River pollution in Bangladesh: Unabated atrocity on people's right to safe water

[Bangladesh Poribesh Andolon (BAPA) Monitoring Cell works since 2005 with special emphasis on the rivers. Sources of information are secondary in nature & sources comprise contact points and movements all over the country, media references & academic expressions and issue based visits & examinations which will be depicted in this presentation.]

A. Introduction:

a**.** Bangladesh is a deltaic land created & flown over by numerous rivers; the land is also consistently nourished by their water flows. Bangladesh had 1400 to 1500 rivers in the 11th Century but reduced to 7 to 8 hundreds due to various natural anthropogenic factors during the establishment of the then East Pakistan. Presently no more than 230 to 310 rivers with numerous tributaries & distributaries are existent in the country out of which 25 rivers are already dead or going to die. Dozens of other are drying up gradually. Only around 100 rivers have navigable depth round the year at the moment. Total river route in the country in 1971 was 24,140 Km covering 8% country area now that has been reduced to 3800 km only during the lean flow period.

b. There are three principal river systems in the country: (a) Barak-Meghna (b) Brahmaputra-Jamuna & (c) Ganga-Padma. Teesta is no less important water flow for the country because it is the terminal tributary for the Brahmaputra. These systems and other all rivers carry a water load of about 1074 billion cubic meters (bcm) from the up stream sources. Rainfall adds another 251 bcm of water volume. Around 150 bcm of water is required to be available in the riverbeds to maintain navigability.

B. River Degradation through Physical Contaminants.

Physical Degradations include: reduced flow, siltation, erosion, cordon structures and encroachment.

a. Reduction of flows: Flow reduction becomes critical in 97% of the rivers in dry season (Nov to March). Causes of flow reduction include flow diversion and water withdrawal in upstream region mainly by India in all 54 rivers & partly by Myanmar through damming or other obstructive or diversionary infrastructures. Indian River Linking Project (IRLP) & Tipaimukh Dam will be last pins in our rivers coffin. (List of dammed rivers attached).

b. Silt deposition: Prolonged silt deposition meanwhile killed 187 rivers (28% of the rivers). All the rivers of Bangladesh carry about 3.8 billion tons of silt every year & 40-45 million tons get deposited on the river beds. Many rivers lost their depths and about 77% of the river-mouths are silted meanwhile. Silt deposit rate has been increased in 574 rivers (i.e. 86%). (Lists of depth lost & mouth silted rivers attached).

c. River Erosion: 41% of the rivers in Bangladesh suffer from erosion. During the rainy season, erosion increases in some rivers.

d. Cordon Structures: 500 Flood Controlling drainage & irrigation projects taken in last 60 years have disconnected 35 million hectors of land from the rivers. Harmful & river killing structures were built on certain rivers causing immense negative impacts on them.

e. Unauthorized Encroachments: 158 rivers lost their width from unauthorized encroachments.
f. Instrumental & Organic dumping: Different abandoned parts of marine vehicles like wooden boats, steamers, fishing nets, boundaries used in dry seasons for fishing traps, plastics & other non-degradable items, house hold materials, rejected foods-fruits-vegetables etc are also causing further pollutions.

g. Unmanaged Hospital wastes: including seriously poisonous and infective materials are getting mixed knowingly or unknowingly all over the country & all over the year contributing to a huge biological pollution of the rivers & wetlands.

Degrading river having reduced water amount, more sediments, narrowing, cordoning, diversions, dry ups, commercialization, so called developments, unplanned re-excavations, changing characters, sluggish flows due to all the misbehaviors on the rivers mentioned above accelerate pollution & induce deaths of rivers finally, through more human accessibility & interventions in the rivers e.g. cross roads, sub-width bridges & culverts, regulators, long uninterrupted embankments, fishery projects, fishing traps & ponds, application of dirty fish feeds, chemical agriculture etc inside.

C. Chemical Contamination: Source of enormous public health threat.

a. About 11% of the rivers in Bangladesh are polluted by Industry wastes. Further escalations noted from agro-chemicals, marine vehicular discharges & wastes, municipal cum domestic wastes. As per governmental study, Rivers around Dhaka namely the Buriganga, Shitalakshya, Turag, Balu, Bangshi & Dhaleswary have earned notorious impression meanwhile, due to their huge pollutions from Industry wastes (60%), Municipal house-hold & City drainage of toilet wastes (30%). We could hear from a former state minister of water resources in late 90's that a ten feet thick poly bags layer has made'carpeting' on the Buriganga river bed! The newly built beautiful Hatirjheel project is still pouring its dirty city wastes into the river Balu through the Narai khal without proper & adequate. So, especially during the winter season, all these rivers become absolutely poisonous, devoid of oxygen & marine life. Government looks like shy in executing the decision for mandatory fixation of ETPs in the industrial plants.

b. Excreta & dead bodies: play a significant role in polluting the rivers in Bangladesh. In spite of prolonged national drives, the nation is yet to achieve a satisfactory Sanitation management. Rivers and canals are major disposal venues for much amount of human & animal excreta (stool) as well as dead animal bodies especially by the river side inhabitants. Media sources revealed few years back that number of hanging latrines on the both sides of the river Karnaphulee was 1.5 lacs !

c. About 1.6 million tons of chemical fertilizers & 4-5 thousand tons of pesticides are used for agriculture every year. Though illegal, the notorious 'dirty dozen' group of illegally imported 9 out of 12 Persistent Organic Pollutants (POPs) are also being used all over the country for agricultural & house hold purposes. These are: Eldrin, Dieldrin, Chlorden, DDT, Endrin, Heptochlor, Mirax & Toxafen. A huge portion of these dangerous items are carried by rain water & flood flushes causing huge contamination to

the rivers, wetlands, ponds, soil and finally entering the food chains & human cum animal bodies as permanent pollutants causing numerous deadly diseases.

d. Marine vehicular discharges: chemical contamination resulted in sediments amounting 1.7 to 2.4 billion tons are causing 35 millions tons of silt deposits in the rivers.

D. Transboundary mixed pollution:

Transboundary river pollution is also a significant factor for Bangladesh. All the plain land & hilly rivers are carrying huge amount of wastes from a big area of India around Bangladesh and a part of Myanmar. The components include eroded river bank soils, peeled off hilly stones, boulders, construction materials from urban developmental projects & hydel power plants, dam constructions, contaminated mountains & glaciers, run off urban wastes, coal dusts, grabbles, sandy floods, suspected radiation materials and municipal wastes from Meghalaya, Assam, Tripura, West Bengal and border side Myanmar.

E. Two Specific Scenarios of pollutions:

a. River Pollution Incidence Rate: BAPA Monitoring Cell: Conducting observation on rivers since 2005, taking the information on last 3 years & could identify some basic trends in the scenario, though the observation was not academically organized. Gross points are as following:

River Pollution in Bangladesh (2010-2012)

Subject	Year 2010	Year 2011	Year 2012	Remarks
Total Rivers reported	168	57	90	average 105 rivers/year
Total Information on rivers	302	218	166	Decline in News numbers!
Total Pollution reported	54	29	19	Decline in pollutions!
Polluted rivers out of Total Info	17.68%	13.30%	21.11%	Increased numbers of rivers polluted
Highest Reported 5 rivers	Shitalakshya Buriganga Turag Karnaphuli Balu	Buriganga Shitalakshya Turag Balu Rivers in Sunderbans	Turag Shitalakshya Buriganga Meghna Karnaphuli	Mostly central
Highest identified 4 Causes	Industry waste Municipal waste	Industry waste Municipal waste	Industry waste Municipal waste	Industry & Municipality topping

	Marine Vehicular Discharge Sand & Soil	Poisoning Sand & Soil	Sand & Soil Marine Vehicular Discharge	the list of polluters

b. **32 major polluted rivers from industry sources** in Bangladesh are shown in the following table with related information like polluting industries, pollutant chemicals and their discharge rates:

Names

Major Polluted rivers in Bangladesh (2005)

River	Polluting Industry	Discharge rate	Chemicals
Karnaphulee	144 Industries	10-12 million gallon day^{-1}	Hg, Pb, Cr, Cd & As
	297Industries	400 t waste day^{-1}	Degradable and persistent organic & inorganic compounds
	40-50 Oil tankers	6000yr.$^{-1}$	Oil, lubricants
Sangu	Fishermen	Huge	Fish poison (toxic chemicals)
Bhairab	Khula News Prints Mills	4500m3 hr.$^{-1}$	K, Ca, Mn, Fe, Cu, Zn, As, Br, Pb, Ni Sr, Cd, Rb and Tl
Mongla, Pasur and Rupsha	Merchant ships, oil tankers and marine vessels	Huge	Oil, grease and other lubricants
Rupsha	Khulna City	10 t day.$^{-1}$	Solid and liquid wastes
Nabaganga	Mobarakgang Sugar mills	Huge	Chemical mixed effluents
Mathavanga	Carew & Company, Darshana Sugar Mills	Huge	Chemical mixed effluents
Kapotakkya	Jessore City	Huge	Solid and liquid wastes
Shitalakkya	Meghna Cement Factory, Ghorasal Urea Fertiliser Factory	Huge	NH_3, $CaCl_2$, NaOH, H_2SO_4 and lubricants
Buriganga	Five main drains of Dhaka City	0.60-2.9m3s^{-1}	Domestic & industrial effluents
	277 tanneries	88 t waste & 2200 litre of effluent yr^{-1}	Different Chemicals
	Passenger and merchant ships	Huge	Oil, grease and lubricants
Turag	250 different industries	Huge	K, Ca, Mn, Fe, Cu, Zn, As, Br, Pb, Ni Sr, Cd, Rb and Tl
Baloo	268 different industries	Huge	Cd, Cr, Pb, As & Zn
Bongshee	Different industries	Huge	Chemical mixed effluents

Kaleeganga	Fabric Industries	Huge	Chemical mixed effluents
Meghna	Ashugonj Fertiliser Factory	Huge	Ammonia & other chemicals
Brahmaputra	Mymensingh city, industries & factories	Huge	Chemical mixed effluents
Jamuna	Jheel Bangla & Dewangang Sugar Mills, Urea Fertiliser Factory	Huge	NH_3, $CaCl_2$, NaOH, H_2SO_4 & lubricants
Hareedhoya, Kalagasia & Pahoria	2000 Textile mills & fabric industries	Huge	Chemical mixed effluents
Dhaleshwaree	Cement factory, other industries	Huge	Chemical mixed effluents
Chandana	Faridpur Sugar Mills	Huge	Chemical mixed effluents
Surma and Dhanu	Chhatak Paper and Pulp Mill	1200-1 300 m_3, ha.-1	NaOH, Cl, Hg, Calcium Hcl
Kushiyara	Fenchuganj fertilizer factory	Huge	CO_2, NH_3, SO_2, (CO_2+N_2), oil, $CaCl_2$, NaOH, H_2SO_4 & lubricants
Tulshiganga	Industries Naogoan Municipal area	Huge	Solid & liquid wastes, effluents
Narod Nad	North Bengal Sugar Mills & Jamuna Distilleries	Huge	Chemical mixed effluents hot water (over 100'c)
Padma	North Bengal Paper Mills	Huge	NaOH, Cl, Hg, Calcium Hcl
Karatoa	Panchagar & Satabganj Sugar Mills, Zaz Distilleries	Huge	NH_3, $Cacl_2$, NaOH, H_2SO_4, lubricants hot water (over 100'c)
Jamuneshwary	Shampur Sugar Mills, Rangpur Distilleries	Huge	NH_3, $Cacl_2$, NaOH, H_2SO_4, lubricants hot water (over 100'c)
Kirtonkhola	Municipal & Industries	Huge	Chemical mixed effluents & wastes

We can see clearly that 32 important rivers of Bangladesh are the victims of dangerously toxic industrial discharges namely: Mercury, Lead, Chromium, Cadmium, Arsenic, Potassium, Calcium, Manganese, Iron, Copper, Zinc, Bromine, Nickel, Strontium, Rubidium, Titanium, Ammonia, Calcium Chloride, Sodium Hydroxide, Sulfuric Acid, Chlorine, Carbon di Oxide, Sulfur di Oxide, Nitrogen, Persistent Organic & Inorganic compounds, Oil, Lubricants, Grease, Fish Poisons, Solid & Liquids wastes, Mixed Chemical Effluents & Hot Water. The magnitude of pollution from these items having potentials of inflicting chemical injuries to human health & environment is evident from this list.

(F). Health Impacts of Chemical Pollutants of rivers:

In general, chemical pollutants of water induce toxic impacts on all the living entities including human being through water, soil and even air. Common diseases from the polluted rivers are: Skin allergy & inflammations, Gastroenteritis, typhoid & paratyphoid, liver diseases like hepatitis, jaundice, Upper respiratory inflammations, and any of these areas may develop even deadlier cancers. The population on around the river banks is in true sense a permanently vulnerable-health society with more morbidity, mortality, prolonged sickness, having less work capacity & costly lives leading to more poverty.

b. WB & GoB Study performed by IWM

In general, we know that Dhaka Water & Sewerage Authority (WASA) does have the capacity of managing only 30% toilet discharges & the rest goes to the rivers around Dhaka city through the WASA storm water drainage but without formal permission from the organization! Side by side the Dhaka City Corporation (DCC) does have the capacity of disposing 45% of the municipal wastes & the rest remains on around its roadside beams, often got back to homes with foot wears in to joining the rivers around through the roadside drains. There was a governmental study by the IWM in 2007 on the pollutions in the water courses around Dhaka namely: Buriganga, Shitalakshya, Turag, Balu, Bangshi, Dhaleswary & Tongi Khal. The study correctly revealed that 60% pollutions are caused by the industries, 30% by WASA and DCC & the rest by others.
This study, in addition to other matters, dealt with the biological pollutions of the rivers around Dhaka city.

Now some important quotations from the biological part of the study: Comparative Disease prevalence between watershed (6 rivers around the city of Dhaka) & Control Populations (river side Tangail):

*** Table: 01: (Secondary: Hazaribag tannery, Haque et al 2000, allopathic cost)**

Illness	illness from pollution	Sick days per month	Sick people per month	Unit Cost Tk (low-high)
Skin Disease	31%	17.8%	1720	1200-5000
Jaundice	21%	0.3%	20	1500-5000
Kidney Dis.	17%	1.4%	74	3000-10000
Diarrhea	15%	7.0%	327	5-500
Fever	10%	33.9%	1056	100-5000

***Table: 02: (Primary 2007: Dhaka Watershed, Norai-Balu)**
Incidence of diseases: by location (% of total reported cases).

Type of Disease	Watershed population	Control Population
Jaundice	77%	23%
Skin disease	66%	34%
Diarrhea	64%	35%
Typhoid	48%	52%

***Table: 03: (Primary 2007Incidence of Disease by attribute)**
Percentage of total reported cases

Attribute	**Jaundice**	**Skin Disease**	**Diarrhea**
	Water-Control	Water-Control	Water-Control
Age			
< 5 year	9.7% - 0.0%	2.0% - 2.4%	21.2% - 10.6%
5-12 years	10.1% - 2.7%	3.4% - 3.8%	7.7% - 5.9%
13-95 years	8.4% - 3.0%	5.5% - 2.3%	8.8% - 5.0%
Gender			
Male	9.7% - 4.1%	5.7% - 1.9%	9.7% - 6.7%
Female	7.9% - 1.3%	4.0% - 3.3%	9.8% - 4.4%
Employment status			
Employed	8.8% - 3.4%	5.5% - 2.4%	10.3% - 4.5%
Un-employed	7.7% - 2.6%	5.7% - 2.4%	7.8% - 5.4%

***Table: 04: (Primary 2007: Reasons for major diseases)**
Major sources of drinking water

Source	**Water(% of 252 houses)**	**Control (% of 252 houses)**
Piped water	84%	40%
Tube Well	66%	91%
River water	09%	02%
Pond	07%	09%

*** Table: 05: (Primary 2007: Causes of Jaundice by location)**

Reasons for having Jaundice	**Area**	**Area**
	Watershed (%)	Control (%)
Drinking contaminated water	54%	39.00%
Eating contaminated food	25%	16.00%

*** Table: 06: (Primary 2007: Causes of Skin Diseases by location)**

Reasons for having Skin Diseases	**Area**	**Area**
	Watershed (%)	Control (%)
Bathing in contaminated water	59%	28%
Drinking contaminated water	09%	00%
Washing clothes in contaminated water	16%	07%
Using others clothes	14%	00%
Being dirty & unclean	59%	52%

*** Table: 07: (Primary 2007: Causes of Diarrhea by location)**

Reasons for having diarrhea	**Area**	**Area**
	Watershed (%)	Control (%)
Drinking contaminated water	75%	65%
Eating contaminated food	58%	73%
No hand washing practices	29%	27%
Unhealthy living environment	20%	13%

**** Key points on findings:**

01. There is strong co-relation between disease & pollutions.
02. Industrial pollution is wide spread & easily affecting drinking water.
03. Health care cost of pollution represents 21.5% of annual income in Hazaribag area.
04. Jaundice, Skin diseases and diarrhea are very high in watershed areas.
05. Male and Children are more affected in watershed areas.
06. Male is more affected by jaundice than women.
07. Infants in control area are less affected by Jaundice and diarrhea.
08. There is co-relation between jaundice & diarrhea in watershed areas.
09. Major source of water contamination are from piped supply.
10. Productivity of Boro rice has declined in 63% of cases.
11. Productivity loss of land is estimated to be 40%.
12. Vegetable cultivation in river beds is severely damaged by polluted water.
13. There is no fishing activity in dry season in rivers and canals in greater Dhaka.
14. In rainy season some fishes appear here with insignificant reduction in amount but number of species is declining.
15. Thus the rice-vegetable-fish reduction is affecting nutrition.
16. WB Report 2006 says due to wide spread contamination there is no safe surface water sources in Bangladesh now, except few natural springs in hilly areas.
18. According to IWM, water is so much polluted at the intake point that it can't be treated at drinking-water level.
19. Rivers around Dhaka are at the height of contamination not only in dry season, posing high threat of health calamities always.

(G). Core essence of killing the rivers: wrong approach towards lifeline!

Historically & traditionally man had the wish to conquer the rivers by cordoning them with long embankment, dam, barrage, cross roads, short length bridges & culverts; people consider rivers as drains & throws all of their wastes & garbage into it not only at individual levels but also the corporate & governments. Bangladesh is no exception! But currently the choice for cordon & commercial approach towards the rivers is taking the reverse course world wide, and sensible people are adopting the ecological approaches towards the rivers. By science & sense of justice, that's the effective way of success to stop the atrocities on rivers including pollutions.

River pollution is violating the people's right to safe water & livable environment. Rivers are not pipelines, these are our lifelines. We must protect the rivers!

Sources: 01. "Degrading Riverine Habitats, conservation is imperative" 2005 by Dr. K. Rahman, 02. "Final draft on Impacts & Costs of pollution around Dhaka city" by GOB (WB) 2007; (03)."Dying Rivers deliver deluge blow" by Pinaki Roy,2005 (04). BAPA Monitoring Cell 2012; & (05). "Resolution on Rivers by BAPA-BEN Jatyo Nadi Convention 2005."

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