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A Study on the Ecology of Mountain Regions of India

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Abstract – The Himalayas are one of the tallest mountains of the world. The length of its arc is measured to be nearly 2400 kilometers. The collision of two major tectonic plates was the root cause of the evolution of these mountains. Some of the known superlatives of the Himalayas are K2 and Nanga. The nature of the climate of India especially, North India is truly dependent on the Himalayas.

The breadth of the mountains of the Himalayas is measured to be within a range of 240-330 kilometers. The range of the Himalayas covers the five major Asian counties. The overall area of the Himalayas is measured to be nearly 7,50,000 kilometers. The complex of the Himalayas includes the Hind Kush, Tien Shan, and the Pamirs etc. The current paper highlights the mountain units of the Himalaya.

Keywords: Himalayas, Mountain, Climate

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INTRODUCTION

The Himalayas is supposed to be a source of emerging a number of rivers. Due to global warming, the glaciers are melting down which facilitates the enough water in these rivers. These rivers are the major source of water in North India, as most of the farmers get the water for the agricultural activities from these rivers.

This Himalayas is also responsible for the raining in the North India portion during the Monsoons. In the absence of this Himalaya, there would be no greenly area in the North part of the country as there were no rains and most of the parts of the North India would have become deserts. Hence, it can be said that this Himalaya is the life line of our country.

During the season of summer, a good amount of raining is caused due to the Himalaya as it makes an interception between the monsoon coming from the Eastern and Western side of the country. As a result, heavy raining is observed in the hilly areas of the country. Higher level of the precipitation is found during the Monsoon period which consequently results into good amount of raining.

There are primarily three belts in the Himalayas which are situated along with each other. These belts are referred as inner, outer and trans Himalaya. The outer belt of Himalaya is also called as the mountains of the Shivaliks and has lesser height as compared to that of other two belts.

In the north side of the outer Himalaya, there is Lesser Himalaya having a height of approximate 20,000 feet. Among all these belts, the height of the trans Himalaya is measured to be higher. There are mainly three categories of the Himalayas moving from east to west side. These categories are eastern, central and western.

In most of the regions coming under the Himalaya is observed to be enriched of alluvium as huge amount of alluvium is found in the soil of these regions. According to a report, nearly 19 lakh tones of silt coming from these mountains are mixed into the Ganga River. This level of silt moves up to 24 lakh tones in the Brahmaputra River. This enrichment of the silt makes the fertility of the soil better and it becomes easier to perform the agricultural activities.

The Himalayan region has also the enrichment of the long trees as a number of forests are fount there. A number of forests from tropical to Alpine are found in the Himalayan region. Many industrial organizations use the wood of these trees for the manufacturing of a number of products. Also, in this region, no proper condition for the agricultural activities is found as the land in most of the parts is steeply and a lot of efforts are made by the farmers to perform the agricultural activities there.

ECOLOGY OF MOUNTAIN REGIONS OF INDIA

The altitude of the Shivalik mountains is measured to be 600-1500 meters. The approximate length of these mountains is measured to be nearly 2400 kilometers. The most of the area covered through this range are Potwar Plateau to the Brahmaputra Valley.

The breadth of the Shivaliks is measured to be about 50 km in Himachal Pradesh where it is found that the width tends to shrink to about 15 km inside in Arunachal Pradesh.

Middle Himalaya is situated in between the inner and outer Himalayas. The width of the Middle Himalaya is measured to be about 60-80 km. An altitude of 3500 to 4500 meters is reported for the Middle Himalayas above the sea level.

The approximate height of the Central Himalaya is measured to be 6100 meter above the sea level with an approximate width of nearly 25 km whereas; the mean height of the Trans Himalayas is measured to be about 3000 meter.

The processing of the evaluation of the Himalaya has a great impact on its overall structure where a continental collision was responsible for the deformation of the lithosphere causing a complex structure of the Himalayas.

Mountain ecosystems play an important role in shaping the sustainable development strategy of India. The Indian Himalayan Region (IHR), covering three biogeographic zones – the Trans Himalaya, the Himalaya and the Northeast India, stretches to about 3,000 km. in length and varies between 220-300 km in width. It spreads over the states of Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, part of Assam, and one district of West Bengal. Inhabited by over 40 million people, IHR covers nearly 17% of the geographical area and 3.8% of India's population. This complex mountain system consists of narrow and deep valleys, glaciers and fertile terrain.

Five climatic zones can be delineated in the Himalayan region based on geographic and physiographic factors. These are: the warm Tropical, warm Sub-Tropical, cool Temperate, Alpine and Arctic. While these are only broad zonations, there are many local variations in the climate due to precipitation, temperature, wind patterns, humidity, etc. The type and nature of soils also varies vastly in the Himalayan region from deep alluvial to the thin and bare soils of the high mountains. The region is a reservoir of over 9,000 glaciers with permanent ice and snow from which rivers like the Indus, the Ganges and the Brahmaputra emanate.

The Himalayan region harbours probably one of the highest hydropower potential in the world. This mountain system represents one of the richest natural heritage sites in the world. One-tenth of the world's known species of higher altitude plants and animals occur in the Himalaya (IPCC, 2001). Himalaya is endowed with richness and representativeness in biodiversity elements and has been recognized amongst 34 Global Biodiversity Hotspots.

The Nieniexiongla Glaciation was the most extensive, with glaciers from tributary valleys joining each other and forming a great piedmont glacier during that time. Further, another set of deeply weathered glacial sediment is found restricted to some ridges and summits between the valleys of the Xixiabangma north slope. These 'ridge-summit moraines' are 6200 m a.s.l. high and some 600 m above the river beds, implying that this moraine was formed much earlier than the Nieniexiongla moraine. It has been named the Xixiabangma Glaciation.

The Nyainqentanglha Mountain was the local centre of glaciation, especially in its east section (south-east Tibet) where the glaciers are fed by extensive moisture transported through the great channel of the Brahmaputra Valley. The Boduizangbo Valley is a crucial area for the understanding of the Quaternary glaciations of this region. Numerous moraines are present in the valley. The most prominent is a set of lateral moraine which extends discontinuously at a height of 800–500 m above the river bed to Guxiang village, some 100 km from the headwater of the Guanxing Glacier. This lateral moraine implies that the most extensive advance of the glaciers covered a distance of 100 km. It is also the oldest moraine preserved in the basin. During that time, the glaciers joined each other in the main valley to form a network of valley glaciers.

DISCUSSION

A unique feature of the Himalayas is their Crustal thickness, which rises from about 35 km in the IGAP to between 65 and 80 km over the Higher Himalayas. The increasing Crustal thickness is reflected in the dip of the MOHO, which has been estimated to be 7–8°N under the Sub-Himalayas but over 15° further north.

A considerable part of the Higher Himalayan mass consists of Precambrian rocks which also constitute Peninsular India. An important component of the Lesser Himalayas is the Lower Palaeozoic (500 ± 50 Ma) dominantly per-alkaline anorogenic granites, which are popularly termed 'Pan-African.' The sedimentary rocks suggest continuity of sedimentation in some parts of the northern shelf sea across the Precambrian–Cambrian boundary into the Lower Palaeozoic,

especially during the Cambrian. Records of continuity of sedimentation in these basins during the Ordovician and Silurian are, however, quite equivocal, although both periods are represented by fossils. Deposition of shelf facies sediments was resumed during the Carboniferous in zones of marine incursions along intracratonic rift basins that had developed in the Salt Range and in the Kashmir region. The deposition in some basins continued until the Triassic. There are records of contemporary volcanicity in the Pir Panjal Ranges and in other places in the east. Both marine and continental sediments can be correlated with those of the Gondwana deposits which occur in parts of Nepal and the Sikkim Himalayas. Continuous sedimentation from the Cambrian to the Eocene, with a number of breaks, is recorded in the Tethys belt. Fossil records from different parts of this belt indicate that the extent of these breaks was not of uniform duration. The closure of the Tethys Ocean by the Eocene caused a brief pause in sedimentation, which was resumed around mid-Miocene times in two important basins. One in the north opened as a major intermontane (back arc) basin in the suture zone, leading to the deposition of the Indus Group. The Siwalik Group was deposited in the southern foreland basin that developed in front of the rising Himalayas from around 18 Ma. The Siwalik Group contains a rich fossil record of plants, molluscs, fishes, reptiles, and mammals. The last Himalayan upheaval at around 1.7 Ma caused shifting of the depocentres to the south, to build up the flood plains of the IGAP. While the closure of Tethys marked the end of sedimentation in the north, marine shelf sedimentation continued both along the eastern and western margins of the Indian continental block, in the Naga Hills and Arakan Yoma in the east and the Sulaiman and the Kirthar Ranges in the west. Sedimentation in these basins, which began in the Eocene, continued at least until the Oligocene.

The earliest Himalayan deformation coincided with the final closure of Tethys at around 50 Ma, affecting the rocks on either side of the suture zone. There was a distinct southward polarity of deformation across the Tethyan region to the Higher Himalayan Crystalline Complex. A series of south-directed recumbent folds and thrusts was produced in the Higher Himalayas, resulting in thickening of the Crust, with attendant Barrovian metamorphism, anatexis and the generation of leucogranites. The southward transmission of thrust nappes by the MCT, continued until around 22 Ma. This was also the time when the Barrovian metamorphic isograds underwent inversion.

Almost simultaneously with the piling of the fold-thrust nappes in the Higher Himalayas, the Indus molasse basin in the north and the Siwalik molasse basin in the south developed as rapidly subsiding troughs.

As in a model of 'piggy-back' thrusting, the southward transmission of the fold-thrust nappes, which was initially along the MCT, was later carried oot by the MBT in the south. The HFT (or MFT) which overrides the Recent sediments was the last thrust to form from Himalayan tectonism.

The Himalayas represent a classic example of continent–continent collision. The very similar tectonic pattern observed over the entire length of the Himalayas is primarily an expression of the impact of two continental blocks. Complexities noted in the western end of the Himalayas arise because of the development of an island arc complex (the Kohistan-Dras Island Complex) prior to its collision with the Karakoram microplate (possibly during the mid-Cretaceous).

CONCLUSION

Palaeomagnetic data indicate an initiation of the continental collision at equatorial latitudes, resulting in the progressive suturing from the Paleocene in the north-western Himalayas until the Eocene in the eastern Himalayas. Continued convergence and indentation of the Indian continental block with southern Asia (or Tibet) up to the Early Miocene, resulted in the doubling of the Crustal thickness over a large region of the Himalayas, the Pamir-Hindukush and Tibet. The total area of thickened Crust may account for about 2000 km of Crustal shortening in the entire orogen. As to the origin of the Himalayan arc, palaeomagnetic observations seem to favor a steady-state model of formation of the arcuate bending of the mountain ranges due to Late Tertiary anticlockwise rotational underthrusting of the Indian continental block beneath the Tibetan Plateau after the latest Miocene.

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