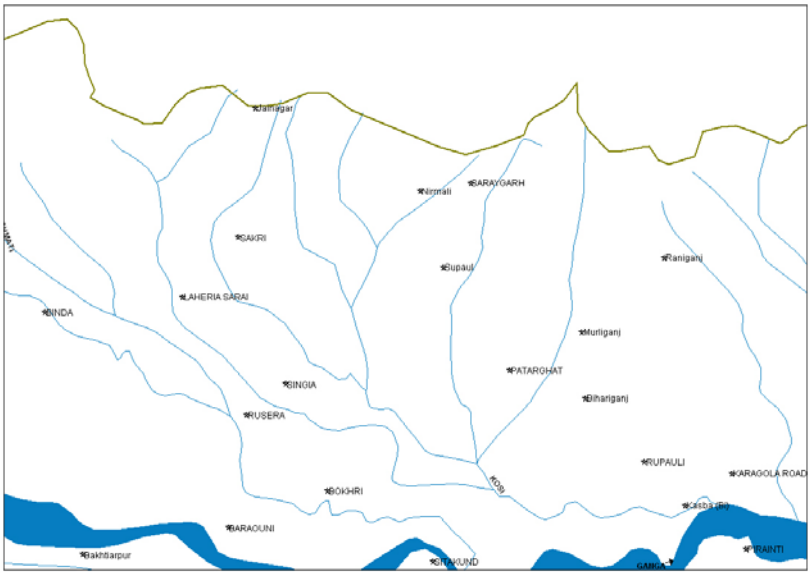
GANGA

Newsletter No. 22; IRBMS; May 2011



Koshi River in India

The scarcity of water is slowly becoming a monster of uncontrollable size in India. Various State Govts. and Central Govt. is taking several measures. High Courts and Supreme Court also pronouncing several verdicts towards managing water resources. But such measures are all piece meal basis and too little.

The land with large number of rivers with all conceivable sizes and shapes are there in India but till date there is no Integrated River Basin Management Program undertaken by any Government. It is the need of the hour without a comprehensive River Basin Management program this large country with over one sixth of global population will lead towards a disaster. Along with food security, water security will be paramount important.

Country like India needs immediate action on this front. The formulation of policy is not sufficient. Implementation of program, based on a sound policy and active participation of stakeholders, is the need of the hour.

NEWS

River linking project in Chhattisgarh

Chhattisgarh government decided to link two reservoirs in the state to meet water crisis at some areas. Project proposal will be discussed in a cabinet meeting at the Chhattisgarh legislative assembly. The two reservoirs viz. Gangrel reservoir in Dhamtari district and the Tandula reservoir in Durg will be joined with 60 km canal for irrigation purpose. The total cost of the project is Rs 265 Cr. approx. which will be borne by the state government. Tandula reservoir was made on river Tandula and Sukhanal at 1920 mainly for irrigation purpose. The Gangrel reservoir was made on Mahanadi at 1979 for irrigation, water supply and hydro power. Due to low rainfall at Tandula catchment area the reservoir was not filled even half of its capacity, and the irrigation meets the water scarcity. According to the Chhattisgarh Government the Gangrel had excess water from Mahanadi. Govt. feels if the project is successful it will help to irrigate 30,000 ha land at Tandula area. But the record shows that the power generation at the Gangrel dam is much lower than its design generation of 40 MU due to its low surplus water. How this expensive linking will help Gangrel Dam Hydro-electricity is a debatable issue.

(Source: Dams, Rivers & People; vol.9; issue.2; March, 2011)

High Court to Intervene for Ganga Water Quality

The stretch of river Ganga flowing in Uttar Pradesh is suffering from unhealthy water quality. Allahabad High Court (HC) ordered State Govt. not to withdraw more than 50% of water from the river Ganga. HC also ordered that at least 50% of water released from the Narora Barrage. The decreasing water level is the main cause of deteriorating water quality of River Ganga. After examination of daily pollution level at Ganga the HC declared that the water of the Ganga is not suitable for human use. It also stated that unlimited withdrawn of river water by the state left river bank dry and for this reason natural resources of River Ganga and its ecosystem is completely destroyed. State Govt. follows the HC order and water from Narora Barrage being diverted to a number of other uses. Such orders may allow to flourish the River Ganga ecosystem.

(Source: Dams, Rivers & People; vol.9; issue.2; March, 2011)

Water meters for Garoundwater management in Gurgaon

Central Ground Water Authority (CGWA) made mandatory for all the permitted and registered tube wells in the notified areas of Gurgaon to be fitted with water meters and record of withdrawal of the ground water

from the tube wells to be maintained. Authority has sealed the tube wells of those people who have not installed the water meter, and has taken action against them under the Environment Protection Act, 1986.

High Court of Punjab and Haryana ordered that bore wells water be used only for domestic purposes. Gurgaon city included municipal area, industrial area and 105 villages of the districts under a 'notified area' where no new bore wells can be dug. The Court informed that if any new well is dug it should be sealed and FRIs would also be registered against the tube well owner.

Excess withdrawn of ground water for industrial, agricultural and domestic uses results rise in arsenic percentage and other heavy metal pollution.

(Source: Dams, Rivers & People; vol.9; issue.2; March, 2011)

Conservation along the Yellow River

China has enforced a successful water conservation and water supply quota system along the entire length of the Yellow River at the end of 1990s.This results more well-organized water conserving practices and more water for fish, birds, wetlands and other ecological resources as well as better serving to industrial, agricultural and residential requirements. In 2007 China established a new water concentration for the industry and agriculture to cut the amount of water they use per unit of gross domestic product by 20%. It increased to 60% in 2009.

(Source: Dams, Rivers & People; vol.9; issue.2; March, 2011)

Cabinet approves National Water Mission Charter

The union cabinet April-06 2011 approved a comprehensive charter for the National Water Mission. It is one of the eight missions in the National Action Plan for Climate Change. The approval was given at a cabinet meeting presided over by Prime Minister Manmohan Singh. The mission document was drafted by the ministry of water resources in consultation with state governments**,** central ministries, non-governmental organizations and academicians.

The objective of the National Water Mission is "conservation of water, minimizing wastage and ensuring its equitable distribution both across and within states through integrated water resources development and management".

Its five goals include setting up of a comprehensive water database in public domain and assessment of the impact of climate change on water resources, promotion of citizen and state actions for water conservation, focused attention to vulnerable areas, increasing water use

efficiency by 20 percent, and promotion of basin level integrated water resources management.

A two-tier body has been proposed, one at central and one at the state level. An apex board will be set up at the central level with the minister of water resources as its chairman while at the state level, a monitoring committee headed by the principal secretary or the secretary will be constituted.

RIVERS OF INDIA

Bengal Rivers

Pattern of Rivers Of West Bengal

(Continued from Newsletter-21)

Next important is the rectangular drainage pattern. In this pattern, both the main stream and its tributaries display right angled bends. They reflect control exerted by joint or any such structural disturbance system. The pattern is easily identified locally e.g. on a tributary stream of river Tista near south of Rongpo, on a tributary of river Mahananda, north-west of Mirik, on a tributary of river Jaldhaka, north west of Jaldhaka Hydel Project, on a tributary of river Torsa near West Bengal Bhutan border, south of Samchi etc.

Among other drainage patterns, following patterns are of local significance. They are as follows:-

1. Radial pattern, includes streams diverging from a central elevated portion. Scattered inselbergs and low mounds in many parts of Puruliya, Bankura, and West Bardhaman have the origin of this type of pattern.
2. Pinnate pattern, develops where the drainage density is too high compared to the area of the concerned stream. There is a great number of first order streams developed due to high order erosion. The source areas of most of the rivers, west of river Bhagirathi have developed this pattern in many rivers.
3. Pincer pattern, develops in many streams in the headwater area where the two adjacent first order streams form a tongue-shaped structure, mostly due to local disturbance. In north Bengal Rivers, this is a very common phenomenon, and form only locally.
4. Deranged pattern; in West Bengal this pattern is well recognized in the rivers of south Bengal, east of river Bhagirathi. The flood plain is affected by monsoon flood more or less every year and the drainage system has no time to develop any significant degree of integration and has not developed any specific pattern

whatsoever. A number of tributaries and distributaries joining with and coming out of Bhagirathi have formed a drainage network which has formed no significant pattern in the river segments.

Considering all the above drainage patterns, in West Bengal three predominant patterns are Straight, Braided, and Meandering. Stream channels are seldom straight for long distances, and where they are, there is usually an implication of structural control or the effect of initially steep slopes on homogenous rocks. In West Bengal, rivers are rarely straight. ,except a few in local patches viz. river Tista, south of Sevok, river Diana, east of Lataguri, river Damodar near Beguahana, etc. The stream channels are often braided that develops after the formation of channel bars composed of material too coarse to be transported. It is often assumed that stream braiding is an indication that there is excessive stream load and that valley aggradation is taking place. In West Bengal, braided patterns are recognized in the deltaic plains, particularly in south Bengal Rivers. Lastly, as most of the stream channels in West Bengal possess a degree of sinuosity, the term meandering is commonly restricted to channels whose curves exhibit a notable symmetry. Meander size is usually proportional to river size. Almost all the river in Bengal shows certain meandering pattern. The river Bhagirathi itself is a meandering river.

Thus the specific pattern of a river always depends on multiple factors like river dimension, basin area, flood plain character, landform gradient, aggradational, and degradational parameters, relief features, structural implications etc.

(Source: 1.Photonirvachak-IPI Publication; 2.Geomorphology-Thornburry, 3.Geomorphology-Arthur Bloom.)

Ganga the Eternal River

Part-19

Koshi River

The Kosi is the third largest tributary of the Ganga, after the Ghaghara and Yamuna. It is also known as Saptakoshi for its seven Himalayan tributaries, flowing through Nepal and India. Some of the tributaries of the Koshi system, such as the Arun, the Sun Kosi and the Bhote Koshi, originate in the Tibet Autonomous Region of China. The

river basin is surrounded by the ridges, which separate it from the Yarlung Zangbo River in the north, the Gandaki in the west and the Mahananda in the east. Below the outermost Siwaliks foothills the river has built up a megafan with 15,000 sq. km. area, breaking into more than twelve distinct channels with shifting courses due to flooding. Kamlā, Bāghmati (Kareh) and Budhi Gandak are major tributaries of Koshi in India, besides minor tributaries like Bhutahi Balān. Along with its tributaries, the river drains 29,400 km^2 in China (mainly the upper Arun basin north of the Mount Everest region), 30,700 km^2 in Nepal (the eastern part of the country), and 9,200 km^2 in India.

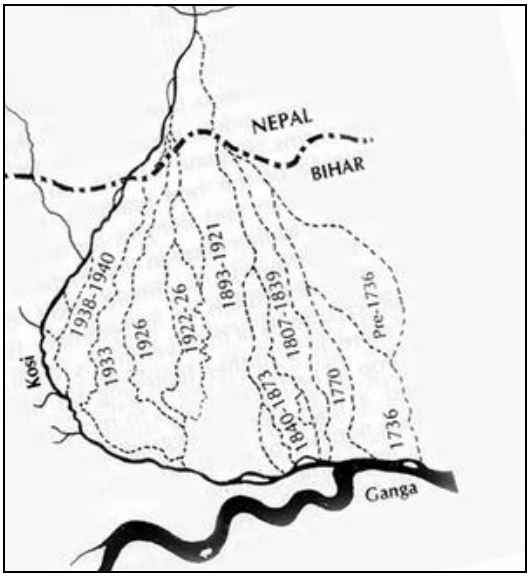
Koshi formerly known as 'Kausiki' is associated with Indian Mythology. As per the story it is named after the sage Viswamitra, who attained the status of 'Rishi' on its banks, was the descendant of sage Kusika. Viswamitra is credited with writing many well known Vedic Hymns on the Banks of the Kosi. Due to the famous vedic hymns composed on its banks it also referred to as the River OM or the Song of the Ganga. Kosi is mentioned in the Bal Kand section of Valmiki Ramayana as the Kausiki who is the form assumed by Satyavati after her death. Satyavati was the elder sister of Viswamitra. In Rigveda also it was known as Kausika, in the epic 'Mahabharata' also it is referred as Kausiki. Due to the violent nature of the Koshi during monsoon season, legend says that Parvati, the wife of Shiva, after defeating the demon Durg, became known as the warrior goddess Durga who transformed into Kaushiki. In Ramayana, the river Ganges is depicted as her elder sister. Kosi is associated with the folklore of Mithila region. The most important depictions of Kosi folklore are Kosi as a virgin absolutely care free and full of energy, as a frustrated wife of old hermit Richeek wandering in Himalayas. Kosi is also invoked as the mother - 'Kosi Ma'. These images capture the contradiction that is inherent in the Kosi River as a source of life and death, prosperity and destruction.

It is also the lifeline of the 'Mithila' region, today spread over more than half of India's state of 'Bihar', and parts of adjoining Nepal. Over the last 250 years, the Kosi River has shifted its course over 120 kilometres from east to west. Its unstable nature has been attributed to the heavy silt it carries during the monsoon season. Due to its flooding nature the Kosi River is known as the Sorrow of Bihar. Along with the Gandak, it is draining the plains of north Bihar, the most flood-prone area of India. The Kosi

River has laid waste over large fertile tracts during frequent migrations and has caused extensive damage through overbank flooding and inundation. Describing Kosi's destructive power, the British administrator, and the author of the Imperial Gazetteer of India, L.S.S O'Malley, wrote in 1913:

"Sweeping down from the hills, it brings with it volumes of sand, which it heaps over the surfaceof the country, destroying the productive power of the land, choking the wells, and driving the villagers from their homesteads….and changing the whole face of the country from a fruitful landscape to a wilderness of sand and swamp."

The movement of the river has not been gradual but of sudden change in river course, avulsive, originating from a nodal point (Map below). The average avulsion frequency has been recorded as 24 years which is among the lowest in the world compared to 1400 years for the Mississippi river. A number of palaeochannels on the satellite image of the Kosi basin proves the migratory behaviour of the river. The river is typically braided in nature and has formed a very large alluvial fan due to a large sediment supply from the Himalayas. The Easternmost palaeochannels of the river trending N-S is more or less straight and after mid 18th century there has been practically no shifting of the channel eastwards. This suggests that there was a neo-tectonic effect and existence of a natural barrier in the Eastern side. Further complications arise due to (a) very high rainfall in the catchment (1200-2000 mm in most part and (b) high seismicity in the hinterland causing landslides and large sediment production which eventually fill up the basin.



Its fury comes from the fact that the place where river meets the Gangetic plain from Nepal foothills is quite narrow (only 5 to 8 KMs wide) and steep (vertical) (as shown Figure below). Enormous amounts of water, laden with silt, sand and pebbles brought down from the Himalaya passes through such narrow and steep range and this provides the river with all the velocity and power for destruction.

(Figure Source; India Today Sept.5 2008)

SPECIAL FEATURE

Watershed development in India

An evaluation of Watershed Development projects in India was conducted by International Food Policy Research Institute, Washington DC, 2002 . The study was mainly conducted in Maharastra and Andhra. The report shows the followings;

a) by the late 1990s the annual expenditure on watershed exceeds US$500 million but very little information on success was available.

b) The participatory projects perform better than the top down technocratic projects. However participation combined with sound technology support performed best.

c) Problems remain with equity, by the nature of the projects the land owners got the maximum benefits whereas landless people got indirect benefit either through peripheral program activities or trickle down effect.

d) In fact watershed projects can actually make women and landless people worse off by restricting their access to resources that contribute to their livelihood. Even some of the more participatory projects found it difficult to ensure the benefits reaching all of the intended population.

e) In rainfed areas of Pune and Ahmednagar Districts, for example, the innovative projects operated in only 40 out of 1000 villages, even though they were more concentrated there than rest of the India. Scaling up is causing the reduction in supply of good NGOs and reduce the attention of highest quality people.

f) The installation of soil and water conservation measures in both private and common land were nearly 100% subsidized to generate employment. But where subsidies are high, long term maintenance of the asset is often low. This problem is to gain employment, people will accept conservation measures they really do not want.

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