GANGA

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Flood Picture in Assam

The seasons are changing fast the monsoon has gone, soon the winter will come. The harvest season will begin soon. The threat of drought at the beginning of the monsoon is no more, although many parts of the country witnessed flood. North east became victim this year. Everybody is happy till the summer brings some news for next year. We are safe, are we really? Sometimes it seems it is “udhar ka jindegi” only it is a matter of time the inevitable will strike.

Govt. is trying to change the Brahmaputra Board to a new body. After 32 years of its existence God only knows what purpose it fulfilled other than providing job to few experts. This change is cosmetic or real only time will tell after many deaths. Only God knows when we will learn to ask questions to the institutions.

The new age consumerist development paradigm has not left anybody even the Great Nile River is facing problem. Interestingly Europe has fewer problems with its rivers, why? The time has come to search answers for many such questions as our rivers are the veins and arteries of our country. Can we afford to keep quite when they are severely affected?

NEWS

Govt. Plans to restructure Brahmaputra Board

Against the backdrop of frequent floods in Assam and allegations of its failures to deal with the situation, the Centre has decided to restructure the Brahmaputra Board and turn it into a body to develop and manage water resources of the entire northeastern region. The Water Resources Ministry has sought feedback of Chief Ministers of the seven northeastern states on the draft proposal to restructure the Board.

Government may bring in a new legislation to transform the Brahmaputra Board into the Brahmaputra River Valley Authority and replace the current Brahmaputra Board 1980 Act with the proposed one. A review of the functioning of the Brahmaputra Board reveals that it did not have a mandate to provide a strong framework for the holistic development of the Brahmaputra river. The Board failed to build up competent engineering cadre to support its activities which remained largely concentrated in the state of Assam. According to the draft, the proposed Authority will be mandated to coordinate development and management of water, land and related sources to maximise economic and social welfare without compromising the ecosystem of the Brahmaputra valley.

It will have two parts - a policy making apex council and an executive wing. The Council will be headed by Union Water Resources Minister as Chairman and comprise of the Chief Ministers and Ministers for water resources of the NE states. The Executive Board will be responsible for implementing the decisions of the council. The Centre will create a fund, after the authority is set up. The fund will be used to finance the water resources activities in the member states. The Centre will be the custodian of the fund which will be controlled by the Authority, as per the draft proposal.

(Source PTI)

Floods in the North East

Floods and landslides caused by relentless rain in northeast India have killed at least 33 people and displaced more than a million in September 2012. Around 21 persons were killed in landslides and another eight were missing in the mountainous state of Sikkim, said state government spokesman.

Assam is still recovering from deadly floods that hit the tea-growing state in July, eight people were killed and 20 were missing. Floods displaced nearly one million in that state alone, and many were now sheltering in camps road side, which tend to be built above the land they pass through, a senior official in Assam's disaster management authority said. Four people were buried and killed in mudslides in the state of Arunachal Pradesh, police said.

The military and federal disaster response teams have launched operations to move people to higher ground by helicopter or in rubber boats. Nearly 100 shelters have been opened to accommodate the displaced.

In July, at least 110 people were killed and more than 400,000 people were left homeless in Assam during floods which Prime Minister Manmohan Singh said were among the worst in recent times.

Over the past 60 years, successive governments have built levees along most of the Brahmaputra, which is Assam's main river and is fed by Himalayan snow melt and some of the world's heaviest rainfall. But experts say the embankments are not only poorly maintained but are a bad strategy of flood management. Floods have inundated three national parks in Assam including Kaziranga National Park, where two-thirds of the world's Great One-horned Rhinoceroses live. Some animals have been forced out of the park to nearby hills in this year flood.

(Source Reuters)

RIVERS OF INDIA

Rivers Of Bihar & Jharkhand

Subarnarekha

Subarnarekha is another very important river not only of Jharkhand but also of the whole eastern India. It passes through Jharkhand, West Bengal and Odissa. 'Subarnarekha' means the Streak of Gold. Large stretch of this river passes through the forest covered, mineral rich and tribal areas of Chotonagpur Plateau.

Subarnarekha originates near Nagri village in Ranchi district of Jharkhand at an elevation of 600 m. The total length of the river is about 395 km. The Subarnarekha

River basin is elongated in shape. It is bounded on the North-West by the Chhotnagpur Plateau, in the South-West by Brahmani basin, in the South by Burhabalang basin and in the South-East by the Bay of Bengal.

The total catchment area of the basin is 18,951 sq.km. It passes through, Jharkhand, West Bengal and Odissa. The state-wise distribution of the catchment area is;

Name of State	**Catchment Area(sq. km)**	**Percentage of total**
Jharkhand	13,590	71.7
Orissa	3,201	16.9
West Bengal	2,160	11.4
Total	18,951	100.0

Major part of the Subarnarekha River is in Jharkhand. It has 6 tributaries namely, Kanchi, Karkari, Kharkai, Raru, Garru and Dulang. - Kharkai is longest and Raru is smallest.

The basin is highly undulating due to underlying geological formations. The formations of the basin area are (i) Pre-Cambrian or Archaean (ii) Tertiary and (iii) Alluvium plains. Out of these, Pre-Cambrian formations mostly cover Jharkhand and West Bengal regions and Tertiary and Alluvium plains cover the basin area in Odissa. The Archaean formations mostly comprise Gneiss, Mica-schist, Phyllites, Dolomites and Granites. This region contains some of the richest coal and ore deposits like iron, bauxite, uranium etc. Jamshedpur one of the oldest integrated steel plan situated on the bank of Subarnarekha.

Different tribal societies thrived in this basin since thousands of years. Subarnarekha is the lifeline of tribal communities inhabiting the Chhotanagpur belt. These communities made a living out of the forest produces, agriculture along the river flood plain and river's gold and fish. In the present era Subarnarekha basin is another natural resource rich river basin with large numbers of poor tribal population.

It is another river with very high pollution, those of domestic, industrial or radioactive pollution. Subarnarekha's rich resource base has spelled doom for the basin. Between Mayurbhanj and Singhbhum districts, on the right banks of the Subarnarekha, are the country’s richest copper deposits. The proliferation of unplanned and unregulated mining and mineral processing industries has led to severe ecological and environmental damages of the region. Improper mining practices have led to uncontrolled dumping of overburden and mine tailings. During monsoons, this exposed earth flows into the river, increasing suspended solid and heavy metal load in the water, silting the dams and reservoirs.

Quarrying of construction material, such as granite, basalt, quartzite, dolerite, sandstone, limestone, dolomite, gravel, and even sand, has created vast stretches of wasteland in the river basin. Used and abandoned mines and quarries are a source of mineral wastewater and suspended solids.

Subarnarekha also has to bear radioactive waste that enters the river through seepage from tailing ponds of the Uranium Corporation of India at Jadugoda. It has three productive uranium mines, all within a 5 km radius of Jadugoda.

After mining uranium is extracted and processed to prepare 'yellow cake', as fuel of nuclear plants. The remnants are effluents comprising radioactive products are mixed into slurry and pumped into tailing ponds. Overflow and seepage from the tailing ponds ultimately ends into the streams that feed Subarnarekha. These radiations pose the greatest threat to human health. Around 5,000-6,000 families of local tribals, including the fishing community, residing on the riverbanks from Mango in Jamshedpur to Bharagora, are exposed to this severe river's pollution. Oil and slug deposits on the riverbed deter the growth of moss and fungi, vital food for fish, hindering the movement of different fish species from the Bay of Bengal. Even sweet water fish die in large numbers during their breeding season. Reports reveal that villages in the region around Ghatsila are suffering from skin diseases. The male fertility rate has also declined. Unfortunately, people have not been active in protecting the river as yet, when they could do well and take an example from other social movements in other river basins.

Ganga the Eternal River

Part-35

The Ganges Delta

The geological history of the Ganga-Brahamaputra delta is very interesting. After passing through the alluvial plains of UP and Bihar, the Ganga river enters the delta region and finally meets the sea in the Bay of Bengal. The Brahmaputra River draining from the northeast joins the Ganga, and together they constitute this vast delta region. The Ganges- Brahmaputra river systems together transport ~$1x10^9$ t/yr of sediment. It is the world's largest sediment load carrying systems. The Bengal basin acts as a large deposition place for this huge sediment dispersal system, about 80 % of which is delivered during the monsoon.

The geomorphology of the Lower Ganga Plain is having three major landforms – (three major landforms may be demarcated as 1, 2,3 or (i) (ii) (iii) Uplands, Old Fluvial/deltaic plains and young fluvial plains. Due to reactivation of some basement faults and tectonic subsidence, the eastern and western subunits of the tectonic shelf were sites of active transgression during 2 million years before present and around 7000-6000 years before present. Uplift of these sub-units at different times triggered regression in the Holocene, during last 11700 years which controlled the timing of soil formation of the sub-units.

The modern Bengal Basin comprises ~105,000 km2 of lowland floodplain and delta plain deposits and is bounded by Tertiary highlands. Within the Bengal Basin, the Madhupur Terrace and Barind Tract of Bangladesh are uplifted alluvial deposits of Pleistocene age (25,00,000 year B. P.). The seaward extent of the Ganges-Bramhaputra deltaic deposits is marked by the base of the under water delta fore-sets.

The initial delta formation began at 11000 years B.P when rising sea level led to back-flooding of the low land surface and trapping of river borne sediment started, an event marked by transition from alluvial sands or Pleistocene laterites to overlying mud that contain estuarine shells and wood, along with thick valley-fill deposits. The thick estuarine deposits and the persistence of the intertidal facies indicate that sediment supply to the delta system has been sufficient to infill accommodation created by the rapid sea-level rise.

Sediment discharge has probably varied significantly under different climatic regimes since ~11 ka. Goodbred & Kuehl (2000) estimated a mean load of 2.3x109 t/yr for the period 11000-7000 year B.P., which is more than twice the present day load of ~1x10 9 t/yr. The intensification of the southwest monsoon increased more rainfall and precipitation conditions, regionally and increased discharge in the river. Late Quaternary Bengal Basin sediments show high smectite-kaolinite concentration during the early Holocene period around 10,000 year B.P. and this appears to reflect enhanced chemical weathering under warmer and more humid conditions .

Williams & Clarke (1984) also found evidence for 20-30 m of floodplain incision along the Ganga tributaries during this time, & Pratt *et al*. (2002) suggested strong incision in Himalayan valleys during this period. The sediment load was extremely reduced prior to 15000 year B.P. because of the dominance of the dry northeastern monsoon, causing lower discharge. Recent studies have identified two phases of major fluvial influx in the Bay of Bengal around 11500 year B.P. and 9500 Year B.P. These variations have been related to monsoonal intensification at around 9500 year B.P.

Stratigraphic development of Bengal basin has been controlled by sediment supply and the active tectonics. The interplay between the two has resulted in unique and differing stratigraphies within the delta system . In the northeastern part of the delta, where tectonic processes are most active, the presence of sub-basins favors the dominance of fine grained floodplain deposits. In the western part of the delta, sandy alluvial deposits dominate the stratigraphy due to fewer tectonic features. Fluvial processes dominate this part of the delta, but channel migration and avulsion tend to erode the fine grained floodplain deposits. In the southern delta region, presence of the estuary played a vital roll. A mix of fine and coarse grained facies with the muddy deposits was preserved during early Holocene sea-level rise. Overall, the presence of individual stratigraphic sequences in the same delta system emphasizes the importance of local basin factors in modifying the delta architecture. Additional controls are applied by the river systems and earthquakes. A long history of delta switching in the Bengal basin has been related to channel avulsion of the Ganges and Brahmaputra rivers.

(Source: Late Quaternary Geology And Alluvial Stratigraphy Of The Ganga Basin by R. Sinha etal)

SPECIAL FEATURE

Best Practices in the Nile River Basin

Part-I

After the Mekong River Basin Water Sharing story we felt to share the story of some of the best practices of River Nile. The great Nile is the cradle of Egyptian civilization is generally regarded as the longest river in the world. The Nile has been the lifeline of civilization in Egypt since the Stone Age. It is 6,650 km long, north-flowing River in north-eastern Africa. It runs through the ten countries of Sudan, South Sudan, Burundi, Rwanda, Democratic Republic of the Congo, Tanzania, Kenya, Ethiopia, Uganda and Egypt. The Nile has two major tributaries, the White Nile and Blue Nile. The White Nile is longer and rises in the Great Lakes region of central Africa, with the most distant source still undetermined but located in either Rwanda or Burundi. It flows north through Tanzania, Lake Victoria, Uganda and South Sudan. The Blue Nile is the source of most of the water and fertile soil. It begins at Lake Tana in Ethiopia and flows into Sudan from the southeast. The two rivers meet near the Sudanese capital of Khartoum. The drainage basin of the Nile covers 3.2 million square KM, about 10% of the area of Africa. The Nile basin is very complex, and the discharge at any given point along the mainstem depends on many factors including weather, diversions, evaporation and evapotranspiration, and groundwater flow etc.

Nile near Cairo

In the present day Global Warming scenario the Great Nile is also not immune from the vagaries of disasters. Although different communities in the Nile Basin region have always responded to climate variability by altering cropping patterns, livestock and water management practices, these largely autonomous strategies are unlikely to build resilience of livelihoods, economies and ecosystems to cope with the projected magnitude and scale of climate change in the 21^{st} Century. Moreover, the vulnerability of the Nile Basin region is due to different factors including poverty, high disease rate, conflict and a low adaptive capacity. United Nation Environment Program recognizes the importance of the Nile River Basin in the context of a variable and changing climate and tried to understand the adaptation options at basin level.

Climate forecasting in the Nile Basin region is imperfect and complex. It shows increases in average annual temperature, erratic intra-annual weather patterns coupled with more frequent and more severe extreme weather events. Rainfall and river flow records during the 20^{th} century show high levels of inter-annual and inter-decadal variability. Moreover, significant fluctuations in rainfall have occurred in the humid highlands of East Africa and Ethiopia (headwaters of the Nile) over decadal timescales with definite impact on Nile flows.

Cover Picture Source Reuters/Utpal Baruah

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