water sector integrity in the use and effectiveness of ETP in the Bangladesh textile sector. Issues relating to lack of transparency and corruption in implementing environmental and sectoral laws were reviewed and synthesized. Recommendations and suggestions have been made to draw a path to improved water sector integrity.

Chapter 2: Water Sector Integrity and ETP - Review of Policy and Institutional Bottlenecks

The water sector in Bangladesh is threatened by uncontrolled discharge of effluents and solid wastes to rivers, lakes, natural canals and floodplains (Banglapedia, 2008). Although, there are laws to protect these the natural reservoirs, water bodies have not been protected against pollution, because laws have not been enforced against the polluters by agencies responsible for wetlands and groundwater sources. Furthermore, groundwater extraction is free in the areas outside city or municipal areas, leading to uncontrolled extraction of groundwater for industrial and other purposes. Efficiency in water consumption is uncommon in the industrial sector because of this free availability. Some development organizations, such as GIZ, USAID, and International Finance Corporation (IFC) have introduced projects in the Bangladesh textile sector to improve water consumption efficiency and prevent pollution, underlining the fact that water use efficiency is essential to make this sector more competitive and sustainable. Efficiency in raw material consumption including water energy and chemicals, will reduce effluent volume and loads that have to be dealt with by effluent treatment plants.

The government of Bangladesh has a broad range of legal instruments and policies to protect water bodies (see Table 2). If these environmental and other laws related to water sector conservation can be better aligned, there is scope to protect water bodies from pollution while improving efficiency in the textile processes. (PaCT, 2016).

Table 2: Water Related Act, Policy, Strategy, Plan, International Treaty

Legal Instruments	Year
Act	
Bangladesh Water Act	2013
National River Protection Commission Act	2013
Environmental Court Act	2010
Bangladesh Water Development Board Act	2000
All Playgrounds of Municipal Area, Open Area, Park and natural water reservoir including Municipal Area of City, Divisional Town & District Town, Conservation Act	2000
Water Supply and Drainage Authority Act	1996
Bangladesh Environment Conservation Act	1995
Water Resource Planning Act	1992
Ground Water Management Ordinance	1985
The Protection and Conservation of Fish Act	1982
Territorial Water and Maritime Zone Act	1974
Policy	
National Industry Policy	2010
National Environmental Policy	2013
National Land Use Policy	2001
National Agriculture Policy	1999
National Water Supply and Drainage Policy	1998
National Fisheries Policy	1998
National Environmental policy	1992

Legal Instruments	Year
Strategy	
National 3R Strategy for Waste management	2010
National Sustainable Development Strategy (2010-2021)	2010
Plan	
National Environmental Management Action Plan (1995-2004)	1995
Clean Dhaka Master Plan	2005
Action Plan for Solid Waste Management in 19 towns of Bangladesh based on 3R Principle and Carbon Financing	2009
Sixth Five Year Plan (2011-2015)	2011
Seven Five Year Plan (Final Draft)	2016
International Treaty	
Ganges Treaty	1996
International Convention	
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	1989
Convention on Biological Diversity (CBD)	1992
Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington (CITES)	1973
Environmental Modification Convention (ENMOD)	1977
Ramsar Convention	1973
Paris Agreement	1992

2.1 Acts

2.1.1 Bangladesh Water Act, 2013:

The Bangladesh Water Act, 2013, based on the National Water Policy, is designed to integrate development, management, extraction, distribution, usage, protection and conservation of water resources in Bangladesh. Under this act, all types of water (e.g. surface, ground, sea, atmospheric) within the territory of Bangladesh belong to the government on behalf of the people.

The Act contains a requirement for permits/licences for large scale water withdrawal beyond domestic use. Without prior permission issued by the Executive Committee of Ministry of Water Resources, no individual or organization can extract, distribute, use, develop, protect or conserve water resources, nor can they build any structure that impedes the natural flow of rivers and creeks. However, the maximum amount of surface water or groundwater that can be withdrawn by individuals or organizations is not set The Act does set priorities for water usage in areas where water resources are in critical condition. The priority order is (highest to lowest) as follows: drinking water> domestic usage> irrigation> fish culture> bio-diversity> wildlife> in stream flow> industry> salinity control> power generation> recreation> miscellaneous. Only drinking water and domestic use are considered as basic rights. (Md. Khalequzzaman, 2013)

The Water Act has no specific mention of the protection of environment. Coordinating the provisions under this Act with other laws, policies, rules and regulations is a major challenge.

2.1.2 National River Protection Commission Act, 2013:

The National River Protection Commission Act, 2013 mandates the government to take legal action to protect rivers from encroachment, pollution and unscrupulous use. The commission provides advice to the government and coordinates the activities of ministries involved with management of water and rivers. However, this act is does not directly address the quality of water in rivers.

2.1.3 Environmental Court Act, 2010:

This law established Environmental Courts in Bangladesh and defined their scope in enforcing the Environment Act (revised) 2010. They can impose penalties, imprison individuals, inspect properties and places, and accept public complaints and memorandum. The courts should be able to overcome obstacles in the implementation of environmental laws. However, only the Dhaka Environmental Court has so far started functioning, although the act proposes an environment court in every district.

2.1.4 Bangladesh Water Development Board Act, 2000:

The Bangladesh Water Development Board Act allocates responsibility for the administration of the flow of rivers, waterways and groundwater bodies on The Bangladesh Water Development Board (BWDB). This body is also responsible for programs relating to water resources including project formulation, implementation, operation, maintenance and evaluation in line with the National Water Policy and the National Water Plan.

2.1.5 All Playgrounds of Municipal Area, Open Area, Park and Natural Water Reservoir including Municipal Area of City, Divisional Town & District Town, Conservation Act, 2000:

This Act is designed to conserve, regulate, protect and reduce the abuse of the listed resources as well as making them sustainable.

2.1.6 Water and Sewerage Authority (WASA) Act, 1999:

Under the WASA Act (1999), the Dhaka Water and Sewerage Authority (DWASA) has sole responsibility for providing water, sewerage and storm water drainage services in Dhaka. The Act provides for an autonomous structure in which the management of DWASA is answerable to a Board of Directors appointed by the Government but representing a range of stakeholders. In practice, full autonomy of is lacking due to the dependence of DWASA on Government financing and guarantees, and the fact that the WASA Act (1996) has not been implemented in full. The Act lacks detailed rules and regulations which would clarify the responsibility of sector and institutional actors and encourage a transparent mandate and accountability structure. There is, for example, no performance agreement between the Government and DWASA. DWASA also suffers from a range of technical, commercial and financial inadequacies and inefficiencies. Dhaka's growth puts extraordinary pressures on DWASA to manage water supply, sewerage and storm water drainage services to maintain the level of service and meet the growing needs of its population. (DWASA, 1999).

2.1.7 Bangladesh Environmental Conservation Act (ECA), 1995:

The Department of Environment (DoE) adopted the ECA in 1995 to protect the natural environmental from pollution and emissions, to improve environmental standards and to control and mitigate pollution. The ECA has a number of shortcomings, since it deals only with the post-harm situation and does not specify permissible levels of emissions or corrective actions. The Act was revised in 2010 to adapt to changing development patterns.

2.1.8 Water Resource Planning Act, 1992:

The main function of the Water Resource Planning Act is to ensure the development and balanced use of water resources. It oversees institutions involved in the development, utilization and preservation of water resources, those seeking to raise professional standards in relation to teaching and training, and those collecting and reviewing information on the utilization of water resources etc. The Act has no specific powers for industrial pollution control.

2.2.8 Ground Water Management Ordinance, 1985:

This ordinance is designed to manage groundwater resources for agricultural production. A licence must be granted by a thana parishad before a tube-well can be installed. The thana parishad considers soil condition, distance to other wells, the number of beneficiaries and the suitability of site before granting a licence. The Ordinance does not take into account other uses or users, and leaves the legal position of groundwater used for domestic/industrial purposes in doubt. New legislation should include the possibility of declaring special groundwater management and protection areas, and provide for issues such as the registration of drillers, permits for water well drilling and groundwater abstraction control.

2.2.9 The Protection and Conservation Fish Act, 1950:

The Protection and Conservation Fish Act has powers to prohibit fish sales, penalize illegal fishing, and make arrests without a warrant. However, there are concerns about integrity issues (transparency, equity and accountability), environmental conservation and pollution control.

2.2.10 Territorial Water and Maritime Zone Act, 1974:

This act is intended to prevent and control marine pollution and preserve the quality and ecological balance of the marine environment in the high seas adjacent to territorial waters. There is no specific provision dealing with the integrity and accountability of ocean policy management.

2.2 Policies:

2.2.1 National Industry Policy, 2010:

The core objective of is the balanced development of industries in different regions of the country. The policy lays strong emphasis on the protection of the environment and directs manufacturing enterprises to control environmental pollution by setting up effluent treatment plants (ETPs) and comply with environment-related laws and regulations. Corruption and water integrity issues are not addressed.

2.2.2 National Environmental Policy, 1992 (revised 2013):

The National Environmental Policy 2013 is a timely revision of the old policy in the context of climate change. It recognizes the importance of managing all aspects of the environment in a sustainable manner. The policy covers a wide range of issues, but there is lack of focus to control corruption in implementation of the policy.

2.2.3 National Land Use Policy, 2001:

The national land use policy is designed to safeguard the environment and control the conversion of agriculture land. There is no specific provision to tackle corruption or improve accountability.

2.2.4 National Water Policy, 1999:

Under this policy, effluent disposal will be monitored by relevant Government agencies to prevent water pollution. Standards of effluent disposal into common watercourses will be set by the Water Resources

Planning Organization (WARPO) in consultation with DoE. Industrial polluters will be required under law to pay for the cleanup of water body polluted by them. The policy has no provisions to combat corruption, accountability, and community participation for water management.

2.2.5 National Agriculture Policy, 1999:

The National Agriculture Policy promotes 'environment-friendly sustainable agriculture' through increased use of organic manure and strengthening of the integrated pest management (IPM) program which are important to protect water bodies from agro-based pollution. There are no specific provisions to deal with untreated or poorly treated effluent of the industry discharged into the crop field.

2.2.6 National Water Supply and Drainage Policy, 1998:

The policy signifies that standards of effluent disposal in common watercourses will be set by WARPO in consultation with DoE, and incorporates the "polluter pays" principle into the development of guidelines for regulatory actions designed to protect public health and the environment. Specific penalties against corruption and pollution are not included.

2.2.7 National Fish Policy, 1998:

The objectives are to maintain ecological balance, conserve biodiversity, ensure public health, provide recreational facilities, and meet demand for protein. Although pollution from textile effluent threatens fisheries, the policy contains no specific points to control pollution from the industry.

2.3 Strategies:

2.3.1 National 3R Strategy for Waste Management

The National 3R (*reduce, reuse and recycle*) Strategy recognizes waste as a resource and emphasizes the importance of separation of waste at source. Technologies should be environment friendly, appropriate and affordable. Cleaner production is central to efforts to prevent pollution, reduce the use of energy, water and material resources and to minimize waste. The strategy promotes good practice in areas such as product life extension, industrial symbiosis and by-product exchange, green purchasing, and environmental management. It supports the polluter-pays principle, public private partnerships to secure waste service improvements, and collaboration with scientific research bodies to promote 3R. The strategy supports alignment between services received and payments.

2.3.2 National Sustainable Development Strategy (NSDS):

The NSDS aims to reduce industrial water pollution and air pollution caused by transport, and identifies solid waste management as a key challenge in the urban environment. It supports tackling water pollution through enforcement of environmental rules and regulation, industrial zoning, water quality monitoring, waste reception and facilities in ports, and cleaning up and rehabilitating hot spots in Dhaka, Chittagong and Khulna.

2.4 Plans:

2.4.1 Action Plan for Solid Waste Management in 19 towns of Bangladesh based on 3R Principle and Carbon Financing, 2009:

The plan covers waste management from generation to final disposal to reduce the environmental, social and economic impact of current disposal practices. (APSWM, 2009)

2.4.2 The Sixth Five Year Plan, 2011-2015:

The Sixth Five Year Plan recognizes the need to mainstream environmental issues in development processes. It sets targets to increase productive forest coverage, treat urban waste to clean river waters, promote zero discharge of industrial effluents, protect at least 10% of wetlands as aquatic sanctuaries in peak dry season, and restore canals and natural water flows in Dhaka and other major cities.

2.4.3 National Environmental Management Action Plan (NEMAP), 1995-2005:

NEMAP was a 10 year plan prepared by the Ministry of Environment and Forests (MoEF) to promote better management of scarce resources, raise awareness and reverse environmental degradation. It may be considered as the first initiative towards the preparation of a National Agenda 21, the United Nations action plan for sustainable development.

2.4.4 Clean Dhaka Master Plan, 2005

Dhaka City Corporation prepared the Clean Dhaka Master Plan, with technical and financial support from JICA, to develop its capabilities and management skills in solid waste management. The Plan identified programs and projects that support hygienic practices, protection of water bodies, and sanitary land fill for Dhaka's solid waste.

2.4.5 Seventh Five Year Plan, 2016-2021 (Final Draft)

Major environmental targets in the seventh five year plan include increasing tree cover and healthy native forests and protecting wildlife. Several aims are relevant to controlling industrial pollution, including watershed management and soil conservation, community based pollution control enforcement mechanisms, enforcement of environment clearance conditions, establishment of lead recovery and recycling plants, and increasing the capacity of Dhaka's sewerage treatment plant to cover 80-90% households. More specifically the plan includes provisions to install communal ETPs in 10 textile zones of the greater Dhaka region and within washing, dyeing and finishing textile factory premises. Installing an ETP in factory premises or connection to a combined ETP is mandatory for all WDF firms under the Environment Conservation Rules (ECR), 1997. The five year plan also aims to reduce water use and by 25% and waste water generation from processing activities by 25%.

2.5 Several International Environment Relevant Convention

Table 3: List of international convention, treaty, protocol to protect and conserve environment and water

Sl. No.	Convention, Treaty	Highlight of Focus
1.	Ganges Treaty	Transboundary water sharing between Bangladesh and India.
2.	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	Controlling transboundary movement of hazardous wastes to protect human health and environment.
3.	Ramsar Convention, 1971	Protocols to protect wetlands of international importance and promote the conservation and wise use of wetlands.

2.6 Institutional Level Challenges:

The Department of Environment (DoE) has responsibility for issuing environmental permits for factories, monitoring compliance and enforcing environmental standards. This has been supplemented by the Bangladesh Water Act 2013, initiated by the Ministry of Water Resources (MoWR), which empowered the Water Resources Planning Organization (WARPO) to spearhead its implementation. It is not clear whether in future the DoE or WARPO will be the body that ensures appropriate Environmental Quality Standards are met. Within the Water Act 2013, there are several provisions covering enforcement such as compliance orders, protection orders, removal orders, imprisonment and compensation but implementation is vague.

Chapter 3: ETP Operations and Integrity Practices

Conventional textile dyeing and wet processes require large amounts of fresh water and subsequent disposal of wastewater. The textile industry in Bangladesh has long been exploiting groundwater sources and discharging pollution from wastewater into local streams and rivers.

Pollution loads in wastewater vary with the chemicals and dyeing processes used and the fiber quality of the fabric. Approximately 6 kilograms of chemicals per 100 kilogram of textiles are typically needed to dissolve the dyes in water. Overall, 20 % of freshwater pollution comes from textile treatment and dyeing. Water is also used as a solvent in many pre-treatment and finishing processes, such as washing, scouring and bleaching. At the end of the dyeing process, an estimated 10–20 % of the dye typically remains in the wastewater. Wet processing wastewater contains dyes, bleach, detergent and other processing chemicals and requires treatment before disposal. If untreated, or insufficiently treated, water is released into water courses water pollution occurs. As such, the elimination or reduction of wastewater and chemicals is a key water management solution for textile dyeing and finishing.

Reducing the quantity of wastewater is a factor of efficiency in the process. Cleaning up the wastewater is the major task of an effluent treatment plant (ETP).

3.1 Water Management in Textile Sector in the context of Water Use Efficiency and ETP Operations

3.1.1 Water Management and Water Use

Water is a precious natural resource that needs to be conserved. Water management means planning, developing, distributing and managing the optimum use of water resources. The water footprint is the amount of water used by individuals or manufacturers, directly or indirectly. The textile industry uses water intensively and enormous quantities of wastewater are generated during manufacturing processes. It is a fragmented and heterogeneous sector, with a demand mainly driven by clothing, home furnishing and industrial use.

Experts at a national level stakeholder consultation in Dhaka in December 2016 agreed that textiles is one of the largest polluting sectors and that water consumption is very high. In Bangladesh it takes 300 tons of water to produce 1 ton of cloth. Many countries use 50-70 lt/kg water in dyeing and finishing where Bangladesh uses 200-300 lt/kg.

The rivers around Dhaka city are already polluted by textile effluent. While production increases day by day, effluent treatment plant performance has not increased. Buyers seek to drive down prices so the factor owners want to cut costs. As space is limited in garments factories, there are constraints on improving ETP performance. The industry does not pay anything to extract and use water, so there is no incentive to reduce water consumption and become more efficient.

Photo-1: Public Consultation at Shanirvar Dhamshona Union, December, 2016

Photo-2: Public Consultation at Kanchpur Union Narayanganj, December, 2016

Photo 3: National Level Stakeholder Consultation was at the Hotel Nordic, Dhaka, December 2016

3.1.2 Textile Water Usage and Pollution

The textile dyeing and washing industry plays an important role in economic growth but has a big environmental footprint. This sector has been condemned as being one of the world's worst offenders in terms of pollution, second only agriculture in its effect on clean water globally. The textile industry uses large quantity of water in production, discharging highly polluted toxic wastewater into inland waterways, sewers and drains without proper treatment.

> Dye is a coloured substance that has an affinity to the substrate to which it is being applied. The dye is usually used as an aqueous solution and may require a mordant to improve the fastness of the dye on the fiber. Dyes are mainly organic and inorganic chemical substances and if these substances spread out in the environment, they may have huge adverse impact.

Polluted water has adverse impact on agriculture and fisheries. Polluted water damages the physical characteristics of soil and water and consequently changes the nature of the soil and water.

3.1.3 Perceived Impact of Pollution on Nearby Communities

Polluted water has adverse impact on agriculture and fisheries. Polluted water damages the physical characteristics of soil and water and consequently changes the nature of the soil and water. A survey was conducted during the public consultation using a structured tool (see Annex-3). According to the questionnaire survey during public consultation in Narayanganj, most participants believe, that soil is become less fertile day by day, because of discharged from the textile industry.

In Shanirvar Dhamshona Union 67 % and Kanchpur Union 88 % of participants believe that pollution from the textile industry has had a negative impact on their income. In Shanirvar Dhamshona Union, around 25 % of farmers and 4 % of fishermen's said that that the productive capacity of agricultural land and availability of fish has declined since the textile sector became active in their area. Participants at the public consultation in Kanchpur Union were convinced of the negative impact of polluted water on agricultural land and on terrestrial and aquatic plant and wildlife. The survey data reveals that 76 % of Shanirvar Dhamshona Union and 91 % of Kanchpur Union participants think that pollution from the textile industry has had a negative impact on their households.

Table 4 briefly describes the response of participants attending Public Consultation Meetings.

Table 4: Impacts of Textile Industry on Agricultural Practice

Impacts on Agricultural Practice	Participants Response (%)	
	Kanchpur Union Parishad (n=33)	Shanirvar Dhamsona Union Parishad (n=20)
Soil fertility is lost	43%	43%
Irrigation water becomes unfit	28%	30%
Prevalence of Diseases in Cattle	24%	21%
Losses of fisheries species	4%	6%

3.1.4 Characteristics of Factories Surveyed and Extent of Water Discharges

Surveys were conducted by ENRAC with key personnel responsible for ETP management and operation in factories, most of which conduct dyeing and washing related activities. The activities of factories visited for this study are shown in Figure 7.

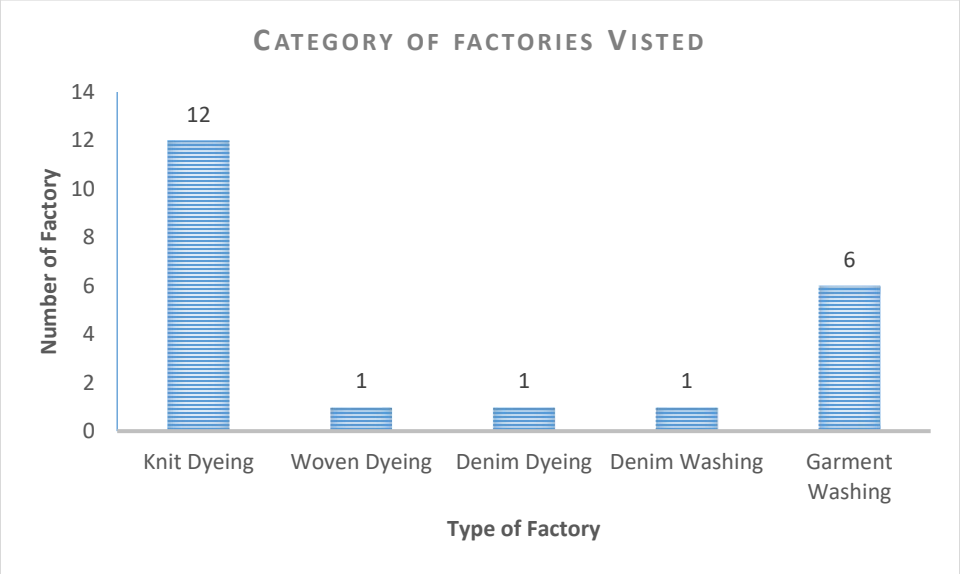

Figure 7: Category of factories (Total number of factory) n= 22, (Factory visit, 2016)

Approximately 85% of the water used and discharged from factories is in the wet processing unit. The textile dyeing industries clustered around Dhaka City generate large amount of effluent, sewage sludge and solid waste materials every day which are directly discharged into the surrounding fields, irrigation channels and surface water and finally enter the Turag, Balu, Buriganga and Shitalakkhya Rivers systems. Textile and dyeing industrial effluents alter the physical, chemical, and biological properties of the aquatic environment due to high levels of pH, temperature, odor, toxicants, noise, turbidity etc. These are harmful to public health as well as to livestock, wild life, fish and biodiversity.

Dyes in surface and subsurface water are not only aesthetically objectionable but also cause waterborne diseases, like dermatitis and respiratory tract problems, and render the water unfit for drinking, agriculture, fisheries and so on. Public consultation showed around two thirds of participants in Shanirvar Dhamsona Union (62 %), Konabari (70 %) and Kanchpur Union (67 %) think that untreated or poorly treated effluents from the textile industry pose serious health threats to their communities. Contamination of the aquatic system affects socio-economic conditions in nearby communities.

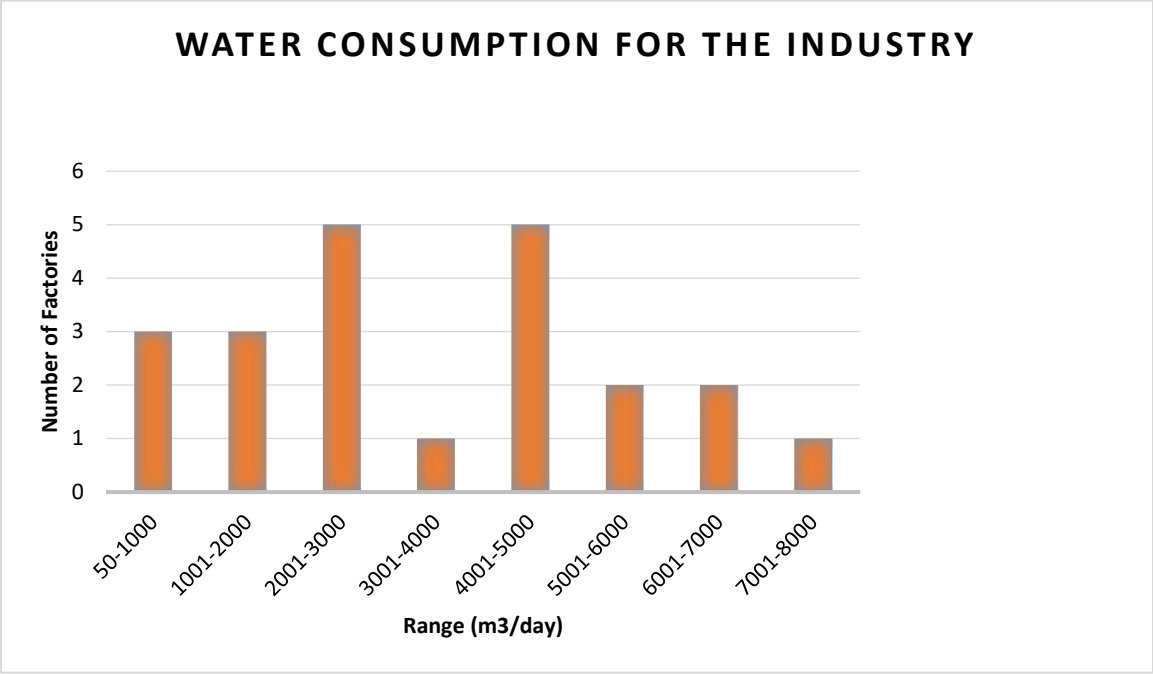

Figure 8: Water consumption by 22 textile factories, Source: Factory visits, 2016

The quantity of water required for textile processing varies from factory to factory depending on the fabric, processes, equipment, dyes and expertise of the operators. The longer the processing sequences, the higher will be the quantity of water required. The bulk of the water is used in washing at the end of each process. The processing of yarns also requires large volumes of water.

3.1.5 Pollution Load of Textile Process.

It is reported by Thomas Sagris, (2015) that discharges from WDF factories are heavily polluted with high levels of dissolved solids and chemicals. Some 72 toxic chemicals reach our water supply from textile dyeing. Many of these chemicals cannot be filtered or removed through treatment in the ETP. Estimates of the number of factories with Effluent Treatment Plants (ETPs) vary from 40 to 80% although it is widely acknowledged that many of the installed plants are poorly designed or not operated in an appropriate and responsible manner. It is estimated that around 70% of the 1,700 WDF textile processing units which are responsible for considerable portion of the water demand and water pollution are located in the greater Dhaka area (Figure 9). The remaining units are located in Mymensingh (north of Dhaka) and in Chittagong.

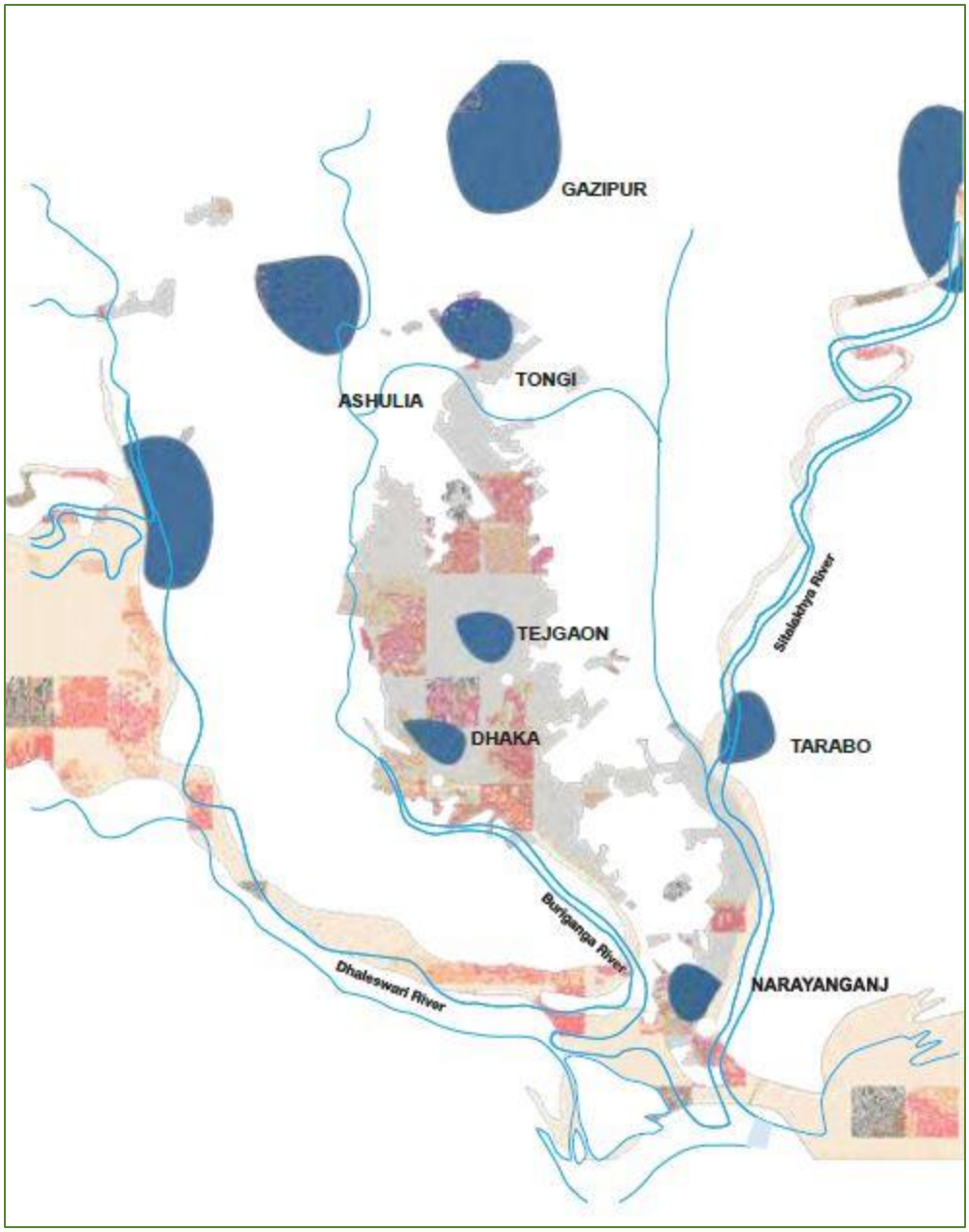

Figure 9: Textile processing units located in the Greater Dhaka area (Thomas Sagris, 2015)

This large quantity of water consumed during wet processing becomes polluted with different chemicals which become hazardous for health and the environment after discharge. According to the survey of factories, eight types of chemicals are used at different stage of wet processing. The percentages of chemicals used in different factories are shown in Figure 10.

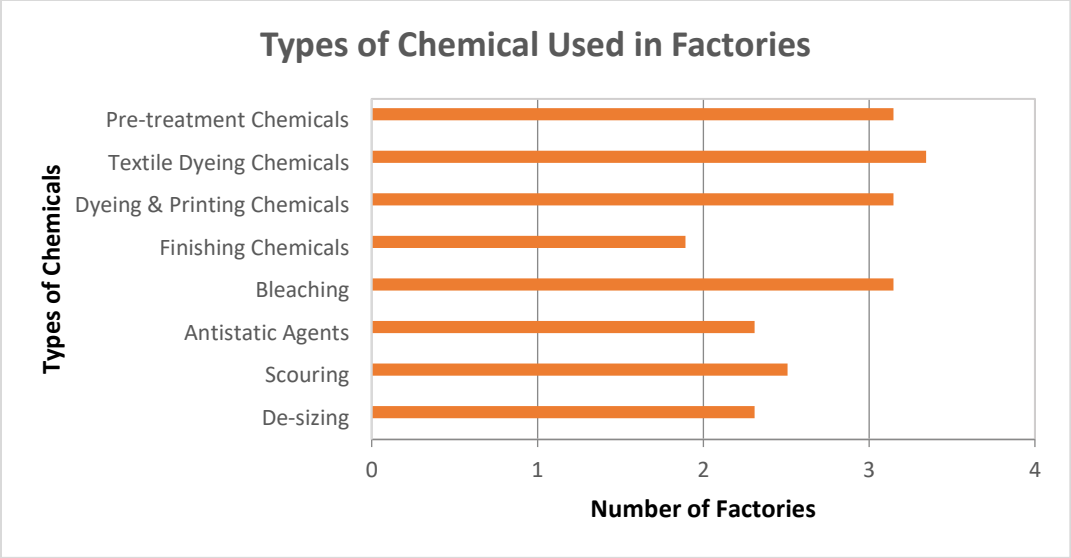

Figure 10: Types of Chemicals used among the factories, (Total number of factory) n= 22 (Factory Visit, 2016)

Discussions with factory staff and the data collection surveys confirm that effluents released from textile factories often violate environmental standards.

Colour: Removal of dyes from the effluent is major problem in most textile factories. Colours are easily visible to human eyes even at low concentration, so colour in textile waste carries significant aesthetic importance. Most of the dyes are stable and not affected by light or oxidizing agents and not easily degradable by conventional treatment methods.

Total Dissolved Solids (TDS): Dissolved solids contained in industrial effluents can lead to increase in total dissolved solids in ground and surface water and are difficult to remove with conventional treatment. Dissolved solids in effluent may be harmful to vegetation and restrict its use for agricultural or other industrial purposes (Shri D.S. Kharat, 2007). The TDS effluent discharge standards for inland surface water set by the DoE is 2100 mg/l. Factory surveys revealed that 30 % of factories exceeded the standard during their last ETP inspection before the survey. Use of common salt and Glauber salt etc. in processes increases total dissolved solids (TDS) levels in effluent.

Chemical Oxygen Demand (COD): Textile effluents are often contaminated with non-biodegradable organics, such as detergents, known as refractory materials. The presence of these chemicals results in high COD value of the effluent. According to the DoE, standard of COD for inland surface water is 4 mg/l (Shri D.S. Kharat, 2007), whereas COD values in the canal connected to open water ranges from 28 to 38mg/l. According to key interviewees of the factories, the discharge COD value is in few cases above DoE industrial wastewater discharge standards (200mg/l). The cumulative impact of continuous discharge of effluent with COD even within standards may result in excessive level of COD in the inland surface waters.

Biochemical Oxygen Demand (BOD): Organic pollutants, which originate from organic compounds of dyes, acids, sizing materials, enzymes, tallow etc. are also found in textile effluent and are reflected in analysis of BOD and COD. These pollutants are controlled by use of biological treatment processes. In many textile units, particularly those engaged in synthetic processing, low BOD/COD ratio of effluent is observed which means that even biological treatment does not work effectively. According to the DoE

standard of BOD for inland surface water which is50mg/l. Respondents reported that the range of BOD is from 7 to 50 mg/l, which complies with national standards.

pH: The DoE guideline for discharged water following ETP operations is 6.5-8.5. Key personnel of the factories reported that the range of pH was 6.80 to 8.5 in the last ETP inspection before the survey. This means that the pH in water discharged from the 22 factories complies with the DoE standard.

Others: Among the 22 factories the range of total suspended solids is from 13 to 100 mg/l and has been found compliant with the DoE discharge standards during their last ETP inspection. `Likewise most factories comply with the dissolved oxygen standard (DoE range 5 mg/l or more) since they recorded rates of 4 to 8.1 mg/l.

3.2 Quality of Discharge of Textile Clusters

As part of this study, in November/December 2016 ENRAC carried out detailed environmental quality sampling and testing of inland surface water. The assessment looked at the most important parameters namely, pH, DO, BOD, COD, EC, TOC, TDS and TSS. The findings, together with the DoE standard values, are shown in Figures 11 to 14. Eight sets of samples were collected from Tongi-Konabari, Savar, Narayanganj and Chittagong. Samples were collected from the combined drainage channel of the industrial clusters connected to canals or rivers and the result presented are based on these clusters.

pH: The "desirable" range of pH prescribed by the DoE is between 6.5 and 8.5. This is the range, which provides adequate protection to the life of fresh water fish and bottom dwelling invertebrates. The pH of water samples lies in the range of 4.3 to 8.In most of the water bodies, the pH was well within the DoE standards but in Narayanganj the pH was too low.

Electrical Conductivity (EC): The electrical conductivity is the measure of capacity of a substance or a solution to carry an electrical current. The EC indicates the concentration of dissolved electrolytes present in water sample, but does not give any idea about the types of ions present. EC values of the inland surface water samples ranged from 1194 to 4440 mg/, against a standard of 1200 mg/l.

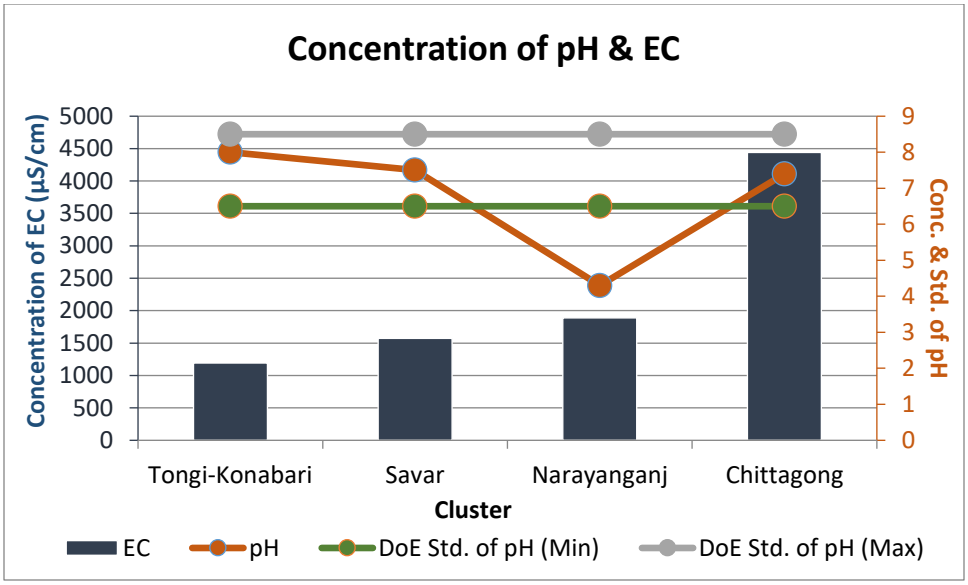

Figure 11: Concentration of pH and EC of four industrial clusters

BOD and COD: COD values are always greater than BOD values. The BOD and COD level among four clusters ranges between 8 to 13 mg/l and 28 to 38 mg/l (Figure 12).When effluent with high BOD levels is discharged into inland surface water body, it accelerates bacterial growth in the river and depletes oxygen levels. The oxygen may diminish to levels that are lethal for most fish and many aquatic insects.

Some photographs of Tongi-Konabari Cluster Inland Surface Water Collection

Photo-4: Effluent Discharge from a Textile Wet Processing Industry in Tongi BSCIC, November 2016

Photo-5: Sample Collection from Main Outlet of Tongi BSCIC, November 2016

Photo-6: Effluent Discharge from Main Outlet of Konabari BSCIC, November 2016

Photo-7: Onsite Data Collection from Kashimpur Area, November 2016

As the river re-aerates due to atmospheric mixing and as algal photosynthesis adds oxygen to the water, oxygen levels will slowly increase downstream.

Chemical oxygen demand (COD) does not differentiate between biologically available and inert organic matter, and it is a measure of the total quantity of oxygen required to oxidize all organic material into carbon dioxide and water. The BOD and COD results of the clusters drainage channel show non-compliance with the inland water standards of the DoE.

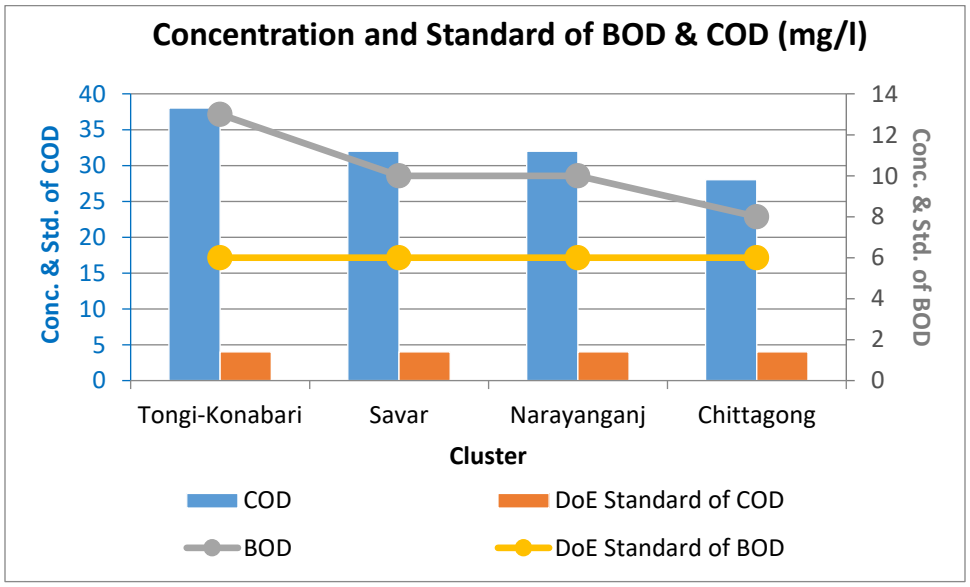

Figure 12: Concentration and DoE standard of BOD and COD of four industrial clusters

Dissolved Oxygen (DO): Dissolved oxygen is necessary to many forms of life including fish, invertebrates, bacteria and plants. Decrease in DO values below the critical level of 3 mg/l causes death of most fish and other aerobic aquatic organisms. The dissolved oxygen values ranged from 1.37 to 4.38 mg/L among four clusters and so were, in some cases, well below the desired level.

Total Organic Carbon (TOC): TOC in freshwaters arises from living material (directly from plant photosynthesis or indirectly from terrestrial organic matter) and is also a constituent of many waste materials and effluents. Consequently, the total organic matter in the water can be a useful indication of the degree of pollution. In inland surface waters, TOC concentrations are generally less than 10 mg/L unless the water receives municipal or industrial wastes, or is highly coloured due to natural organic material, as in swamps. The concentration of TOC ranges from below 18.1 mg/L to 33.9 mg/L. Samples collected from the Narayanganj cluster recorded the highest value of total organic carbon.

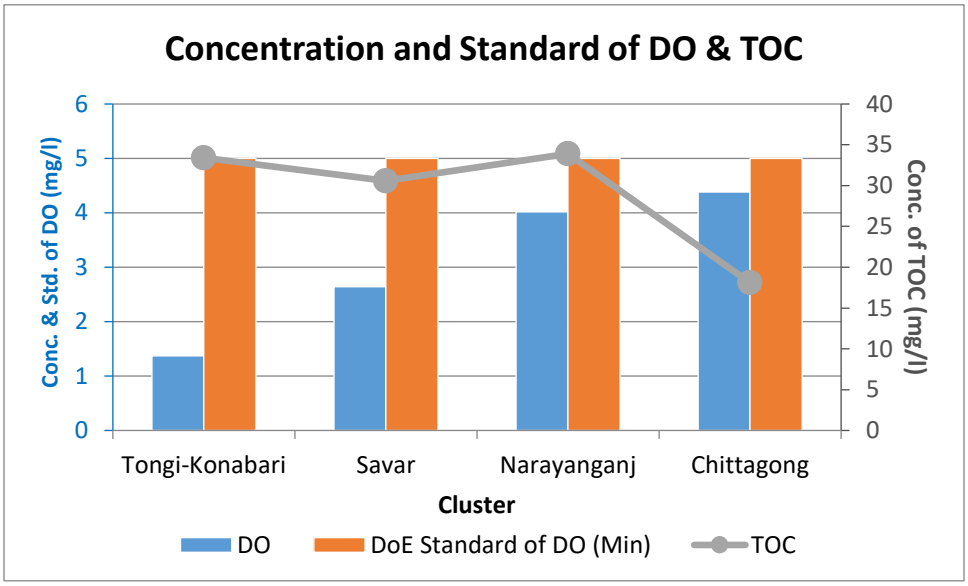

Figure 13: Concentration DO and TOC in Effluents of Four Industrial Clusters

Total Dissolved Solids (TDS): TDS values indicate the general nature of water quality and are usually related to conductivity. The values of TDS of all the samples collected throughout the project influence area (ranges between 589 and 2200 mg/L) are within the standard limits except for a sample from Chittagong Cluster. In inland waters, dissolved solids are composed mainly of carbonates, bicarbonates, chlorides, sulphates, phosphates, silica and calcium, magnesium, sodium and potassium. The specific conductance of the water provides another general indication of the content of dissolved matter for water that is not too saline or too dilutes

Total Suspended Solids (TSS): The concentration of total suspended solids ranges from 78 mg/L to 118 mg/L. The water sample collected from Narayanganj cluster recorded the highest value of suspended solids, which can negatively impact a body of water. Excess over background amounts are often attributed to human influence. According to Ramesh, (1996) Pollution may contribute to either organic or inorganic suspended solids, depending on the source. Organic particles from decomposing materials can also contribute to the TSS concentration. As algae, plants and animals decay, small organic particles break away and enter the water column as suspended solids. Chemical precipitates are considered a form of suspended solids.

Some photographs of Savar Cluster Inland Surface Water Collection:

Photo-8 Effluent Discharge from Dhaka EPZ, November 2016

Photo-9 Effluent Discharge from Dhaka EPZ, November 2016

Photo-10 Inland Surface Water Pollution through Effluent Discharge of Dhaka EPZ, November 2016

Photo-11 Sample Collection from Main Outlet of Dhaka EPZ, November 2016

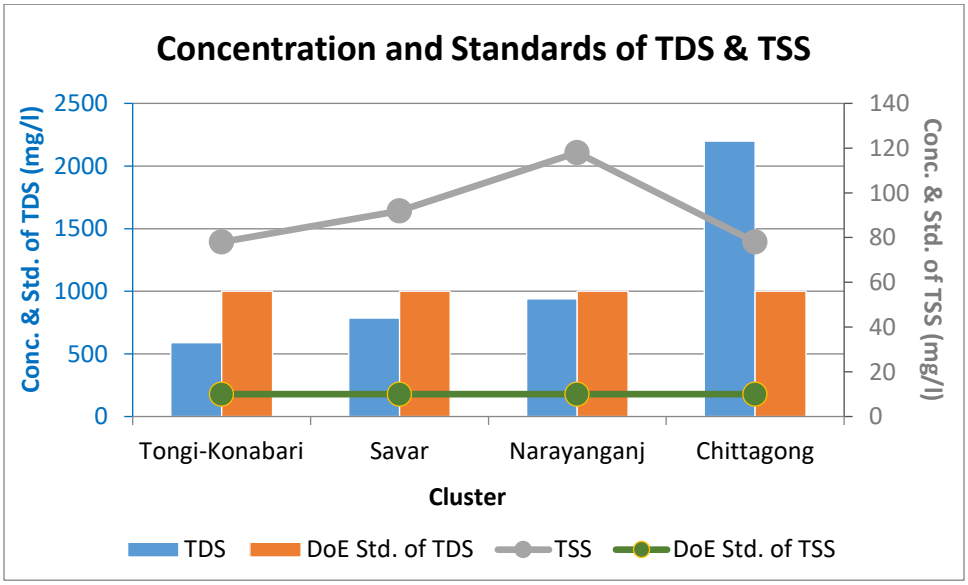

Figure 14: Concentration TDS and TSS of four industrial clusters

3.3 Need for Effluent Treatment Plants and Treatment Processes

Industries in Bangladesh generally indiscriminately take water from groundwater sources without paying any fees or taxes resulting in depletion of aquifer levels. There is an urgent need to recycle wastewater to make the industries sustainable and preserve and conserve groundwater.

Fabric dyeing and chemical processing industries are categorized as “Red industries” that pose the highest environmental threats according to the 1997 Environment Conservation Rules (ECR). Effluent treatment plants (ETP) are mandatory for Red category wastewater producing industries, including textile dyeing plants. Environmental law mandates that all dying and washing related textile industries must use ETP to treat wastewater before discharging effluent.

Effluent treatment is required, not only to treat contaminated wastewater, but also to recycle and reuse valuable water resources. An effluent treatment plant is designed to treat a variety of effluents coming from different areas of the plant. The basic thrust of the technology is to separate water and salt using evaporation and separation technology. The treatment is designed to remove COD/BOD and organic and inorganic ingredients in suspended and dissolved form to meet the fresh water quality requirements.

Water is recycled from effluent coming from textile & chemical industries using series of operations i.e. coagulation, flocculation, aeration, and filtration, mainly by reverse osmosis. The effluent produce has high BOD, COD, pH, TSS, TDS and color material. Various studies suggest that automation and use of highly substantive dyes during coloration stages (dyeing & printing) considerably reduce the amount of effluent produced. It was noted that use of polyphosphazene membranes instead of polyamides increases durability of reverse osmosis plants, as they possess better resistance at high pH and temperature.

There are generally four levels of treatment as described by Mahfuz, (2011):

- Preliminary: Removal of larger size solids such as rags, sticks, grit and grease that may result in damage to ETP equipment and/or operational problems (physically);
- Primary: Removal (physically or chemically) of floating and settable materials including suspended inorganic and organic solid matter;
- Secondary: Removal (biologically and chemically) of biodegradable dissolved organic matter and suspended solids particles);
- Tertiary: Removal of residual suspended solids / dissolved solids (physically, chemically and biologically).

3.3.1 Choosing an Effluent Treatment Plant

Any factory needing to install an ETP has to consider several factors, including the quantity and quality of the factory’s wastewater generation. To get this information the factory will have to measure the flow of waste stream, taking samples for analysis at a reputable laboratory.

There are various types of ETPs and their design differs depending on the quantity and quality of the effluent, amount of money available for construction, operation and maintenance, and the amount of land available.

It is reported by Samiya Ahmed (2014) that following points should be considered when planning an effluent treatment plant:

- National or international standards to be complied with
- Volume of effluent and types of chemical and their concentrations. e.g. 30 m^3/hour with COD of 500 ppm, and pH of 11.5
- Affordability of constructing an ETP
- Affordability of running an ETP
- Area land or space on which to build the ETP
- Type of plant to best suit requirements
- Capacity of factory staff and available resources to manage the ETP

3.3.2 Types of treatment in an ETP

There are broadly three types of treatment

Biological Treatment
Biological treatment plants require the presence of microorganisms adapted to degrade the components of the effluent to be treated. It was stated by ETP operators in some textile factories that a properly designed biological ETP can efficiently satisfy BOD, pH, TSS, oil and grease requirement. In some cases the wastewater compounds of textile industries may be toxic to the microorganisms so pre-treatment may be necessary. Similarly, most dyes are complex chemicals and are difficult for microbes to degrade so there is usually very little colour removal through biological ETP treatments. The basic units needed for biological treatment are: screening; an equalization unit; a pH control unit; an aeration unit; and a settling unit. A sludge dewatering unit may also be included.

Physio-chemical Treatment
The physio-chemical treatments generally used in Bangladesh (coagulation and flocculation) are capable of removing much, possibly all, of the colour, depending on the process used. It is however difficult to reduce BOD and COD to the value needed to meet the national effluent discharge standard, and impossible to remove TDS. Removal rate is dependent on the influent wastewater quality. The removal efficiency of this type of treatment has been found to be 50 % and 70 % for BOD and COD respectively (Nicolaou and Hadjivassilis, 1992). The basic units needed for a stand-alone physio-chemical treatment plant are screening, an equalization unit, a pH control unit, chemical storage tanks, a mixing unit, a flocculation unit, a settling unit and a sludge dewatering unit.

Physio-chemical and Biological Treatment
The three treatment mechanisms (physical, chemical and biological) are often combined in a single ETP. The basic units needed for a physio-chemical and biological treatment plant are screening, an equalization unit, a pH control unit, chemical storage tanks, mixing units, flocculation units, a primary settling unit, an aeration unit, and a secondary settling unit (Figure 4). The physio-chemical unit always comes before the biological unit.

Samiya Ahmed, (2014) reported that biological wastewater treatment possess a high degree of efficiency with minimum running costs 5 to 6 times less than other methods. Average reduction efficiency of BOD, COD, TSS and TDS is found to be 84%, 59.1%, 81.7% and 54.8% respectively by biological treatment. None of the methods except biological method can satisfy discharge standard.

Combining the physio-chemical and biological methods is considered most efficient but is not generally practised. High running cost (20-28 taka/m^3) due to high chemical consumption, and the problem of disposing of huge amount of highly toxic sludge (2-5 kg/m^3) do not encourage the owners to run their plants effectively.

3.4 ETP Practices in 22 Factories Visited

Water usage at textile factories generates millions of m^3 of wastewater daily. The average factory water consumption in Bangladesh is estimated to be around 250 to 300 litres of water per kilogram of fabric produced (PaCT, 2015), of which 80-85 % is generally discharged as wastewater (Thomas Sagris, 2015). Among the 22 factories, the discharge volume of treated water ranges from as low as 26 m3 per day to as high as 13,700 m^3/day. This variation may be due to differences in factory size, washing cycles, washing equipment, and operator practices. It has been reported that the capacities of the ETPs (50-15000 m^3/day) correspond in theory to wastewater generation of the respective textile processes, and that the volume of wastewater generated by factories is within the capacity of their ETPs. The range of water consumption of the factories that has been surveyed is shown in Figure 8.

Wastewater treatment is mostly by primary and secondary ETP processes. However, these conventional treatment systems are not very effective in removal of pollutants such as dissolved solids, colour, trace metals etc. from wastewater. More advanced treatment methods, while reducing these pollutants, also give scope to recover and recycle water and chemicals.

3.4.1 Types of ETP Used in 22 Factories Visited

The types of ETP used at the 22 factories visited are given in Figure 15.

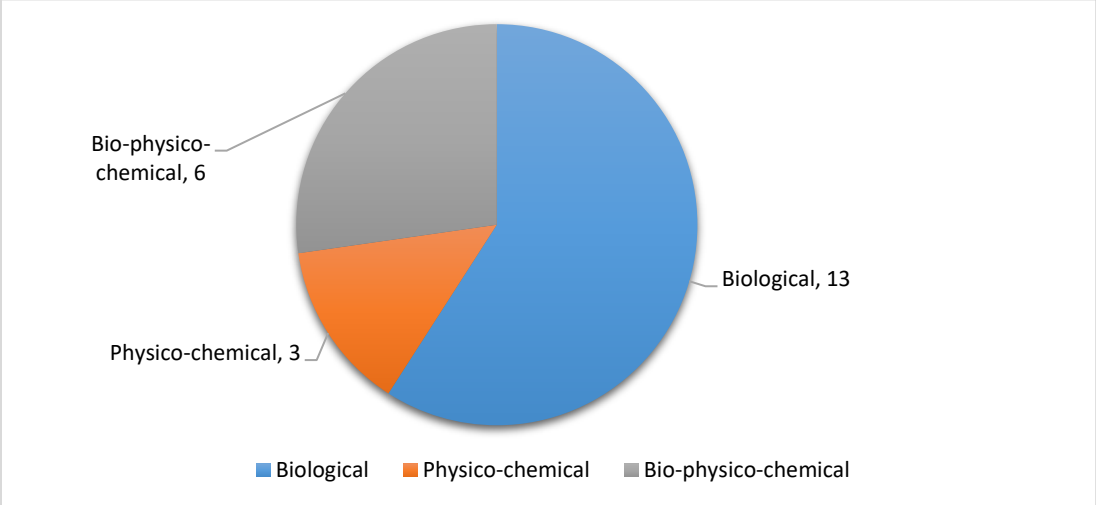

Figure 15: Types of ETP used among the factories (Factory visit, 2016)

The survey data shows that around 60 % of factories visited use a biological ETP, which is more effective in polluted water treatment as it can treat more parameters of wastewater quality and is cost effective in operation and maintenance.

Taken together, the two treatments that include biological methods account for more than 80% of ETP used in Bangladesh for the treatment of textile waste and are the most likely to meet the water quality standards set by the Government of Bangladesh, according to Samiya Ahmed, (2014) as they provide the benefit of physical, chemical and biological treatment and can therefore raise the efficiency of BOD and COD removal to 90 %.

3.4.2 Performances of Factories in Checking Effluent and Challenges Perceived by Staff

To monitor performance of ETP, factories collect effluent discharge samples every two months. Water samples are usually collected by a third party or by in-house staff (Figure 16).

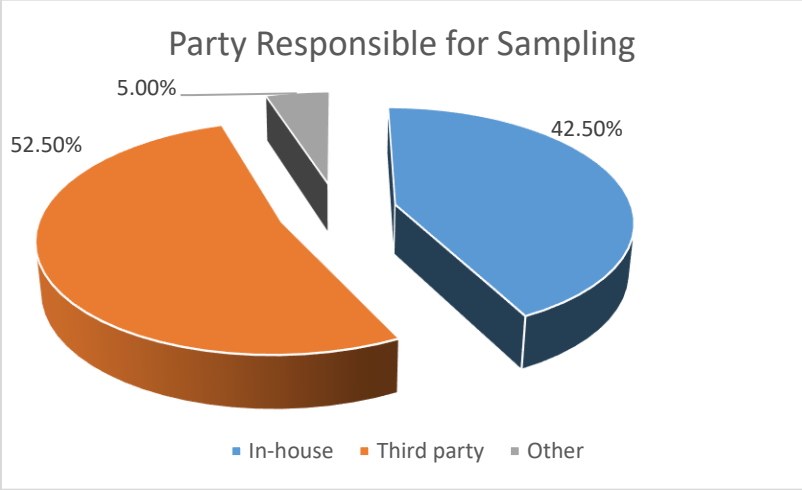

Figure 16: Party responsible for sampling from ETP

Table 5: Response to Specific Questions regarding Environmental concern in textile sector

Does your company have a valid Environmental Clearance Certificate (ECC)?	No	0
	Yes	22
Do you implement a DoE approved Environment Management Plan (EMP)?	No	3
	Yes	19
Do you face any problems in obtaining ECC from the DoE?	No	22
	Yes	0
Do you think existing environmental law and rules of Bangladesh are adequate to manage environmental issues of textile sector company? (in number)	No	11
	Yes	6
	N/A	5
To what extent are effluents from textiles liable for surface water pollution? Please response in a ranking scale of 1 (lowest) to 5 (highest) (in number)	1	1
	3	9
	4	11
	5	1
To what extent the existing regulatory framework is being implemented by the garments industries and their association/s? (in number)	Fully	9
	Moderately	13

All figures are number of factories.

More than 70% of respondents said that environmental laws are not implemented properly. None of the respondents claimed implementation to be moderate or good.

Respondents in more than half the factories gave the two highest (most polluting) rankings (4 or 5) to the question about whether textile effluents are responsible for surface water pollution. The average score was 3.5

Respondents saw the broad challenges of ETP operations as:

- Lack of competency of ETP operator and manager in the factory;
- Unavailability of sludge management and disposal options;
- Absence of recycling and reuse of treated effluent;
- Absence of performance tracking and recordkeeping
- Lack of reliable sample testing laboratory facilities within near the factory.

3.4.3 Measures Taken by Factories in the Event of Pollution

According to answers in the factory questionnaires, in the event of any of the parameters being outside the standards of the DoE, factory management or the ETP operator undertake the following measures:

Table 6: Measures taken by Industry if any effluent parameters found beyond DoE standards

Measures taken by Industry	Percentage
Shut down ETP for repair and maintenance	27.8%
Stop sending wastewater to ETP	33.3%
Store wastewater for treatment till ETP is fully functional for treatment	38.9%

Only the third option (storing wastewater until the ETP is fully functional) may be considered acceptable by the DoE.

3.4.4 Staffing Requirements for Effective ETP Operation and Maintenance

The manpower requirement for ETP operation and maintenance are broadly plant manager, plant operator, electrical or mechanical technician, laboratory analyst and helpers.

Educational qualification and training programs on environmental management for staff responsible for ETP play an important role in achieving better operation, maintenance and management of ETP. Survey data from factories reveals that six ETP managers have degrees in Environmental Management/Engineering and seven ETP manager have been trained on sustainable management and know the environmental management system well. In the absence of any dedicated staff for ETP operation, or when the ETP manager is absent, key interviewees in 11 factories said that the operations manager took responsibility for ETP operation whereas in nine factories ETP was operated by a chemical or mechanical engineer.

3.5 Characteristics of Textile Effluent:

Wet processing of textiles involves, in addition to extensive amounts of water and dyes, a number of inorganic and organic chemicals, detergents, soaps and finishing chemicals to aid in the dyeing process to impart the desired properties to dyed textile products. Residual chemicals often remain in the effluent from these processes. In addition, natural impurities such as waxes, proteins and pigment, and other impurities used in processing such as spinning oils, sizing chemicals and oil stains present in cotton textiles, are removed during de-sizing, scouring and bleaching operations (Samiya Ahmed, 2014). This results in an effluent of poor quality, which is high in BOD and COD load. Table- 7 lists typical values of various water quality parameters in untreated effluent from the processing of fabric using reactive, sulphur and vat dyes and compares these to the DoE effluent standards for discharge into an inland surface water body (e.g. river, lake, etc.). As demonstrated, the effluent from textile industries is heavily polluted.

Table 7: Textile Industry Waste Water Characteristics (Mahfuz, 2011)

Parameters	Standard Effluents	Cotton	Synthetic	Wool
pH	5.5-9.0	8-12	7-9	3-10
BOD	30-350 ppm	150-750 ppm	150-200 ppm	5000-8000 ppm
COD	100-250 ppm	200-2400 ppm	400- 650 ppm	10000- 20000 ppm
TDS	1500-2100 ppm	2100-7700 ppm	1060-1120 ppm	10000-15000 ppm

Chapter 4: Environmental Governance with Respect to Textile ETP Operations

4.1 Overview of Environmental Governance

The government of Bangladesh adopted an Environmental Policy in 1992 with the objectives of maintaining ecological balance, environmentally sound development and sustainable use of resources. The policy proposed broad guidelines for 15 policy sectors (agriculture, industry, energy and fuel, water development etc.), but only the industrial sector was advised to implement Environment Impact Assessments before industrial project development. The Water Development Board Bangladesh (BWDB) and few others such as the Local Government Engineering Department (LGED) adopted their own environmental screening tools for their projects. However, no government department has an adequate level of environmental monitoring and compliance to minimize the environmental footprint. It is impossible for the DoE to look after every sector when this department has inadequate manpower and resources.

As mentioned by the World Bank (2006), Momtaz (2002) and others, the DoE is understaffed and lacks resources in both operational funds and logistics. The low priority given by the Ministry of Environment and Forests (MoEF) to this institute has demoralized the working force of the DoE to work on EIA issues. The MoEF should proactively promote environmental good governance in the country and allocate resources for the DoE that matches their mandate and workload.

Environmental problems and water sector integrity are becoming major challenges for a country like Bangladesh that depends on water and wetlands. All development activities should involve proper planning, and DoE, under the scope of the Environment Conservation Rules (1997), has made provision for location clearance certificates at the beginning of development. The DoE considers location clearance as a major part of the Environmental Clearance Certificate (ECC), but environmental impact assessment reports rarely use land use maps for decision making. Images of landscapes, aerial maps and land use maps can help to visualize a project area so that potential ecological sites, such as water bodies likely to be endangered by a proposed project, can be identified by decision makers. Key informants told this study that the local representative or Deputy Commissioner at district level who issues a No Objection Certification (NOC) may not have the knowledge to foresee the environmental consequences of an industry on wetlands and ecosystems. This could be improved through informed decision-making processes at local level. Lack of transparency and integrity is also considered significant for this process.

4.2 Environmental Policy Integration (EPI)

Environment is cross-sectoral issue. Other Government ministries relevant to water and environmental issues include the Ministries responsible for Agriculture, Industries, Water Resources, Fisheries and Livestock, and Inland Transport. Each sector focuses mostly on its own priorities with a bias towards economic developments. Especially since the Rio Summit in 1992, the GoB has tried to incorporate

environmental priorities as a cross-cutting agenda in the sectoral policies, but the key informants believe there is no satisfactory progress so far.

High level bodies empowered to control and mitigate environmental impacts of development activities have prioritized economic development over the environment. A National Environment Council (NEC) headed by the Prime Minister with an Executive Committee headed by the Minister of Environment and Forests (MoEF) has been operational for years aiming to integrate environmental concerns into sectoral policies and provide supervisory guidance to line ministries. The Government Planning Commission and its Executive Committee for National Economic Council, has the statutory power to coordinate inter-sectoral activities that could influence the natural environment. However, these bodies have not proved bold enough to protect the environment or any water body of significance from harmful projects or industrial pollution.

Integration of environment planning not only depends on the legal or procedural availability but also on institutional factors (Keysar, 2002).

Strong integration of environmental policy is needed to make environmental screening functional in all sectoral policies and strengthen water sector integrity.

4.3 Environmental Clearance Certificate (ECC) for Textile Operations

Obtaining Environmental Clearance Certificate (ECC) is a mandatory requirement for Amber B and Red category projects (ECR, 1997). DoE regards textile washing, dyeing and finishing operations as serious environmental threats, and places them in the Red category. To obtain an ECC companies must conduct an Environmental Impact Assessment (EIA) and get it approved by the DoE. Although this is required under the Environmental Conservation Act 1995, EIAs for industrial projects are not mentioned by The National Environment Policy itself. This absence may be a reason why decision-makers are unwilling to put in place an effective EIA system. Nor has the DoE enacted any statutory EIA guidelines, although the DoE has published non-statutory guidelines for industrial projects. Without a proper EIA system, the compliance mechanism to ensure proper implementation of environmental laws will remain inadequate.

4.4 Monitoring Environmental Management Plans (EMP) and Enforcement Challenges

Any project that requires an EIA also has to produce an Environmental Management Plan (EMP). In most cases this includes a monitoring plan and proposed mitigation measures. However, monitoring plans are affected by the weaknesses resulting from the lack of an environmental database, and poor collection, analysis, and disclosure processes. Most companies do not employ qualified consultants to produce a proper environmental baseline, identify potential impacts and devise mitigation measures, resulting in poor quality EIA reports. Even when consultants are engaged, many simply use previous EIA reports to produce another one for new clients. Public consultation and land use analysis are seldom conducted with local communities. Quality therefore remains a challenge in establishing a sound EMP for future environmental monitoring and mitigation.

The EIA system also requires post implementation monitoring and audit. From consultations with factory management it seems that textile factory EIA reports are used only for getting DoE approval and

the environmental management plan is not followed. These weaknesses are compounded by the DoE's inability to enforce compliance due to insufficient logistics and resources for monitoring. The World Bank reported in 2006 that the DoE receives less than 1% of the Ministry of Environment and Forests (MoEF) budget and 3% of its staff. This has not improved over the years and makes it easier for companies in search of loopholes in the legal system to make more profit without being environmentally compliant.

4.5 Legal Actions for Violation of Standards in Effluent Discharge

The DoE may issue penalties based on the polluter pays principle on any Industry violating emissions standards in the Environment Conservation Rules 1997, or they may issue warning and directives to mitigate the problem within a stipulated time. If the factory fails to comply within the stipulated time, DoE may initiate legal proceedings. If an enterprise is in commercial operation without a valid ECC the DoE will issue a directive for the company to obtain one within a stipulated time, and can institute legal proceedings in case of failure to comply.

A complaint against a polluter can be initiated by the DoE or begin with a complaint by members of the community. The DoE gives up to three notices to the factory to mitigate the problem. The first and second notices give the factory 15 to 30 days to address the problem, failing which the DoE will issue a third and final warning, and if there is still no response will initiate legal proceedings.

The Director General (DG), DoE has the right to issue a closure notice, until and unless the factory is ready to operate in compliance. To enhance enforcement against environmental pollution, DoE has since 2010 deployed mobile magistrates, who can act with the authority of a director of the DOE. So far about 2000 factories have been fined a total of about taka 200 crore (approximately €23 million). In many cases, industries have the right to appeal to MOEF against the ruling or the penalty or can directly petition the judicial court.

4.6 Challenges and Constraints in Inspection and Enforcement of Environmental Pollution:

Environmental management plans are prepared within the scope of an environmental impact assessment report, but it is clear that the EMP is not followed in the day to day operations of a textile factory. There is only a low chance that a factory will in fact be penalized for failing to meet environmental standards.

With the staff resources and logistics available, the DoE can seldom operate random inspection drives. Even if a factory is issued with a warning, the DoE is rarely able to follow up to see whether the factory complies with directives. One key informant told the study that a major portion of a penalty against a violation was later withdrawn without any reason being given.

4.7 Effluent Discharge from the ETP and Role of the DoE

Many factories dispose of effluents into the wetlands or rivers through channels or trunk drains without adequate treatment, in violation of environmental laws. Many Bangladeshi citizens believe that untreated effluent discharge into water bodies are the main reasons for water pollution, and that this is due to improper monitoring system and failures on the part of the responsible department.

The questionnaire survey conducted at two public consultations showed that, around a third of participants (31 % and 35 %) hold the DoE to be the responsible organization who should ensure the proper use and effectiveness of ETP. Table 8 shows that other official organizations are also held responsible for the proper use and effectiveness of ETP.

Table 8: Responses of participants regarding responsible authority to ensure proper ETP management

Sl. No.	Organization	Participants	
		Shanirvar Dhamsona Union (n=20)	Kanchpur Union (n=33)
1.	Social Organization	7.3%	4.4%
2.	Public	5.7%	6.6%
3.	Environmental NGO	9.8%	3.3%
4.	DPHE	11.4%	12.1%
5.	WASA	6.5%	8.8%
6.	Environmental Planning and Management Agency	13%	7.7%
7.	Environmental Conservation Agency	15.4%	22.0%
8.	DoE	30.9%	35.2%

An even greater number of key interviewees in the 22 factories, (68 %) regarded the DoE as the responsible agency, whereas about 27 % of personnel named the brand or buyer as the responsible authority to take action against water pollution, with smaller numbers naming the BGMEA (18 %), NGO's (14 %), or community people (9 %) as needing to raise their voices.

Table 9 shows what action interviewees believe should be taken to ensure proper use and effectiveness of ETPs. The top three actions were to improve the sludge management system (72 %), train ETP operators (59%) and to improve the monitoring frequency (50 %).

Table 9: Response of participants on the measures to reduce water pollution

Sl. No.	Measures	Percentages of Key Interviewees
1.	Improve sludge management system	72.7
2.	Improve monitoring frequency, making proper regulation	50.0
3.	More precise and correct sampling	27.3
4.	Arrangement of training for ETP operators	59.1
5.	Ensure the use of chemicals to treat the waste water	22.7
6.	Higher management should visit the ETP & conduct the assessment	31.8
7.	Awareness about the effluent & make community group to create pressure to the industry	27.3
8.	Arrangement of reward for better performance the ETP	22.7
9.	Proper guidance for 100% ETP functionality	27.3
10.	Enhance the competency level of the related personal those who are working at ETP	27.3

4.8 Educational Qualification of ETP Personnel's and Staff

Proper operation and maintenance of ETP is critically important in meeting the standards. Many ETPs do not produce desired results due to inadequate operating systems and lack of technical capabilities by the operator.

The survey data shows that in most cases factories surveyed have personnel with proper educational qualification and adequate subject knowledge, but that educational qualification of those responsible for ETP operation and maintenance varies significantly. About 91 % of these staff have a degree, 27 % completed Diploma in (Engineering, Environmental Technology), 50 % completed a BSc (Mechanical Engineering, Environmental Science, and Applied Chemistry & Chemistry) and around 25 % completed MSc (Chemical and Environment & Chemistry). This picture may not be true of all ETP operators in Bangladesh. It is essential ETP staff are well trained and well equipped.

In many cases, ETP operators work under the maintenance department and are not promoted to manager level to contribute to planning in the factory. Strong operational performance of ETP would be easier to achieve, if operations became the responsibility of higher management levels.

Chapter 5: Corruption and Irregularities in Textile ETP operations

5.1 Overview:

The textile industry plays a contradictory role in the socio-economic and environmental progress of Bangladesh. On the plus side, textile firms are major employers that contribute to boosting wealth and prosperity. On the debit side, they are destroying the surrounding environment on which marginal farmers depend for their livelihoods (Today, 2008).

This report has shown that there is a lack of transparency and accountability in environmental decision-making processes in Bangladesh. Weak political governance has resulted in undue influence on state institutions to achieve growth rather than sustainable environment management practices. In our culture, an implementation strategy and action for environmental management integration is missing.

Ngai Weng Chan, (2016) concludes that water resource management in Bangladesh is fragmented and that public participation in water projects is scarce due to lack of policy directives. The lack of focus on integrated water resource management and effective water governance can be traced to a constant struggle to address basic challenges for achieving water related MDG goals with extremely poor quality public water services and inefficient systems for operations and maintenance of existing infrastructure. These shortcomings are compounded by regional socioeconomic disparities, inequity in access, weak institutional set up and unplanned urbanization and industrialization.

Key environmental constraints in the development of textile industries in Bangladesh are the lack of a strong national effluent quality standards and adequate up-to-date environmental rules and regulations to conduct regular environmental compliance monitoring, along with weak institutional capacity, and trained personnel (Rafiqul, 2008). Environmental impact assessments and other measures have large loopholes that can be exploited by opportunistic owners.

While there has been progress, the stakeholder consultation revealed that weaknesses in complying with environmental regulations in the textile sector are due to a number of factors: lack of adequate space, corruption, irregularities in ETP operations, poor inspection and enforcement of laws, lack of transparency and accountability in governance.

All agencies need to demonstrate fairness, responsiveness and transparency and act responsibly as key pillars of governance. Powerful groups should not receive privileges that allow them to destroy the environment. Those who grab land, wetlands and forest resources illegally and pollute the environment through discharge of untreated or poorly treated effluent from the ETP must be punished in accordance with law. Ministries, departments and administrators must work under the cover of existing laws, independently and boldly. The political process must demonstrate support for institutions. Civil society groups must put pressure on the government and the political process so that the Bangladesh Environmental Act other laws and by laws are implemented efficiently.

5.2 Corruption and Irregularities in ETP Operation:

As stated by Ataur Rahman Belal and et al, (2015) irresponsible corporate practices persist due to a weak and ineffective institutional and regulatory regime. ETPs in many industries do not treat wastewater adequately. The questionnaire survey in this study suggests this mainly happens due to lack

of knowledge about maintaining ETPs, lack of monitoring, technical weaknesses and poor record-keeping. The owners are often reluctant to run the plant full-time, which means that the biological treatment processes do not perform as they should.

Rahman S. (2012) reported that operating combined physio-chemical-biological ETP is expensive due to the chemicals consumed in the coagulation-flocculation process. This induces factory managers to skip treatment and discharge polluted effluent.

There is no sludge disposal law in Bangladesh. Lack of knowledge and recklessness on the part of factory managers combine to sludge being disposed of without analysis. In some cases, the sludge is used for compost and if it contains toxins, they may be washed into water bodies during rainfall and contaminate surface water.

DoE fines two factories Tk 42 lakh

STAFF CORRESPONDENT

The Department of Environment (DoE) fined two industrial units a total of Tk 42 lakh in Gazipur for polluting the Turag river.

Karuni Knit Composite was fined Tk 40 lakh for operating a faulty effluent treatment plant (ETP) and releasing untreated waste materials into the river while Hamza Chemical Industries Tk 2 lakh for dumping unrefined sodium silicate, an ingredient of glues, said a press release.

At the DoE office yesterday, representatives of the factories promised to take proper steps.

Figure 15: News Paper Clip (Source: The Daily Star November 25, 2013)

Some factory staff and interviewee in consultations have reported that it is very easy to be tempted to bypass the regulations because the fines imposed by DoE officials are less than the cost of running an ETP. There have also been cases where DoE officials seem to have put pressure on company owners by creating false test reports. Such cases would not be possible if the owners had a clear understanding of the ETP and waste treatment processes. It can be seen that the textile and garments industry needs to raise its own awareness about the use of ETPs and the industry needs to adopt effective initiatives to lowering operating costs.

5.3 Inspections and Enforcement:

There are many problems with inspection processes with different views expressed by firms and regulators. Factory managers indicate that the frequency of inspections varies between factories, as does the quality of the inspections. In some cases, water samples are not collected and no action is

taken if a factory is non-compliant. Sometimes, additional 'un-official' payments are required for environmental certificates. DoE officials report that inspection officers do not always get adequate support from factory managers. Sometimes inspectors are barred from entering factory premises or managers delay their entry so that ETPs can be turned on. Some factories conceal drains through which they dispose of untreated wastes.

Although there are a large number of rules and regulations to protect water from industrial effluents, enforcement actions are few and institutional capacity is low (Textile Today, 2008). As a result, textile sector polluters are not deterred from discharging untreated pollutants. Moreover, existing rules, regulations and enforcement programs do not take account of the lack of skills and expertise among project experts and consultants. Punitive measures are also difficult to implement because of weak political willingness to impose punishments or appropriate actions for environmental violations. When the violators are politically active they can bring strong pressures to bear on the regulatory bodies.

5.4 Government Capacity to Monitor and Penalize:

Chowdhury, (2006) mentioned that Government inspection teams do not have the expertise to provide appropriate advice on ETP operation and on other technological issues. The DoE does not have a proper database for recording inspections, which creates problems with updating records and issuing penalties. The DoE also lacks funds to upgrade its testing laboratories. These challenges, along with limited institutional coordination, impede monitoring. The DoE is not even always aware of the existence of all the registered textile mills in Bangladesh.

5.5 Transparency and Accountability in Governance

Some NGOs and civil society organizations are working for better management of natural resources, conservation of the environment and pollution control. Activists and protestors against environmental pollution need to strengthen their interventions and need to ensure that the voices of affected people and communities are included and heard.

The protection of environmental resources (forests, hills, wetlands, rivers and biodiversity) and the urban environment remain one of the great challenges. Political commitment, skilled human resources and institutional capacity are all required to ensure proper enforcement of rules and regulations for pollution control and protection of the environment. Environmental governance needs to be strong enough to ensure that institutions, businesses and individuals take responsibility for conservation of natural resources and the environment and avoid pollution of land, water, air and ecosystems. Private sector businesses must uphold and promote corporate social and environmental responsibilities. The Government has to force them to maintain and comply with these responsibilities. All agencies – government, private sector, civil society and citizens – must adhere to the environmental acts, by-laws and EIA guidelines.

5.6 Sectoral Governance and Inter-agency Coordination

There is a need to improve internal governance within government institutions, such as DoE, Department of Fisheries (DOF), Forest Department (FD), Bangladesh Water Development Board (BWDB), LGED, BIWTA and ministries. The Ministry of Environment and Forests is supposed to be the regulatory

body. However, in some cases, political influence forces government institutions to work against the laws on nature and environment that they are supposed to protect. The National Environment Council (NEC) headed by the Prime Minister could focus more effectively on increasing sector linkages and making departments liable for their failures.

5.7 Corporate Approaches to Environmental Pollution in Textile Industries

The textile industry in Bangladesh is growing in number and capacity. As corporations mature and become more socially and environmentally responsible, their approach to pollution can also become more mature on the following spectrum:

Ignore the problem: This causes maximum damage to the environment, from local to regional scales, and even in some cases at national level.

Short-cut solutions: Polluters convince themselves that 'the solution to pollution is dilution'. This creates a smokescreen by diluting or dispersing pollution, so that its effects are less harmful or apparent. However, this approach is unacceptable in environmental management practice.

Cost-effective prevention: Eliminate pollutants from the production process through alternative technology or process modifications. This is becoming more popular especially as raw material and treatment costs increase.

Chapter 6: Conclusion and Recommendations

6.1 Overview:

The textiles sector is the most important in Bangladesh's economy and the 'Made-in-Bangladesh' tag has bolstered the country's image worldwide.

However, the textile industry uses large quantity of water in its production processes and highly polluted and toxic waste waters are discharged into sewers and drains without any kind of treatment. Bangladesh textile factories typically consume double to five times more water for each unit of fabric production compared to the best global standards.

Textile and dyeing industrial effluents can alter the physical, chemical, and biological properties of the aquatic environment in a way that is harmful to public health, livestock, wildlife, fish, and biodiversity. Contamination to this aquatic system brings serious threat to the overall socio-economic pattern of livelihoods. The final discharges falling into Turag, Bangshi, Balu, Buriganga and Shitalakhsya River causing severe pollutions and make these rivers waters unusable for any purpose, particularly during dry months. The Ministry of Environment and Forests has declared four surrounding rivers (Turag, Balu, Buriganga and Shitalakhsya) of Dhaka city as ecologically critical areas, meaning no major exploitation, interventions and pollutions can be acceptable in these rivers. However, this has not proved effective so far.

6.2 Opportunities for Water Sector Integrity through Improved ETP Operations

Governance and management issues appear to be the major constraints in meeting the increasing demand for water by competing sectors in Bangladesh (Syed Hafizur Rahman, 2014). A plethora of policies and laws have been enacted and institutional frameworks have been put into place to govern and guide water governance and management. These policy and institutional frameworks should provide stewardship in addressing corruption, transparency and accountability and ensure inclusive decision-making processes by involving different stakeholders. Lack of supervision from any advisory and regulatory watchdog in this sector means that there is no organization overseeing activities from planning to operation, making critical comments and suggestions for improvements through systematic investigations, undertaking advocacy campaigns, and enforcing action against violations.

6.3 Improve Existing ETP Operation and Management

Mohidus Samad Khan, (2012), recommends that ETP operations and management can be improved through a number of measures:

Technical Issues

1. **Determine effluent characteristics**: Develop a baseline measure of the quality of effluent is an important step in devising treatment mechanisms.
2. **Improve monitoring**: Regular ETP monitoring is should be undertaken and the use of an automatic pH controller is recommended to ensure more effective biological treatment and better coagulation and flocculation with minimal use of chemicals.

3. **Effective biological unit management**: Running costs for biological treatment are low compared to physio-chemical plants. However, biological treatment plants must be carefully managed as they use live micro-organisms to digest pollutants. Some compounds in the wastewater may be toxic to the bacteria, requiring pre-treatment with physical or chemical processes. Knowing the effluent characteristics is therefore very important.

4. **Optimize chemical dosing**: Avoiding excessive use of chemicals in the treatment process, reduces treatment costs while excessive chemicals produce more sludge and hamper bacterial operations in ETP biological chambers. Automated chemical dosing is preferred with periodical calibration of the dosing equipment.

5. **Hygienic sludge disposal**: Solid sludge is separated from wastewater during clarifying processes. Sludge is usually toxic, depending on the chemicals and dyes used. Because there are no sludge disposal laws or standards from the DoE, sludge from ETPs is dumped indiscriminately and leachate from sludge pollutes wetlands. Sludge needs to be further processed and disposed of safely. The German Development Agency (GIZ) has developed sludge management guidelines for the Government of Bangladesh. The DoE needs to pay immediate attention to this issue.

Knowledge Development of Effluent Treatment within the Sector

6. **Advocacy for effective ETP operations**: All relevant players including DoE, relevant ministries (industry, fisheries, agriculture, water resources and planning), BGMEA, BKMEA, BTMA, local public representatives should be raising awareness, organizing knowledge building seminars and workshops and conducting advocacy campaigns in the main textile clusters. Higher management from the factories as well representatives of international brands should attend.

7. **Statutory ETP Guidelines**: Effluent water treatment is relatively new in the textile sector and still struggling with mindset changes, technical ability, regulatory operations, inspection and monitoring, and the quality of testing. Industry sector ETP guidelines have been prepared by the Bangladesh Environment Management Program of the DoE, and the operating guidelines for textiles could be made statutory to develop a uniform effluent treatment system and reduce the weaknesses of ETP operations.

Water Conservation from the Perspective of Financial Savings and ETP Pollution Load

8. **Water conservation** is a must to sustain the functionality of ecosystems, livelihood operations, business and growth. A water conservation program can cut water consumption by 30 % or more, as well as energy consumption. Reuse and recycling processes lead to reduced costs in wastewater treatment, thermal energy consumption, and electrical energy consumption and reduce pollutant loads and effluent volume.

6.4 Governance and Integrity in Textile ETP Operations

Water Sector integrity demands transparent, accountable and inclusive decision-making by water stakeholders on the basis of core values of honesty, equity, and sustainability in water management

(WIN, 2014). While examining water ETP operations in textiles, several integrity indicators and issues have emerged:

1. **Policy and legal instruments**: Water and related sectoral policies have evolved in the right direction with good objectives. However sectoral policies are narrowly focused on their respective mandates and businesses, and cross sector linkages are not always in place. Horizontal environmental policy integration is needed for integrity and effective use of policies, laws, strategies and action plans covering the operation of ETPs in the textile sector.

2. **Regulatory laws governing ETPs**: ETP use and effectiveness is covered under the Environmental Conservations Act and MoEF Environmental Conservation Rules 1997. Regulatory mechanisms and the DoE are independent and independently resourced. The Director General has given full authority to implement these laws for proper operations of environmental management related works and ETP operations. Prior approval is also required from the DoE before designing and starting high polluting industry, including textile factories. Approval in the textile industry must follow an EMP for proper environmental management and ETP-based wastewater treatment to protect water quality. In theory, regulations show equity, completeness and a sustainability plan, but interviews with stakeholders, community members and factory staff indicate that the application of the laws is faulty, inequitable, and unjust during enforcement.

3. **Right to water justice**: Equitable access to water is determined through water and sanitation policy, based on the Water Act 2013. However, over-extraction of groundwater for irrigation, urban water supply and industrial uses makes access to potable water difficult for people living in or close to industrial clusters. Marginal farmers and fisherman face livelihood challenges due to polluted surface water and a falling groundwater table.

4. **Enforcement of wastewater discharge rules**: ECR 1997 set wastewater discharge standards for industrial operations. DoE as the national regulatory agency conducts environmental inspections of factories. An enforcement cell headed by an Executive Magistrate sets up a mobile court wherever environmental pollution occurs, so that enforcement can be assured instantly with punishment for violators. The polluter pays principle is used in assessing financial penalties. Effective action is often taken, but appeals by polluters often lead to a withdrawal or reduction of punishment without proper justification, making enforcement actions ineffective. In community and stakeholder consultations, it was suggested that ambiguity and corruption may cause these irregularities.

5. **Transparency and accountability in environmental management**: The environmental impact assessment process for obtaining an environmental clearance certificate should involve people who are potentially affected in the decision making process. However, in practice EIA for industry seldom follows participatory protocols and affected people are bypassed in the DoE decision making process. Stronger EIA guidelines are needed to promote participation by affected communities. There is also a need for greater transparency in the planning processes including budget allocations to implement the environmental management plan as approved in the Environmental Clearance Certificate (ECC). ETP treatment and auditing of expenditure should be made transparent.

6.5 National Water Act 2013: A Way Forward for Water Sector Integrity

The literature review and stakeholder consultation in this study have demonstrated that the National Water Act 2013 could be used as a strong legal instrument to protect water integrity across all sectors and geographical areas of Bangladesh. The global apparel brand H&M reviewed the provision of the law with a water sustainability perspective and identified a number of gaps and made recommendations which may offer useful ways to improve water sector integrity through improved effectiveness of ETP in the textile industry. These are summarized in Table 10.

Table 10: Provision of Use and Effectiveness of ETP in Textile with Water Sector Integrity Perspective – a Gap Analysis Matrix

Identified Gap	Recommendations
The Ministry of Water Resources (MoWR) has developed the Bangladesh Water Act-2013, but there has been no coordination with water-related laws of other ministries.	Greater integration of responsibilities with related ministries will help to identify common goals and start a dialogue on strengthening institutional ownership.
DoE has Insufficient coordination with other water sector agencies.	MoEF in collaboration with other ministries and should develop appropriate legal instrument and enforcement mechanism.
In the Environment Conservation Act (ECA) 1995 and the Environment Conservation Rules (ECR) 1997, the DoE has specified that any water related project requires an Environmental Impact Assessment (EIA) before approval. However, the Water Act 2013 states that the Bangladesh Water Resources Planning Organization (WARPO) has responsibility for clearance of any water-related project.	A review of the ECA 1995, the ECR 1997 and the Water Act 2013 is needed to establish a consistent approach to conduct EIA and issue project approval for water related project.
Inadequate enforcement of water regulations	Establishment of Central Effluent Treatment Plant (CETP) at clustered and zoning basis is important to ensure full time monitoring of the effluents and to improve the state of environment of the country. To promote improvements to the groundwater licensing for industrial users it is necessary to include compulsory metering of water abstraction
Inadequate manpower is one of the major problems of DoE, which only has an effective institutional presence in Dhaka.	Immediate need is to increase the manpower and expand its official set up all over the country
DoE testing laboratories are out of date, lack capacity and testing of samples is time consuming.	DoE needs funds to modernize and update laboratories.
DoE does not have the capacity to monitor all the ETP system on a regular basis due to lack of manpower and other resources.	DoE regulatory bodies should be decentralized to monitoring ETP systems and development capacity as needed

There is no control by WARPO or DoE over withdrawal of groundwater for industrial use.	There should be licensing system for industrial withdrawal of water from groundwater sources and DoE and WARPO need to have strong monitoring system
The Environmental Conservation Act includes a kind of 'Polluters Pay Principle' but it is not currently fully implemented.	DoE and WARPO should create more effective mechanism for penalties. These could include fines, loss of tax and duty concessions, blacklisting or even removing operating licences. The country should gradually switch from a 'command and control' system to market based 'polluters pay principle' system with appropriate fiscal policy for economic incentives, reward, disincentive and penalties
Specific, differentiated functions of the WARPO and the DoE in the Water Act 2013 are not clear.	Need to clarify the specific role of WARPO and DoE so that the two agencies can work with harmony with differentiated functions.
DoE officials often lack knowledge regarding various technical design specification and operation aspects of ETP and other pollution.	Initiatives are needed to enhance local and foreign training facilities on various aspects of ETP for DoE staff and factory personnel engaged in ETP operation.
Although The Department of Textiles (DoT) approves ETP setup for textile facilities, it does not have the capacity to conduct EIAs, monitor and supervise the performance of textile sites or to enforce penalties against polluters. These duties are in the remit of the DoE. This is contradictory from both administrative and legislative viewpoints.	It should be ensured that both full responsibilities for monitoring of textile sector give to the DoT or enforcement and ETP setup related responsibility give to the DoE.
WARPO has limited resources. It is a major constraint on managing implementation of water related projects.	WARPO should be involved at the project development stage, which will reduce its workload.
Delays in project approval are a problem in water governance by WARPO.	A solution needs to be found to reduce project approval time.
Coordination of the 35 agencies and 13 ministries involved with WARPO is not satisfactory.	Greater collaboration and outreach by institutions would support much stronger enforcement of the present water related policies.
WARPO cannot perform properly because of shortage of manpower.	Recruitment of additional trained manpower, promote professionalism.
Huge lack of skilled Manpower in WARPO	Professionals in WARPO need continuous local on-the-job training and exposure to experiences abroad.
The responsibilities of a WARPO officer are not clear in the Bangladesh Water Act 2013.	Responsibilities should be clearly specified.
Public representatives have no role in controlling pollution of river and other water bodies by industries.	Public representatives must become involved in controlling the water pollution.

The legal mechanism is too complex and slow to impose penalties.	The legal process should be simpler and quicker.
There is no appropriate system for public consultation for informed decision making and grievance redress	Authorities should have priorities for public consultation particularly for local people affected by water pollution.
The WARPO Director General is usually deputed from BWDB for a short period of time, which makes it difficult to take firm action against industry owners for improper water extraction and pollution.	Ensure long term commitment for the Director General of WARPO.

Source: Adapted from secondary information review (H & M, 2015), (Chan, Roy, & Chaffin, 2016)

6.6 Recommendations

Specific recommendations may be implemented by the textile industry and the water and environmental regulatory agencies engaged with water pollution control:

- Increase awareness among textile owners and their leading organizations about the pollution problem and their legal and social responsibility to prevent it.
- Adopt efficient textile production options that use less water and energy and make factories environmentally and economically beneficial and competitive.
- Monitor ETP functions more thoroughly to reduce costs and maintain environmental standard.
- Government can promote cluster-based ETPs with low operating cost to serve factories at all scales.
- DoE should accredit and appoint competent third party organizations to work on its behalf to monitor textiles regularly in addition to its own monitoring.
- DoE should raise the awareness of Local Government Institutions (LGIs) and make them aware of the issues, and of how LGIs can use their powers to minimize pollution. DoE should establish formal linkage with Upazila Fisheries Committees to assist them in ensuring acceptable water quality in wetlands and capture fisheries.
- Environmental courts should be strengthened to ensure that polluters and those who commit environmental violations are punished. Administrative interference should be minimized as much as possible to decrease corruptions and increase transparency for improved water sector integrity.
- Sampling collection of effluent from all garments factories should be done in a proper way. It is important to maintain the sample protocol.
- National and community level bodies should be established and validated to monitor water quality in khals, beels and rivers, and the results used to determine anti-pollution measures, operating permits and actions, including legal action against offending industries.

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ANNEXE-1: Questionnaire

Questionnaire

The use and effectiveness of ETP in the garment industry of Bangladesh from a water sector integrity perspective

(All information provided will be kept confidential and we will not disclose your personal identity and information to a third party)

Name of the Contact Person: _____

Designation of the Contact Person: _____

Name of Industry: _____

Address: _____

13

Q1: What is the type of the industry?

1. Knitting
2. Knit dyeing
3. Woven dyeing
4. Yarn dyeing
5. Denim dyeing
6. Denim washing
7. Garment washing
8. Printing
9. Garment cutting, sewing, finishing
10. Other _____

Q2: What is production capacity of your textile?

1. Yarn dyeing : _____ tones/day
2. Fabric dyeing: _____ tones/day
3. Fabric washing: _____ tones/day

Q3: Number of employees and workers in your factory

1. Dyeing Unit: _____ Nos.
2. Washing units: _____ Nos.
3. Total _____ Nos.

Q4: Does industry manage/use any chemicals or hazardous materials? (Chemicals, dyes, paints, cleaning agent etc.) 1. Yes 2. No

If so, what types of chemicals are used in the industry?

1. Pre-treatment Chemicals
2. Textile Dyeing Chemicals
3. Dyeing & Printing Chemicals
4. Finishing Chemicals
5. Bleaching
6. Antistatic Agents
7. Scouring
8. De-sizing
9. Mercerization
10. Other _____

Q5: Do you keep records of your chemicals/hazardous materials used? 1. Yes 2. No

If so, please specify the volume of major chemicals used per day.

Name of Chemical	Quantity used per day (kg)
1.	
2.	
3.	
4.	

Q6: Please specify the amount of water consumption for the industry per day: _____m^3/ day

Water Consumption Sector	Consumption (%)
1. Process (Dyeing, Washing, Printing, etc.)	
2. Domestic purpose (wash room, drinking, others)	
3. Steam generation (boiler feed water)	
4. Cooling (processing machines, cooling tower)	
5. Others	

Q7: What is the manufacturer/brand of the ETP? _____

Q8: What type of ETP is used in the industry?

1. Biological
2. Physio-chemical
3. Bio-physio-chemical
4. Others, please mention

_____

Q9: What types of treatment facilities do exist in the ETP?

1. Cooling and Mixing
2. Neutralization
3. Flocculation
4. Electrocoagulation Contaminants Removal (ECR)
5. Anaerobic Treatment
6. Coagulation
7. Aerobic Biological Treatment
8. Setting and Separation of Sludge
9. Tertiary Treatments
10. Others, please mention _____

Q10: Please specify the capacity of ETP: _____ m^3/day

Q11: What is the volume of discharged effluent? _____ m^3/day

Q12: Do you maintain any log book for ETP operation? 1. Yes 2. No

If yes, please mention the parameters/records which are maintained:

_____

If available, please provide the discharge volume of treated water from ETP as per record maintained for last 7 (seven) days: _____ m^3/day

Q13: Is there any seasonality of usage of ETP? 1. Yes 2. No

If yes, please explain:

_____

_____

____

Q14: Please specify ETP used in your industry is adequate in size and treatment capacity. If yes, please explain your answer: 1. Yes 2. No

_____

_____

____

Q15: How much wet sludge is produced? _____ m^3/day

Q16: How frequently and where do you dispose this sludge?

1. Frequency _____month
2. Where disposed _____

Q17: Is there any dedicated staff for monitoring the operation and the efficiency of ETP? 1. Yes 2. No

If so, how many staff? _____

In case of no dedicated staff, who operates the ETP?

1. Engineer
2. Operation Manager
3. Other _____

Q18: Qualifications of the ETP Operation and maintenance Staff?

Designation of Personnel	Qualification
1.	1.
2.	2.
3.	3.
4.	4.

Q19: What basic trainings did the ETP manager obtain in the past? Please mention previous related experiences ETP operation and maintenance staff, if any

1. Degrees on Environmental Management/Engineering
2. Engineering
3. Trained on Environmental Management
4. Other _____

Q20: Does the person have training on ETP performance assessment? 1. Yes 2. No

If yes, please provide training details:

1) Training subject/ issue (anything specific item etc.):
2) Duration:
3) Provider:

Q21: Do you follow any specific methodology for collecting sample? (this should be asked if there is any implication approach)

1) Collected by whom? a. In-house b. 3rd Party c. Other

   _____

2) When collect?

   (Frequency)_____

3) From where collect?

   _____

4) Anything else, please specify:

   _____

Q22: Where the samples have been tested? Please specify _____

Q23: What parameters do the tests cover and results?

1. pH	2. BOD	3. COD	4. TDS	5. TSS	6. DO	7. Other

Q24: Does the ETP Manager or Facility Personnel have an explanation for the non-compliance? 1. Yes 2. No

If so, Please explain to whom ETP Manager or Facility Personnel explained the non-compliance ?

_____

_____

_____

Q25: How frequently DoE/ Buyer/ Third party inspect your ETP? Please specify separately-

1. DoE: _____ months
2. Buyer: _____ months
3. Third party (specify): _____ months

Q26. When did DoE personnel conduct last visit? Month/Year _____

Q27. What were their observations?

Please mention _____

Q28: Please specify, in ranking scale how is effluent from textiles liable for surface water pollution?

1 2 3 4 5

Q29: Does your Industry practice recycling and reuse of waste water in any way? 1. Yes 2. No

Please explain your response (if yes, how; if not, why not?)

_____

_____

_____

Questions on Environmental Laws and Enforcement/ compliance in Bangladesh

Q30: Does your company have any formal/written environmental policy? 1. Yes 2. No

If so, provide us a hard copy of the policy.

Q31: Are you aware about the environmental laws of Bangladesh? 1. Yes 2. No 3. N/A

Q32: Are you aware about the environmental rules of Bangladesh? 1. Yes 2. No 3. N/A

Q33: Does you company have a valid Environmental Clearance Certificate (ECC)? 1. Yes 2. No

Q34: Do you implement DoE approved Environment Management Plan (EMP) duly? 1. Yes 2. No

Q35. To what extent the existing regulatory framework is being implemented by the garments industries and their association/s? 1. Fully 2. Moderately 3. Minimally 4. Not at all

Q36: Do you face any problem in obtaining ECC from the DoE? 1. Yes 2. No

If yes, please mention

briefly:_____

_____

_____

Q37: Do you think existing environmental law and rules of Bangladesh are adequate to manage environmental issues of textile sector company? 1. Yes 2. No 3. N/A

Q38: If no, what could be proposed to ensure proper environmental management of textile effluents and pollution? Please explain your response briefly (if yes or no)

Please mention _____

_____

Q39: Please list out the major challenges in garments/ textile sector to adopt proper operation of ETP?

_____

_____

_____

Q40: According to your opinion, to what extent the existing regulatory framework is being implemented by the garments industries and their association/s?

Q41: Which measures are needed to be taken by the government/buyer/other relevant stakeholders i.e., BGMEA, BKMEA, etc. To ensure the proper use and effectiveness of ETP?

1. DoE	2. BGMEA	3. Brand/Buyer
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4. Civil Society/NGOs	5. Community People	6. Other
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Questions to be asked by the enumerator during field visit

(The enumerator should not read out the options below. He/she should mark options according to the response provided)

Q42: What measures do factory management or ETP Operator take if any parameters found beyond DoE standards?

1. Shut down ETP for repair and maintenance
2. Stop sending wastewater to ETP
3. Store wastewater for treatment till ETP is fully functional for treatment
4. Discharge wastewater without treatment till ETP becomes functional

Q43: How is your wastewater sludge disposed?

1. Direct discharge to drain/inland waters
2. Discharge to sewer system
3. Discharge to septic tank
4. Vendor takes away
5. Combination of the above

Data Collected by:

Designation:

Date:

Signature:

ANNEXE-2: List of Textile Factories from Different Clusters

Sl. No.	Factory code	Cluster	Production Type	Production Capacity (Tones/day)			
				Yarn Dyeing	Fabric Dyeing	Fabric Washing	Total
1.	Factory 01	Savar	Knit Dyeing	-	15	-	15
2.	Factory 02		Knit Dyeing	-	16	-	16
3.	Factory 03		Woven Dyeing	3.5	-	45	48.5
4.	Factory 04		Garment Washing	-	-	3	3
5.	Factory 05	Gazipur-Konabari - Tongi	Knit Dyeing	-	13	-	13
6.	Factory 06		Knit Dyeing	-	25	-	25
7.	Factory 07		Knit Dyeing	-	15	-	15
8.	Factory 08		Knit Dyeing	-	60	-	60
9.	Factory 09		Knit Dyeing	-	25	-	25
10.	Factory 10		Knit Dyeing	-	20	-	20
11.	Factory 11		Knit Dyeing	-	25	-	25
12.	Factory 12		Knit Dyeing	-	18	-	18
13.	Factory 13		Knit Dyeing	-	50	-	50
14.	Factory 14		Knit Dyeing	-	38	-	38
15.	Factory 15		Knit Dyeing	-	12	14	26
16.	Factory 16		Garment Washing	44	80	78	202
17.	Factory 17		Garment Washing	-	-	20	20
18.	Factory 18	Narayanganj	Knit Dyeing	-	35	10	45
19.	Factory 19		Knit Dyeing	-	23	-	23
20.	Factory 20		Knit Dyeing	-	25	-	25
21.	Factory 21		Knit Dyeing	-	25	-	25
22.	Factory 22		Denim Dyeing	-	15	-	15

টেক্সটাইল শিল্পে বর্জ্যপানি পরিশোধনাগার এর ব্যাবহার ও কার্যকারিতাঃ বাংলাদেশের পানিখাতের শুদ্ধাতার প্রেক্ষাপট(Use and Effectiveness of Effluent Treatment Plant (ETP) in the Garments Industry of Bangladesh: from a Water Sector Integrity Perspective)

প্রশ্নাবলী (Questionnaire)

বিভাগ: _____

জেলা: _____

থানা/ উপজেলা: _____

প্রশ্ন ০১- আপনি কি এই এলাকায় বসবাস করেন?

- হ্যাঁ
- না

প্রশ্ন ০২- আপনার পেশা কি?

- কৃষক
- কামার
- ব্যাবসায়ী
- মাঝি
- শিক্ষক
- জেলে
- কুমোর
- শ্রমজীবী
- চাকুরীজীবী
- অন্যান্য

প্রশ্ন ০৩- আপনি কত বছরযাবত এই অঞ্চলে বসবাস ও কাজ করছেন?

- ১ বছরের কম
- ১ থেকে ৫ বছর
- ৫ থেকে ১০ বছর
- ১০ বছরের বেশি

প্রশ্ন ০৪- এ অঞ্চলের আশেপাশে কি কোন টেক্সটাইল শিল্পকারখানা আছে?

- হ্যাঁ
- না

প্রশ্ন ০৫-টেক্সটাইলশিল্পকারখানাঅত্রএলাকারজন্যকিপ্রভাবরাখে?

১। কর্মসংস্থান
২। ইতিবাচক সামাজিক প্রভাব
৩। নেতিবাচক সামাজিক প্রভাব
৪। পরিবেশের উপর ভালো প্রভাব
৫। পরিবেশের উপর খারাপ প্রভাব

প্রশ্ন ০৬- এই সকল টেক্সটাইল শিল্পকারখানার বর্জ্যপদার্থ দ্বারা কি পানি দূষিত হয়?

- হ্যাঁ
- না

প্রশ্ন ০৭- পোশাকশিল্প কারখানা গড়ে উঠার আগে আপনি কি এই এলাকায় বসবাস করতেন?

- হ্যাঁ
- না

প্রশ্ন ০৮- এই পানি দূষণ কি আপনার আয় এর উপর কোন প্রভাব ফেলে?

- হ্যাঁ
- না

প্রশ্ন ০৯- পোশাকশিল্প কারখানার বর্জ্যপদার্থ দ্বারা দূষিত পানির স্থান হতে আপনার বাসস্থান এর দূরত্ব কত?

- ১ কিলোমিটারের কম
- ১ থেকে ৫ কিলোমিটার
- ৫ থেকে ১০ কিলোমিটার
- ১০ কিলোমিটারের বেশি

প্রশ্ন ১০- এই পানি দূষণ কি আপনার বাসস্থান এর উপর কোন প্রভাব ফেলে?

- হ্যাঁ
- না

প্রশ্ন ১১- এই পানি দূষণ দ্বারা আপনার পরিবারের কেউ কি স্বাস্থ্যগতভাবে ক্ষতিগ্রস্থ হয়েছে?

- হ্যাঁ
- না

হলে কি ধরনের,

১। চর্মরোগ

২। পানিবাহিত রোগঃ
- কলেরা
- বসন্ত
- টাইফয়েড
- যক্ষ্মা
- ম্যালেরিয়া

৩। হার্টের অসুখ
৪। ক্যান্সার
৫। কিডনির অসুখ
৬। অন্যান্য _____

প্রশ্ন ১২- দূষিত পানির কারনে চাষযোগ্য জমিগুলো কি চাষাবাদের অনুপযোগী হয়ে পড়েছে?

- হ্যাঁ
- না

হলে কি ধরনের,

১। জমির উর্বরতা নষ্ট হয়ে যায়

২। পানি সেচের অনুপযোগী হয়ে পড়ে

৩। গবাদি পশুর ব্যাবহার অনুপযোগী হয়ে পড়ে

৪। অন্যান্য _____

প্রশ্ন ১৩- আপনি কি মনে করেন, এই পানি দূষণের দরুন পরিবেশের গাছপালা ও অন্যান্য জীবজন্তুর কি ক্ষতি হয়েছে?

- হ্যাঁ
- না

প্রশ্ন ১৪- আপনি কি মনে করেন, টেক্সটাইল শিল্পকারখানার বর্জ্য পানি পরিশোধনের মাধ্যমে নদী-নালার পানির মান ভালো রাখা সম্ভব?

- হ্যাঁ
- না

প্রশ্ন ১৫- পানির মান পরিক্ষা-নিরীক্ষা করার জন্য সরকারের কোন কোন দপ্তর কাজ করতে পারেন বলে আপনি মনে করেন?

১। পরিবেশ অধিদপ্তর	২। পরিবেশ সংরক্ষণ সংস্থা	৩।পরিবেশ পরিকল্পনা ও ব্যবস্থাপনাসংস্থা
৪। ওয়াসা	৫। জনস্বাস্থ্য প্রকৌশল	৬। পরিবেশগতবেসরকারিসংগঠন / বেসরকারিসংগঠন
৭। জনসাধারণ	৮। সামাজিকপ্রতিষ্ঠান	৭। অন্যান্য _____

ANNEX-3: Public Consultation 01 – Shanirvar Dhamsona Union Parishad

Sl. No.	Profession	Comments & Suggestions
01.	Businessman	Direct discharge of effluent from industry causes massive water pollution. Agricultural land loses its fertility and consequently loss of production occurs. More budgets for environmental protection and ETP Management can help to minimize the pollution.
02	School Teacher	As a result of industrial pollution huge loss of crop production. Local leader should take strong steps against industrial owner.
03		If environment destroyed, our existence will be damaged, biotic and abiotic components will be damaged. For Industry should avoid the agricultural land. Management should be a major concern to protect the environment.
04	Agriculture Officer	More than 1000 acre of agriculture land are damaged by the DEPZ effluent. Many new diseases are seen in crops. 1000 agriculture depended family are affected.
05	Farmer	Fish and agricultural sector are affected more for the DEPZ. Many movements by affected people are occurred but Govt. does not take any step against DEPZ.
06	Farmer	We cannot get any crops in our agriculture land for effluent of DEPZ from 20 years. How can I get my compensation? Govt. should take strong step against industry.
07	UP Chairman	High Chemical present in effluent water. There have ETP in every industry but they do not use it in proper way. Maximum time the ETP is closed. Many factories do not give their effluent to CETP. They direct discharge into agricultural land. Gradually the fertility of land is damaged. We notified for ETP management by letter. But they deny all types of accusation against ETP management. One cannot dare to protest them. Govt. probably not knows the real situation of ETP management. It is necessary to dig a canal to protect the agricultural land.

Public Consultation 02 – Kanchpur Union Parishad Complex

Sl. No.	Profession	Comments & Suggestions
01.	UP Member	Effluent water from paper mill direct discharge into the river without any treatment. Many Govt. Officer take bribe from the industry owner. So the industries do not think to need the proper management of ETP. People suffer from different skin diseases. Fish become extinct from the river.

Sl. No.	Profession	Comments & Suggestions
02.	UP Secretary	Agricultural land gradually losses the fertility, water Pollution increase day by day. If there have proper management of ETP, people are not more sufferer for the industry. Meeting should be arranged with the combination of govt., industry owner and affected people. Local leader can take strong step against the mismanagement of Industry.
03	UP Member	The river water fully damaged by the effluent of different industries. Govt. and affected people should work together for proper management of ETP.
04	UP Member	This area was full of agriculture land. Effluent passes through a drain into agricultural land from the industries. Agriculture and fish farming has been reduced in the area. People suffer from Skin diseases.
05	UP Member	In rainy season effluent discharge directly into agriculture land. Some unscrupulous person support to industry owners for such kind of illegal works. Effluent water must be discharged after proper treatment to protect the land.
06	Farmer	One day the water of Shitalakkhya river used in different domestic purposes. Now it is fully damaged by industrial water. There have available ETP but not use in proper way.
07	Inspector, family planning	Many diseases can be seen from effluent water. Proper management should be needed. There have some corrupted people but they are limited. Govt. can take strong steps against industrial owner with the support of local leader.
08	UP member	Administration should be more alert in these issues. Then it is possible to proper management.