The Tsangpo in Tibet and Brahmaputra in Assam

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TIBET is the highest plateau in the world, lying 12,000 feet above sea level. It lies to the north of the Himalayas, which act as a barrier to the monsoon air currents from the Indian Ocean. Central and Western Tibet receive little rainfall, and the region is barren. Moist currents of air from the Pacific Ocean, however, have access to Eastern Tibet, which is well watered and fertile. No water escapes to the sea from Central and Western Tibet. The troughs contain a series of lakes, into which the rivers empty their water. The Tsangpo is the only river which has access to the sea through the Dihong and Brahmaputra.

Heinrich Harrer, a Tibetan explorer, in ‘Seven Years in Tibet’, states that “in former times rainfall in Tibet must have been heavier. There used to be great forests, which made for rainier and cooler weather”. Burrard and Hayden, in A Geography and Geology of the Himalaya Mountains and Tibet’, have given a similar opinion on the rainfall in Tibet. South of the Himalayas lie the river basins of the Indus, Ganga and Brahmaputra. The reclamation of the ancient sea, between the Himalayas and the Vindhya, by the deposit of silt transported by river water from the crumbling of the hills, has created the alluvial plains of India. Moissoon currents of moist air from the Indian Ocean have access to these plains. The combination of the rich alluvial soil and rainfall have made the river basins highly fertile.

The Great River

Tsangpo in Tibetan means “any river, but usually a large one; especially the ‘great river’ of Tibet from west to east”.

The Tsangpo rises in Tibet, a few miles east of the Gurla Mandhata peak, between the Ladakh and Kailas Ranges, at an altitude of 16,000 feet. At its eastern end, a few miles east of Gyala Sengdong, the Tsangpo turns south and crosses the Himalayas into India.

Some of the tributaries of the Tsangpo the Kyi Chu, Shang Chu, Snap Chu, Nyang Chu, etc.—flow in a direction opposite to that of the main river. Burrard and Hayden state that this remarkable feature has given rise to a belief that the Tsangpo “must at no distant date have flowed from east to west in Tibet”. The authors write:

“It is not possible to express an opinion as to where it (the Tsangpo) escaped through the Himalayas; it may have flowed through the Phuotu Pass through the defile of the Kali Gandak; it may have passed through the basin of the Karkali, and it may have flowed through the present Himalayan course of either the Sutlej or the Indus; arguments can be adduced to show that each of these hypotheses is worthy of future investigation, but with our present knowledge no conclusion can be reached”.

From the ancient books of Tibet and India, it appears that a part of Tibet was under a sea-like lake. The Kailas on the north shore line of the lake tallies with the existing Kailas Range. The Gandhamadan on its south shore line is probably the Ladakh Range; the Jarudhl on its west shore line is probably a spur connecting the Kailas and Ladakh Ranges; and the Sambartaka on its east shore line is probably the eastern end of the Nyenchintangla Range. All these ranges have altitudes of over 16,000 feet.

The ancient Tsangpo Lake probably extended on the west to the source of the Indus, and covered the Mansarovar and Rakhas Lakes, and on the east to the extreme end of the Eastern Himalayas. Its northern shore line was the Kailas and the Nyenchintangla Ranges, and its south shore line the Ladakh Range.

Tsangpo Flows from East to West

Near Bunji, north of the Nanga Parbat peak, the Indus flows between precipices of 20,000 feet height, through a gorge 17,000 ft deep. Such a deep gorge could not have been cut, if only the water from the catchment of the Indus in the Himalayas had drained through it. Similarly the great Sutlej canyon across the Himalayas could not have been created by the small stream that now trickles along the floor of the canyon”. On the same reasoning, the gorges of the Karnali or the Kali Gandak could “hardly have been cut by the volume of water from so small a catchment as the river now possesses behind the Great Himalayas.”

Burrard and Hayden have not, however, mentioned the Sarasvati as being one of the channels through which the waters of the Tsangpo might have once escaped. This is probably because the Sarasvati at present is an insignificant stream near Kurukshetra. losing itself in the desert lower down. For an escape of Tsangpo water through the Indus, the watershed joining the Ladakh and Kailas Ranges, at an altitude of 16,000 feet, need crossing. The water level in the ancient Tsangpo Lake must thus have been above 16,000 feet, so that the region, where Lhasa now stands at an altitude of 12,000 feet, was under 4000 feet of water. With the addition of Tsangpo water, the discharge during the flood season made the Indus look vast as the sea, which justifies

Fig 1

HINDU KUSH MOUNTAINS

THE TSANGPO OUTFLOW THROUGH THE GANDAK-GANGA MILES 0 200 300 400

TIBET

NOTES:

LAND OVER 8000' BLACK

CONTOUR LINE 100'

1243
We don't all wear the same type of clothes; but, 
here or thousands of miles away, clothes are a basic necessity. 
A simple piece of cloth is everywhere the symbol 
of one of man's fundamental needs. 
For the fulfilment of this need we must depend 
on the joint effort of many; in India industries and 
development projects all form a part of this joint effort, 
speeding the nation's progress. 
A constant supply of our petroleum products 
to such enterprises is fundamental 
to this progress.
the name Sindhu (sea) given to it in Vedic times.

The Sarasvati, extending its channel by cataract action along the present Sutlej across the Himalayas, reached the Tsangpo Lake. Its water thus flowed through the Himalaya mountains along the Sarasvati to the Arabian Sea. With the flow through the Sarasvati, the level was lowered in the Tsangpo Lake, so that flow of its water through the Indus ceased. Later, with the extension of the Karnali channel by cataract action across the Himalayas to the Tsangpo Lake, its water flowed through the Kamali-Gogra-Ganga into the Bay of Bengal. The level was further lowered in the Taangpo Lake, so that flow of its water through the Sarasvati into the Arabian Sea ceased.

Thus the water from the Tsangpo Lake changed its outfall, from the Arabian Sea into the Bay of Bengal. With the cessation of Tsangpo water flow and the subsequent capture of its channel in the Himalayas by the Sutlej, the Sarasvati was deprived of its upland water supply and dwindled down to its present insignificant condition.

The extension of the Kali Gandak channel across the Himalayas by cataract action to the Tsangpo Lake, caused a flow of its water through the Kali Gandak-Gandak-Ganga to the Bay of Bengal (Fig 1). The level in the Taangpo Lake was further lowered, so that flow of its water through the Gogra-Ganga ceased. Up to this time, the Tsangpo water flowed from east to west.

**Tsangpo West to East**

The extension of the Dihong channel across the Eastern Himalayas by cataract action to the eastern shore of the Tsangpo Lake, caused a flow of its water through the Dihong-Brahmaputra-Meghna into the Bay of Bengal (Fig 1). The level in the Taangpo Lake was further lowered, so that flow of its water through the Gogra-Ganga ceased. Up to this time, the Tsangpo water flowed from east to west.

Drainage through the Dihong lowered the level in the Tsangpo Lake, until land in the Tsangpo valley emerged above water. The deposit of silt from the water of the lake for ages made the soil fertile, while moist currents of air from the Pacific Ocean provided sufficient rainfall. Large forests grew up in the sparsely populated country. With a prosperous cultivation and abundant crop production, civilisation and culture grew up and appear to have flourished in Tibet from the 7th century A.D.

On the other hand, although Kamarupa under King Bhaskara Varman had diplomatic relations with China and "attained considerable power and a fair degree of civilisation," the fact remains that "so few materials of their time have come down to us." The reason, given by Gait in his History of Assam, is "that nature vied with man in destroying them." The decline in power and civilisation in Kamarupa, started after the death of Bhaskara Varman in 650 A.D.

The building of the Potala Palace in the capital city of Lhasa, and the growth of civilisation and classical literature in Tibet, started from the 7th century A.D. The decline in power and civilisation of Kamarupa also started from the 7th century A.D. It may, therefore, be inferred that the drainage of the Tsangpo Lake through the Dihong, which caused the emergence of considerable areas of land in the Tsangpo Valley and destructive floods in the Brahmaputra Valley in Assam, started about the 7th century A.D.

**Conditions in Modern Tibet**

The cataract action in the Dihong channel across the Himalayas is continuing. It has been mentioned that the hills on the eastern shore of the Tsangpo Lake had an attitude of over 16,000 feet. Along the channel of the Dihong, there has been a lowering of these hills to 8,000 feet at Gyala Sengdong. About 40 miles lower down, the Dihong channel bed has an altitude of 6,000 feet (Fig 2).

In the vicinity of Lhasa, the Tsangpo has still a wide and shallow channel with a sluggish flow. It is one of the rare instances of a navigable river at such a high altitude. On May 28, 1882, Sarat Chandra Das' came to a chain bridge across the Tsangpo, where its channel was about 400 yards. As it was the dry season, there were sand banks for several hundred feet, beyond the ends of the bridge. His party and ponies were taken across the river in a roughly made boat. On August 28, during the flood season, he found that the waters had submerged the wide sand banks. On October 28, during the dry season, the water had gone down, so that had to walk over nearly 2 miles on soft sand before he reached the ferry boat. The Tsangpo here has thus all the characteristics of an alluvial river.

With the extension of cataract action, from the Dihong to the Tsangpo, its alluvial characteristics are changing. The wide and shallow channel, having a sluggish flow, and which formerly extended nearly up to Gyala Sengdong, is now gradually becoming narrower and deeper, while the current is becoming swifter. Between Sadiya at an altitude of 442 feet and Gyala Sengdong at 8,000 feet, the distance along the river being about 210 miles, the fall in the Dihong is about 36 feet per mile. In its natural tendency to flatten this steep slope, the deepening of the channel bed is gradually ex-

* "Bhota Frakash" by Vidhu Sekhara Bhattacarya.
tending upstream in the Tsangpo. In this process in the course of a few centuries, the Tsangpo will flow through a drop gorge, similar to the 4,000 feet deep gorge of the Indus.

The draining of the water through the Dihong had at first reclaimed from the bed of the ancient Tsangpo Lake extensive areas of land in the Tsangpo Valley. Heavy silt deposit made the soil very fertile, while moist currents of air from the Pacific Ocean provided sufficient rainfall. Forests grew and there was ample production of food crops. But, with the deepening of the Tsangpo channel, and its gradual conversion from an alluvial to a torrential river flowing through a deep gorge, river-side lands are becoming desiccated, by seepage of sub-soil water through the sides of the deep gorge. Thus, despite the rainfall in this region with the gradual desiccation of the land in the Tsangpo Valley, Eastern Tibet will become more and more barren, similar to the lands in Central and Western Tibet.

Conditions in Assam

The colossal amounts of debris, formed in the process of lowering of the Dihong and Tsangpo channel beds, and from the landslides in the sides of the river gorges, are adding to the silt load transported by the Dihong waters. But when the wide and shallow Brahmaputra is reached, owing to its lower velocity a considerable part of the silt load is deposited on the channel bed. As the river bed rises, flood waters overflow and deposit silt on the river banks. South of Sibsagar, the palace of the ancient Ahom Kings are buried in silt, up to the first-floor level.

The rise in river bed and banks has created other problems. The high dry-season water level in the river prevents drainage from river side tea gardens, villages and towns. It may be mentioned here, that, it has become "necessary to construct a channel 14 miles long to a point downstream of Dihrugarh, to ensure an outflow for the town's drainage into the river, at a cost of Rs 14 lakhs. Owing to the high water level in the flood-season, the submergence of paddy and tea garden lands, and villages and towns has become an annual occurrence.

Conclusion

The deepening of the channel bed of the Tsangpo in Tibet, and the deposit of colossal amounts of silt on the bed and banks of the Brahmaputra in Assam, are the primary causes of the rapidly deteriorating conditions in Tibet and Assam. It is not known if the Government of Tibet is taking action to prevent, or minimise, the desiccation of the soil in the Tsangpo Valley. In Assam marginal embankments are being constructed, along rivers, to prevent the submergence of river-side lands; but, as is now well-known, such embankments are very temporary palliatives.

Before the Sara Railway Bridge was constructed in East Pakistani was constructed the width of the Padma from bank to bank, at high water level was 16,500 feet, or over 3 miles. Although 15 x 359 feet spans are provided in the bridge, in its natural tendency to concentrate in a narrow and deep channel not more than 7 x 359 feet spans or less than one-half mile of waterway passes the whole of the flood season discharge. With the narrowing, the depth of the channel has increased to a maximum of 130 feet, and the velocity to 13 feet per second.

At Pandu, the Brahmaputra has a width of 2,960 feet, the velocity in the flood season in this reach being up to 12 feet per second. But in the other reaches, the width varies from 1 to 9 miles. It needs narrowing, deepening, canalising and stabilising of its channel to a width of less than one-half mile, so that a high velocity is developed, which can transport the whole of its silt load to parts of its wide bed to form new parallel river banks, having in between a narrow and deep channel with a stabilised alignment.