

LOWER GANGA BASIN WATER MANAGEMENT PLAN

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ABSTRACT

The proposed action plan to create infrastructure for managing mega water resource available in transit in Lower Ganga Basin would be outcome based with stakeholder participation under Public Private Partnership on Built Own Operate and Transfer (B. O. O. T) model through three DPRs namely, one interlinking & deepening of existing river beds (a system of double layer of levee-inner levee with barrages/regulators), two inner levee with comprehensive river training work/hydropower generation/navigation infrastructure and three regime & navigability improvement of river system utilizing the existing infrastructures namely, east west highway in Nepal, outer levee along snow fed tributaries Kosi, Gandak & Ghaghra rivers with massive silt deposit within these levees with barrages near India Nepal border, another barrage coming up on Kosi river at Dagmara, outer levee along Ganga at several scattered locations, barrage & navigational lock on river Ganga at Farakka & a feeder canal off taking from Farakka to feed Bhagirathi river, barrage & navigational lock on river Bhagirathi at Jangipur and numbers of regulators in Malda & Murshidabad districts of West Bengal using the existing agreement with Nepal for construction of levees along rivers and the treaty with Bangladesh for Ganga water sharing at Farakka.

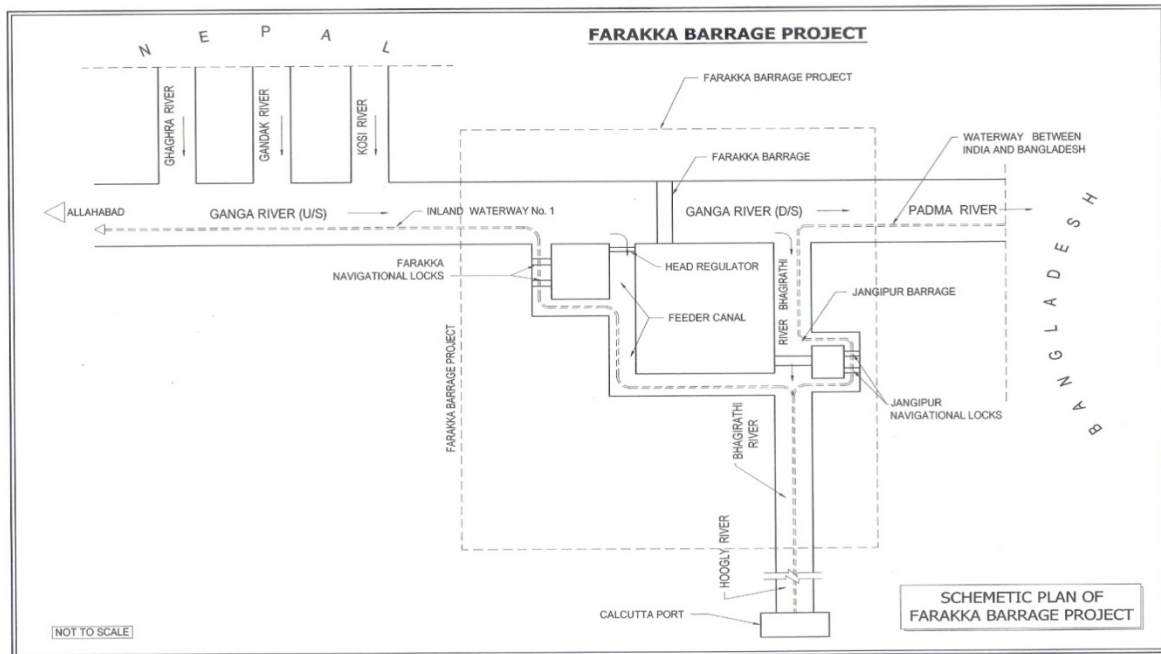
Rainfall in Gangetic plain, for that matter in the country, is primarily monsoonal. Major part is concentrated in a few months. Monsoon varies year to year and so does the availability of water resource. Human beings cannot change the rain pattern. But they can certainly determine where and how that precious water resource could be utilized. Major changes in spatial location of flow are observed in Gangetic plains at slightly larger intervals say 25 to 30 years or so. This substantial change is due to the massive silt coming up because of continuous stress between Indian and Tibetan plates, former going down while the latter coming up. Planning for this land mass is as important as the water resource itself for proper management of demand and supply of water resource over space and time. Therefore the Plan vision is citizen centred at outset to ensure no adverse effect through proper management of natural path of water; result oriented with proper utilization to deliver optimum result– agriculture, industry (particularly agro and water based) can deliver results; and hydropower and inland waterway communication can make the plan marketable by adding value to agricultural and industrial products and at the same time both hydropower and inland waterway communication are eco friendly. Thus Plan vision is citizen centered, result oriented and market based.

Nearly 35% of India population resides in eastern part of Uttar Pradesh, Bihar, Jharkhand and West Bengal, technically, we say in Lower Ganga Basin. These are the states with most growth potential and are perceived as potential drivers of growth in unfolding Indian growth in 21st century. Ganga river is the master drain of this area. The mean annual flow in the master drain at Allahabad is 152 BCM and at Farakka before entry in Bangladesh is 459 BCM. Hence there is a net addition of nearly 300 BCM from eastern part of Uttar Pradesh, Bihar, Jharkhand & West Bengal. However, the area together with its neighboring regions Nepal terai and all of Bangladesh has the greatest difference between agriculture potential productivity and actual productivity. Massive mini hydropower potential is available within the area, yet the area faces acute power crisis. Choked rail and road corridors are acting as a great impediment to growth of the area, whereas economics of shifting bulk cargo to waterways in the region carried by NCAER in 1999 has been highly favorable.

We have to have a change in perception of lower Ganga basin from playground of rivers to land of rivers. Data collected during last a few decades demands a paradigm shift in the approach from supply based

engineering dominated approach to resource oriented demand management. We start with a Navigation Development Plan over the land of rivers for shifting bulk cargo to waterways by improving regime & navigability of river system ensuring availability of water resource over space and time with creation of required infrastructure.

The existing infrastructure for the purpose include, National Waterway No. 1 extending from Haldia to Allahabad over Hooghly-Bhagirathi-Ganga river, A system of barrage/regulator & lock over Ganga at Farakka, A possible link up to National Waterway No. 2 extending from Dhubri to Sadiya on Brahmaputra (via Bangladesh) through similar system of barrage/regulator & lock over Bhagirathi at Jangipur and Barrages over Kosi and Gandak near India Nepal border all fully/partially constructed by seventies. It must be remembered that there have been no addition in infrastructure in water resource sector in Lower Ganga Basin during last a few decades. An era has passed merely in data collection and maintenance!



The strategy for infrastructure creation is simply to continue the exercise initiated at Farakka and Jangipur in West Bengal and have the assured availability of water resource over space and time through a system of Barrages/Regulators with comprehensive river training works over an inter connected system having a paradigm shift for addition of locks with Barrages/Regulators in the land of rivers to have resource oriented river management with emphasis on preserving and improving ecosystem.



We go for a sea-river-highway co-ordinated transport model in Lower Ganga Basin having a huge market potential with sustainable growth! Since otherwise, it is neither highway nor railway almost annually during the four months sufficient to undo the development exercise of eight months or even worse! The net result is the backward trend in economy of the area despite development exercises! A paradoxical situation!

There are three categories of rivers in this region coming from Nepal, Category 1 is snow fed perennial rivers. There are only four rivers under this category in this region - Gandak and Kosi entering Bihar and Mahakali and Karnali entering UP, Category 2 is rivers originating in the midlands of Mahabharat range of mountains and are fed by precipitation as well as ground water regeneration, including springs. There are only six rivers under this category - Bagmati and Kamla between Kosi and Gandak, Kankai and Mechi to the east of Kosi and West Rapti and Babai to the west of Gandak. Category 3 is small rivers in the terai which originate from the southern Siwalik range of hills i.e., Churia range. Rest of the rivers in this region comes under this category.

For an interconnected system in the land of rivers we go for interlinking existing river system including old (abandoned) courses of rivers/depressed land (water bodies) through a system of Barrages/Regulators with deepening of existing river beds to have a system of double layer of levee or planned raising of the adjoining areas. Inner Levee, where ever provided, to have a system of Barrages/Regulators with Comprehensive River Training Works with Hydropower Generation Infrastructures and Navigation Infrastructure.

The inner levee with comprehensive river training works would concentrate the low flow river and encourage it to scour away its load of silt and its planned deposition.

The inner levee provided with storage and diversion infrastructures would be connected to adjoining river/old (abandoned) courses of rivers/depressed land (water bodies) through contour canals to have an inter-connected system of flowing/stored water, where flow across any river would be controlled for assured availability of water over space and time. Every strategy has a time frame. It is a fact that by the time Yellow river reaches Kaifeng, it runs 10 m above the surrounding plain, where river bed is above the rooftops of houses behind the levees. Then, there comes another strategy at that point of time!

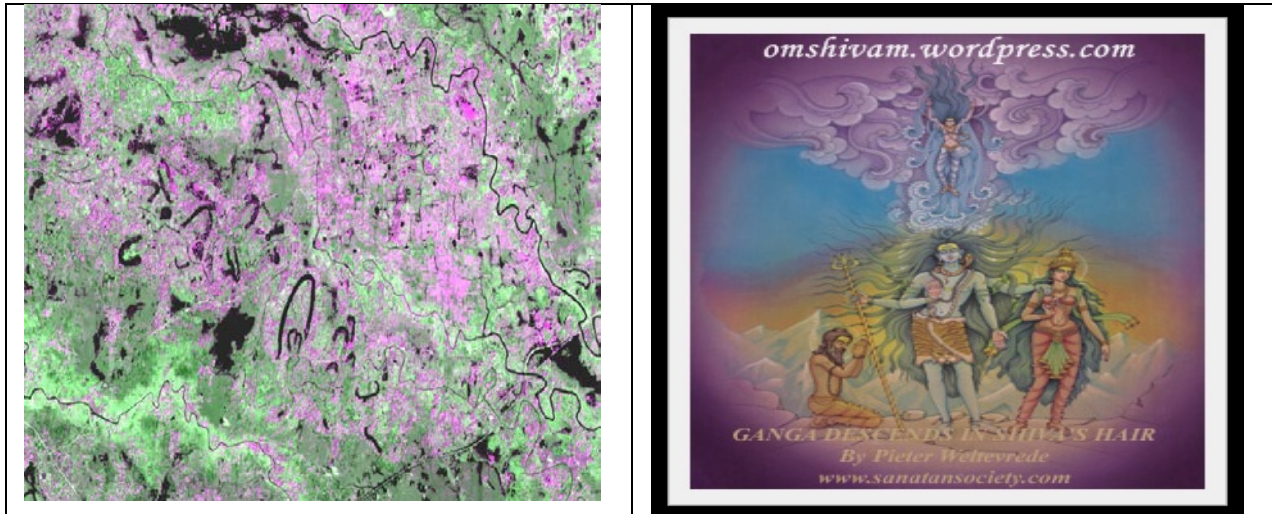
Revival of old/abandoned courses of rivers for spreading water during rain to bigger areas covering longer routes would not only give advantage of the time lag (temporary retention) but would also check the drainage problem, while water bodies would hold the water. This is just like diverting traffic to by-lanes or to some open ground to ease traffic congestion on main roads. The outer levee would confine the so called floods.

The natural surface between the existing two levees along most rivers has gone up in the plan area in post embankment scenario. The soil mass causing this rise in natural surface level between the existing levees could be utilized for the inner levee by deepening of existing river beds. Possibly a mega opportunity exists

under MGNREGA! In long term one would dig out an alternative route for river on flood plain complete with levee!

Power generation would start through mini power stations located within the country, which would acquire a bilateral dimension with Nepal as development moves ahead.

Thus, the strategy remains a blend of traditional wisdom & scientific knowledge. A remote map for Lower Ganga Basin, particularly, the area to the north Ganga in Lower Ganga Basin resembles Lord Shiva jatta. It is said that Ganges coming to earth from heavens remained lost in Lord Shiva jattas for months. Infinite capillaries holding enormous water! Let's act on the philosophy of holding water on horizontal inter connected system of water.



Inner levee with Barrages/Regulators and comprehensive river training work with hydropower generation/navigation infrastructure would ensure irrigation, power generation and navigation besides creating an environment for rapid water/agro based industrialization. It would also provide security against:-

- a) any rehabilitation caused by river bank erosion
- b) farmers losing their agricultural land and employment
- c) any likely damage from inundation with presence of second line of defence as outer levee
- and above all it would provide security against unemployment, since both agriculture and water/agro based industries have massive employment opportunities in the region.

Thereby, the outcome, at domestic level is economic development and well being of people of the area besides preservation of natural resources and at international level, all time navigational facility from Kolkata Port to Nepal for Nepal and smooth sharing of water at Farakka for Bangladesh.

Infrastructures would be finalized under the (proposed action) Plan on Geographical Information System supported by mathematical simulation with Digital Terrain Model based on Airborne Laser Terrain Mapping survey for critical part of the area and on digital terrain satellite data for rest part with ground truth verification in association with neighbors Nepal & Bangladesh.

The action plan for creation of infrastructure would be outcome based with stakeholder participation under Public Private Partnership on Built Own Operate and Transfer (B. O. O. T) model through three DPRs namely, interlinking & deepening of existing river beds (a system of double layer of levee-inner levee with barrages/regulators), inner levee with comprehensive river training work/hydropower generation/navigation infrastructure and regime & navigability improvement of river system utilizing the existing infrastructures namely, east west highway in Nepal, outer levee along snow fed tributaries Kosi, Gandak & Ghaghra rivers with massive silt deposit within these levees with barrages near India Nepal border, another barrage coming up on Kosi river at Dagmara, outer levee along Ganga at several scattered locations, barrage & navigational

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BRIEF PROFILE OF THE AUTHORS

Liladhar Prasad Singh graduated in civil engineering from IIT, Delhi in 1984 and got admitted to Systems and Management on basis of GATE 1983 examination and Humanities and Social Sciences on basis of GATE 1984 examination at IIT, Delhi. He has worked in different capacities in Lower Ganga Basin, Central Water Commission, Ganga Flood Control Commission, Farakka Barrage Project and in various India Nepal bilateral committees in water resources sector. He has been associated with Special Task Force on Bihar, Planning Commission, Government of India for preparation of Road Map for Water Resources Development in Bihar. He has been associated with IIT consortium assigned the task of preparation of Ganga River Basin Management Plan. He is a Member of High Level Expert Team constituted by Government of India after Kosi disaster in 2008. He proposed an Operation Kosi immediately after Kosi disaster in August, 2008 for immediate control of the disaster through army operation and arranged Cabinet Secretary, Government of India consent for the purpose and that of Government of Nepal.