

Tipaimukh Dam: An alarming venture

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TIPAIMUKH dam located in Manipur state of India, by all definitions falls into the category of a large high head (162m) dam. Though learnt to be a hydel power project for generation of 1500 MW electricity, it will definitely work as a flood control dam for Manipur and the neighbouring Mizoram state and irrigation may be practiced in suitable land areas along the 1 km stretch of the Barak river up to the Bangladesh border and by the periphery of the reservoir perimeter.

Dam and international river

Since the river Barak-Surma-Kushyara is an international river, Bangladesh as a lower riparian country should have an equitable share of water and an access to the design details of the project, planning and design etc. It is learnt that the construction that started in 2007 was halted due to national and international uproar and resistance against probable environmental degradation inside and outside Indian territory and unilateral withdrawal of water of the river which will turn

Bangladesh's north-eastern lush-green fertile soil into a sandy dry waste land, during the dry season.

Such action tantamounts to violation of international convention which controls/regulates the equitable share to water of international rivers/watercourses. The above topics were discussed in many forums in different meetings and seminars in Dhaka and Sylhet and in at least two published books, 'No to Tipaimukh Dam' and 'Controversial Tipaimukh Dam: Overall Review'.

If we have access to the planning and design details of the dam we can see, apart from hydro-power generation, what else the project entails. Whether it has a component of irrigation in particular, as for irrigation they will use winter dry season flow which otherwise would have been flowing downstream for ecological and other uses in the lower riparian country. For any large dam the release of water in the low flow period for ecological use is mandatory by international convention as well as custom.

Dam Break Study

For every large dam there is an important study called "Dam Break Study". In olden days this study was done by thumb-

rule calculation without use of modern technology. In USA dams constructed in the 30's had serious incidences of collapse. Now the computer assembles all study, data and design criteria to ascertain the stability and strength of the dam against possible break/breach due to some acts of God like catastrophic hydrological events, severe earthquake or other events (like war). Different models are used to determine as to how to minimize high flood damages that might cause death and destruction downstream. In this case Bangladesh will be the poor victim. Tipaimukh dam

topping might have resulted in washing away of the dam with catastrophic consequences in both countries.

However, I am citing this grim episode for lessons for Tipaimukh dam design. If we can have an access to its design details, we can verify what flood frequency they had applied to arrive at design flood. As for any faulty design, if any catastrophe occurs, the sad outcome will fall on us in Bangladesh as a result of dam break.

For a dam of such magnitude and dimension a 100,000 to 500,000-year design flood should be considered adequate, particularly when the location of the dam is in a hilly

Ganges water at Farakka. Agriculture that depends on surface as well as ground water will be affected seriously.

Surma-Kushyara with its maze of numerous tributaries and distributaries support agriculture, irrigation navigation, drinking water supply, fisheries, wildlife in numerous haors and low lying areas in the entire Sylhet division and some peripheral areas of Dhaka division. The river system also supports internal navigation, wildlife in haors, industries like fertilizer, electricity, gas etc.

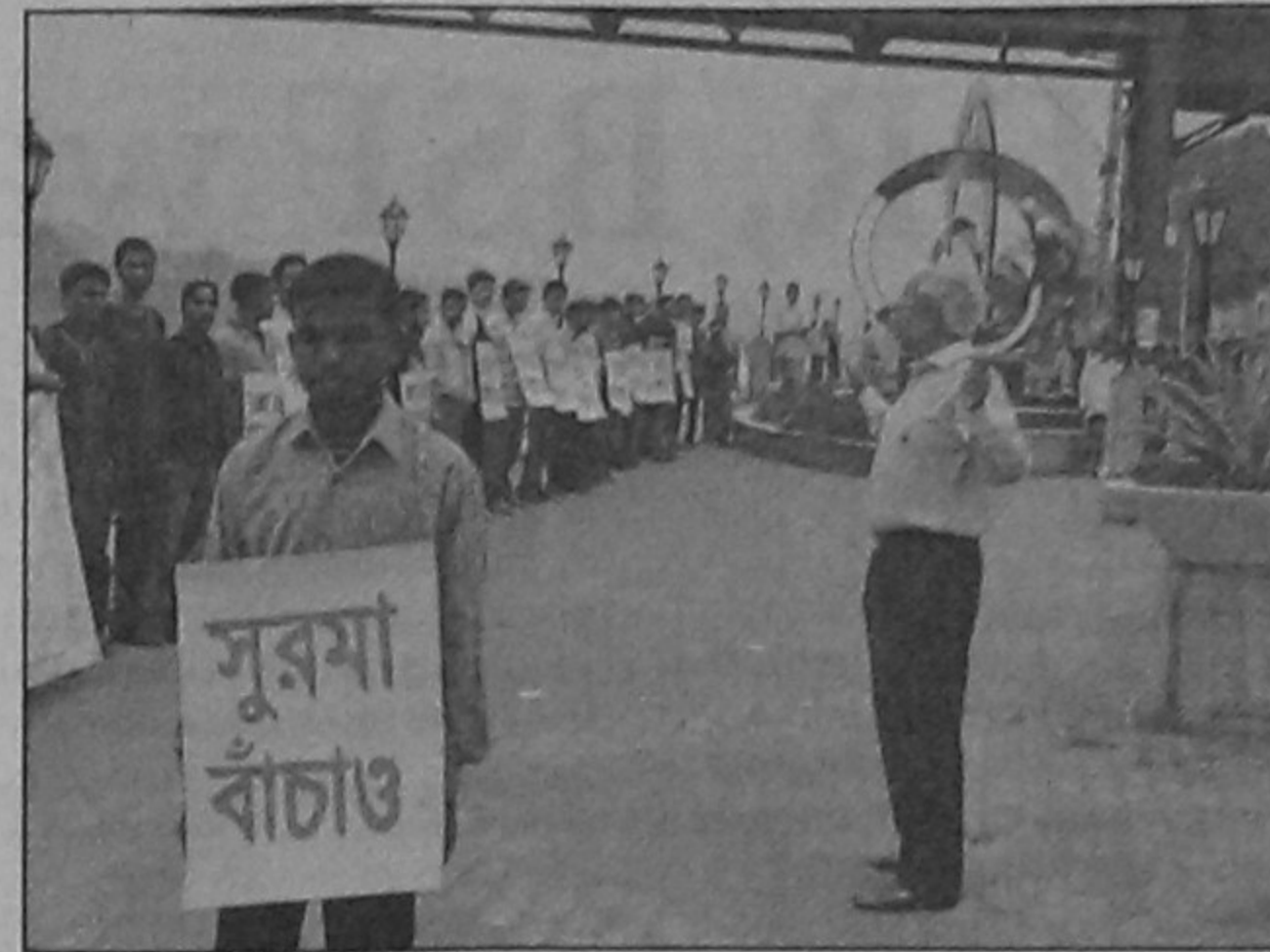
The rosy, prosperous and healthy scenario may soon turn into history causing

yielding drought-resistant crops (unknown to them).

Sedimentation

Scarcity of water will cause siltation on river beds. When high rainfall will occur in the catchment area of the dam, enormous quantity of sediment-laden flood water will be released which will cause severity of flood in the Surma and Kushyara channels which would be already raised for low flow. This will further raise the water level causing floods in adjoining additional areas.

Navigation in river channels in the Meghna (combined Surma and Kushyara) will face depleted water flow and conse-



Public protest against the dam.

Our government may request India to postpone, better stop, the construction of the Tipaimukh Dam, if possible, through bi-lateral diplomacy. Our government should soon start negotiation on equitable sharing of water according to our entitlement as a lower riparian of the international river Barak-Surma-Kushyara as per UN Convention. Unilateral withdrawal would be a gross violation of UN Convention that regulates the use of water of international rivers/water courses.

impounding "billions" of cube meter (M3) of water, will naturally cause catastrophic floods (in case of dam break) for the dam is large and high.

Nigerian experience

The writer has the experience of review and analysis of a Chinese-built large and high dam in Cameroon, Africa, 40km east of Nigerian border on the large Benue river in 1980. In Nigeria its dam break study was performed. Design flood for this large dam was taken as 50,000-year flood. In the high hilly drainage basin of the dam, there was very high rainfall with consequent abnormal rise of water level of the reservoir in 1988 flood season which menacingly threatened the very stability of the dam, with water almost overtopping the dam. It was a rock-fill dam on which over-

earthquake-prone and a high intensity rain region of India.

Adverse effects

Adverse effects of the Tipaimukh dam will be staggeringly devastating and damaging for Bangladesh. Environmental degradation, economic crisis and hydrological drought will cause irreversible damage. Suddenly, the free flowing Surma and Kushyara rivers will turn dry and remain so for a major portion of the year (Nov-May) disrupting agriculture, irrigation, drinking water supply, navigation etc. Six to seven months dry conditions will stop/lessen recharge of ground water which over the years will lower the ground water level, affecting all dug wells, shallow tubewells, as it happened in south western region of Bangladesh as a result of drastic withdrawal of the

despondency desperation and misery to the people inhabiting the zone which is known for abundance of water, lush green field of crops and fish sanctuary.

Massive environmental degradation will occur, drastically affecting weather and climate, turning a wet cooler habitat into a hot uncomfortable cauldron. The severity of micro-climate causing heat and dry conditions will gradually increase in intensity spreading over a large area over the years. It may be mentioned that rainfall that the area gets for 4 to 5 months and flood water that will be released from the dam for a short period will not be enough to replenish the ground water. Climate and environmental change will force the farmers to reluctantly resort to planting low-

quent sedimentation and severity of flooding in the wet season. Surface irrigation will be in jeopardy. The Meghna up to Chandpur will suffer from the adverse effects. The Meghna-Padma will have low flow which will accentuate saline backwater intrusion in the Padma channel which is already affected by the low flow for the withdrawal of water of the Ganges at Farakka.

Relevant ecological flow

The writer visited Bhumipol and Sirikit Dam sites in Thailand in mid seventies. Though the dams were completed about 5/6 years ago the reservoir water level did not reach design level and the filling of the reservoir was continuing unabated during dry and rainy seasons. It was ascertained that water flowing

(a good per cent of the impoundment) unabated through the outlet meant for release of water to maintain ecological balance in the downstream channel. The writer designed four major dams in Nigeria where, in all of them, there are separate adequate outlets for irrigation, water supply and hydropower and ecological flow for environment and emergency outlet for rapid evacuation of water for the safety of the dam.

It is expected that Tipaimukh dam will also allow ecological flow along with the equitable share of water for the international river Barak-Surma-Kushyara as per UN Convention.

Conclusion

Our government (JRC) may request India to postpone, better stop the construction of the Tipaimukh Dam if possible, through bi-lateral diplomacy or else seek intervention by United Nations. Sharing of water of Indus basin was negotiated between India and Pakistan with the assistance of the World Bank. A dispute on river Danube between Czechoslovakia later Slovakia and Hungary was referred to the International Court of Justice. In our own country Farakka issue was resolved

bilaterally with India.

Our government (JRC) should soon start negotiation on equitable sharing of water according to our entitlement as a lower riparian of the international river Barak-Surma-Kushyara as per UN Convention. Unilateral withdrawal would be a gross violation of UN Convention that regulates the use of water of international rivers/water courses. Any delay in negotiation might end up in a pathetic situation, causing irreversible environmental, economic and hydrological chaos.

We may ask for design/survey data, drawings/maps etc, and EIA report prepared by the dam authority in order to verify if the Dam Break Study was made and whether EIA included adverse effects and mitigation measures thereof for the lower riparian Bangladesh. Environment-concerned institutions and individuals may even intensify resistance against the Tipaimukh Dam, as it is still in the rudimentary stage of construction.

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Proposed Tipaimukh Dam.

Favourable impact of tea plantation

M. AFZAL HOSSAIN

TEA does not grow everywhere in the world as it needs special type of soil, climate and also environment. Tea is basically a forest loving plant. It was found in deep forest area of upper Myanmar, South-East China, Assam, Laos, Cambodia and Vietnam long back. The British started commercial planting here more than 160 years back. The first commercial plantation was at Malnicherra Tea Estate near Sylhet town in 1854. However, first experimental tea cultivation in Indian sub-continent was in 1840, in and around Chittagong Club.

The 162 existing tea estates are occupying 1,14,912.87 hectares out of 144,65,408.88 hectares total land area of

Bangladesh which represents 0.79% of it. New plantation is being carried out in parts of North Bengal and Hill Tracts which is going to bring more area under tea. Tea area means greenery, so more area under tea is environmentally good for our country. As we are aware 25% land of a country should be under forest cover for sound environmental balance but government claims in the book "Tree plantation for a green Bangladesh" published by Ministry of Foreign Affairs in 2006 that we have 17.49% green land without considering tea garden land. However there may be controversy over natural forest land and green land but we know that we may have less than 10% land under natural forest now which is just not enough for us to live well. As such tea plantation may be an

alternative solution to the crisis.

Records show that in 1976 our production of tea was 33.50 million kg out of which only 3.08 million kg was internal consumption and balance 30.42 million kg exported. Thereafter internal consumption started increasing every year and export declining. Finally, in the year 2008 our own consumption was 48 million kg and export dropped to about 10 million kg. It seems internal consumption is increasing by about 1.50 million kg every year on average. Therefore our country should achieve adequate growth of tea production to avoid import from other countries.

Land under tea is giving us oxygen besides a healthy drink as well as cash crop like tea. It is contributing in overall environment and also econ-



omy of the country generating employment and earning foreign currency.

With the initiative of a few tea planters, Tetulia Tea Co. Ltd.

was established in 1999 to grow tea in North Bengal. Tea plantation in that area is now a reality where more than 0.5 million kg was produced in 2008. Besides

creating employment in the area, tea plantation has changed the local micro-climate having a positive impact on its environment.

As tea estate owners do not have control over outside environment they protect the environment inside the estate which benefits them directly while the country gets immense indirect benefit.

For enhancing this the following may be undertaken:

- Increasing the yield from unit area by consolidation because compact tea plantation will protect environment by conserving the soil.
- Taking more area under new plantation means more green coverage.
- Having proper shade in plantation means reducing atmospheric temperature and adding organic matter

- to soil
- Planting more Neem trees in garden roadsides, sectional edges and all vacant patches of the estate will have positive impact on garden local temperature because one mature Neem tree is considered equivalent to one household air cooler. Moreover, Neem oil, Neem cake and neemicide can be produced for environment friendly use on a commercial basis.
- Designing proper drainage system to drain out excess water because well drained soil can give optimum crop and soil erosion/land slide can be checked.
- Making more water reservoirs in the garden to store water for irrigation and to create good micro climate in the garden.

- Using agro-chemicals as much less as possible which will be good for the end product users as well as the garden environment.
- Using more organic pesticide, insecticide and growth promoter.
- Using more organic matters/compost to improve the soil health.
- Allowing areas not suitable for tea or rubber for natural forest with local selective varieties.
- Having cattle farms (stall-feeding) inside the garden to get more compost and biogas apart from milk and meat.
- Planting more fruit trees especially in the labour lines.

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Capital Dhaka: Towards an environmental jeopardy?

MAHFUJUR RAHMAN

DHAKA is the capital city of Bangladesh. Located on the bank of river Buriganga, called its life line it is the most populous city of the country. It is also the most important city of the country for its commerce and education. Dhaka is projected to be the world's 4th most populous city by 2020 with 22 million inhabitants, according to United Nations Population Fund (UNFPA). It is the most rapidly expanding city in the country with present land area of 2000 km² and population 120 million.

But this capital city of ours is affected with various environmental problems staking the lives of its inhabitants. Because of highly dense population, lack of environmental consciousness among the inhabitants and absence of proper role of public agencies it is going to be one of the deadliest cities in world as well. Among its environmental problems huge extraction of ground water, crisis of pure drinking water, incapacitated drainage system, unplanned high rise buildings, discharge of industrial waste in rivers and waterbodies, shortage of electricity and insufficient disposal facilities for solid waste appear most perturbing.

Solid waste management: To its inhabitants, the authority and visitors, the most disgusting phenomenon of Dhaka city is possibly the mismanagement of solid wastes. The solid wastes are generated in the city area from various sources like residents, markets, commercial centres, industries, hospitals etc. Wastes generated in

Dhaka City are estimated to be 1950, 1050 and 200 ton/day from domestic, business and streetsources, respectively.

Dhaka City Corporation (DCC) is the responsible authority for solid waste management. At present DCC uses three landfill sites for dumping of its solid wastes namely Matuail, Bern Band and Uttara. But the collection, processing and dumping are not done in environmentally sound manner. Wastes are found to be spilled over streets polluting the air with malicious odour. The dump sites are open alike. Vectors of many diseases naturally find a heyday.

Sewerage, sanitation and hygiene: Condition of Dhaka city in respect to sewage management, sanitation and hygiene is just despondent. The sewerage system of Dhaka city covers only one third of total urban area. Dhaka WASA utilizes the existing canals and sewerage pipes to collect the waste water from different residential areas, carry the effluent to dispose, most of it, into surrounding rivers without any treatment. Many canals are cut and transformed into lakes. Even these lakes are getting highly polluted due to disposal of waste waters collected from the municipal sewerages. Unhygienic conditions prevail in the markets, industries, roads and even in the parks, play grounds and lakes. The problem of sanitation and hygiene is simply acute in the slums.

Water bodies, drainage and floods: Once upon a time there was a good network of natural canals within the city which served as means of draining the rain run off and water during

an event of flood. Those canals were also a good means of transportation. But this natural drainage system is almost damaged now. Man made drainage and sewerage system used as drainage system are not sufficient enough for this growing metropolis. Flood almost every year visits the city victimizing millions of people in and around. In this respect the localities situated in the city suffers most, especially the



Unhygienic dumping of waste.

inhabitants of old town. Degradation and demolition of natural drainage systems are two causes of flood's severity in some parts of the city.

Ground water extraction: Many ponds that worked as runoff reservoir are filled up yielding space to housing and roads. Being one of the largest mega cities in the world, Dhaka is facing continuous potable water-related problems over the last few decades. Ground water extraction poses a great threat to the sustainability of

the city itself. Dhaka WASA mainly depends on ground water extraction to continue its supply to increasing number of inhabitants in the city. Due to increasing population and industrial growth the demand for fresh drinking water is rising rapidly. Currently, DWASA is producing around 1200 MI/day for the urban water supply from about 423 deep tube wells.

About 82% of the municipal

water supply for domestic use comes mostly from the groundwater sources. In addition, over 500 private tube wells of different depths also exist in this city, which are estimated to supply about 300 MI/day, mainly to commercial and industrial users. In Dhaka city, natural recharge to the aquifer is mainly from two sources -- direct infiltration and deep percolation of rainwater, as well as water accumulated on the land surface.

Leakages from sewerage system form critical problems for ground water while the recharge to the aquifer has reduced gradually as the rechargeable areas are being reduced due to urbanization, covering the ground surface with tarmac or concrete and filling of channels and depressions. As a result the ground water table is being lowered with time. Low recharge indicates future unavailability of ground water and risk of land

subsidence. Highrise buildings and earth quake: A great source of urban problems is unplanned building construction. In fact Rajuk has no execution plan. By any one and anywhere it's possible to construct a multistoried apartment. It is not considered whether the increasing load on electricity, gas, water, sewerage and the road itself shall be plausible anyway. Even the subsurface hydrogeological conditions are not considered before con-



Pollution in Gulshan Lake.

struction of high buildings. The ongoing process seems to be a mechanism for attracting more people in this city of jeopardy to gain some immediate benefit. Unplanned building of multistoried apartments and commercial complexes also increasingly makes the city vulnerable to an event of earth quake. No one knows what will happen if an earthquake having magnitude of 6 or 6.5 in

factories. Though production of polythene less than 20µm is prohibited but polythene under the permitted thickness is being produced and consumed in the city and beyond.

Polluted rivers: Dhaka is surrounded by four rivers -- Buriganga, Shitalakhya, Turag and Balu but all of them have been and are polluted unabatedly. Pollution of these rivers is directly related with the city life. Buriganga, the mother of Dhaka city, although moribund but still nurtures its child.

River pollution occurs due to three reasons. Two main causes are discharge of municipal sewage and industrial effluent: 277 tanneries at Hazaribagh are discharging waste water into Buriganga without any treatment. Third cause is waste thrown by water craft. The effect of pollution on the aquatic ecosystem cannot be expressed in words. The rivers around the city are so polluted that Dhaka Water Supply and Sewerage Authority (DWASA) has to depend mostly on ground water to continue municipal water supply for the cost of treatment of river water goes beyond its bearable limit.

Waning biodiversity: In the city there are still a few parks and some open spaces such as graveyards and playgrounds with some vegetation but virtually not rich in biodiversity. Vegetation in the urban locality is the niche of urban ecosystem. Ecosystem services depend on the amount and quality of green spaces. Green spaces are dwindling in unprecedented rate in Dhaka city. This decline must

be arrested now. Unplanned industries: Tejaon is the announced industrial area of the city but you will find industries indiscriminately distributed throughout the city. Special attention is drawn to the highly dense old Dhaka. Residential areas of Hazaribagh, Lalbagh, Kotoali and Sutrapur are increasingly containing many industries. There are so many small industries that are not even documented by the proper authority. The waste water from these industries is directly discharged into nearby river or waterbody. These industries being in the residential areas create acute civic problem by generating huge solid waste that is heaped on the road and air and sound pollution beyond tolerance limit.

Concluding remarks: The problems of Dhaka city are multifarious in nature. But roots of all problems are apparently two: rapid population growth due to failure of population control measures and migration of rural people to the capital due to river erosion and other unplanned industrialization and development activities. Rest of the liability goes to the factors, unconsciousness of citizens toward environmental pollution as well as protection, and failure of government agencies responsible for these services. Should we allow things to go on this way to the further jeopardy Dhaka's while celebrating the capital's 400th anniversary?

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