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Golden Research Thoughts

Abstract:-

In the Indian Himalayas on the western edge of the Tibetan plateau, Ladakh, or 'Little Tibet', is one of the highest and driest inhabited places on earth. The enormous mass of the Himalayas creates a rain shadow, denying entry to the moisture-laden clouds of the Indian monsoon. Ladakh is thus, a high altitude desert. The main source of water is the winter snowfall on the mountains. The regions on the north flank of the Himalayas-Dras, the Suru valley and Zanskar-experience heavy snowfall and remain virtually cut off from the rest of the country for several months in the year. Summers are short, although long enough to grow crops. Ladakh displays a cold-desert landscape sculpted by Quaternary glaciations and cryogenic weathering, with superimposed effects of fluvial and mass movement processes. The upper Indus River, along with the Shyok is the backbone of Ladakh. The different landforms produced by Indus River and associated livelihood of people of the valley has been studied.

Keywords:

Himalaya, Desert, Indus, Ladakh, Zanskar, Quaternary; Fluvial.

FLUVIAL PROCESSES AND LANDFORMS IN THE INDUS VALLEY AND ASSOCIATED LIVELIHOOD

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INTRODUCTION

Ladakh, a land of Buddhist culture, covered from all the sides with mountains, vales, and breathtaking views of people draped in long dresses and a familiar smile on their faces. All this makes this Ladakh, a land where one longs to spend one's life. From the region passes a mighty river, Indus, which cradled a whole civilization under its shadow and has made the country so rich by its mere being.

INDUS RIVER

Indus river originates from the north-west of the holy lake of Mansarovar in the southwestern slopes of the Kailasa mountain at an estimated height of 17000ft. near its source it bears the name of 'Sinh Khatab' meaning 'lion's mouth. The Indus River is the backbone of Ladakh- all major towns historically and currently is located close to the Indus River. Shey, Leh, Basgo, and Tingmosgang, are situated on the banks of the Indus River.

OBJECTIVES

Main objectives of the study are

- To assess the various fluvial landforms and processes in the Indus valley
- To study how they affect the livelihood of people in the region

Physical Background of the Region

In no other part of the world, probably, is there to be found such a large number of lofty mountains within so confined a space. This immense mass of mountain is intersected by numerous deep valleys, and these, owing to some peculiar geographical formation which I have not remarked in other part of the Himalayas, are generally narrower at their mouths than higher up. It is not unusual to see valleys among them valleys of from 10 to 30 miles in length. The most striking feature in the physical aspect of Ladakh is he parallelism of its mountain ranges, which stretch throughout. This direction of the mountain ranges determines the direction of the rivers, as in the case of river Indus that flows almost parallel throughout out course. This forms the chief valley in Ladakh that is the Indus valley that follows the course of Indus from southeast to northwest. Into it a number of smaller valleys open, forming basins for the tributaries of river Indus, the most important of which are Shyok on the north and Zanskar on the south. The other important tributary of Indus is the Drass River

Indus Valley in Ladakh

There are a number of valleys in Ladakh, Indus being the principal valley among them. There are Nubra, Shyok, Zanskar and Suru and Rupshu valley and most importantly the Indus valley by and large in Leh. Indus valley strategically the most important part of Leh is a large valley formed by the main channel of the Indus River as it flows across Ladakh. It includes parts of Leh district, the Skardu region and the vast cold desert beyond. This valley consists of large stretches of undulating lands interspersed by high mountains across which there are many passes. The popular places include Temisgong and Likkir and monastries like Alchi gompa. Since our survey tooke in Leh, so Leh is chosen for the study area (Picture 1).

Picture 1 Indus River flowing in Leh district

The valley of the upper Indus River is a well-defined feature that follows the geologic strike (structural trend) westward from the Tibetan border to the point in the Pakistani sector of Kashmir where the river rounds the great mountainous mass of Nanga Parbat to run southward in deep gorges that cut across the strike. In its upper reaches the river is flanked by gravel terraces; each tributary builds an alluvial fan out into the main valley. The town of Leh stands on such a fan, 11,500 feet (3,500 meters) above sea

level, with a climate characterized by an almost total lack of precipitation, by intense insolation (exposure to sunlight), and by great diurnal and annual ranges of temperature. Life depends on melt water from the surrounding mountains, and vegetation is alpine (i.e. consists of species above the tree line), growing on thin soils.

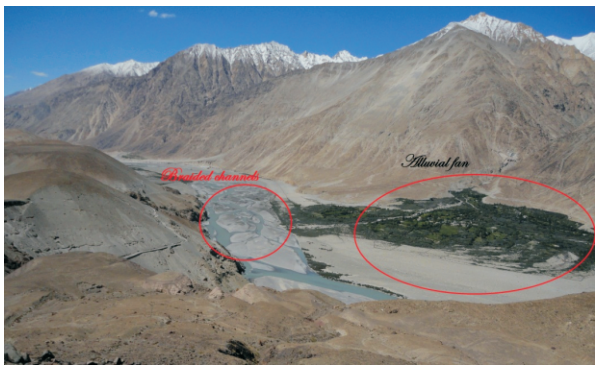
Fluvial Processes Associated with River Indus

River Indus, being an antecedent river has formed ripple marks on the walls lining its side. This was very evident on our way to Hanu village. There are many other processes at work, from rock cutting of the sides, forming deep pits at the side of the walls to the formation of Riverine Island by deposition of alluvium in the course of the river.

Fluvial landforms in Indus valley

There are many kinds of fluvial landforms visible in the Indus valley. Some of them are:

- Gorges: One could also witness deep cut gorges in which the river flowed. These are the only erosional features that we witnessed are formed due to the tremendous cutting capacity of the river along the sides. The walls of the gorge are nearly vertical along the route to Hanu Yogma. The river in many places is passing so closely parallel to the mountain ranges that it's valley is but a deep cut narrow gorge.
- Ravines: at the later course, the river Indus contracts suddenly, the mountains closing upon the river. The mountains on both sides being extremely steep and almost uniformly rocky.
- Riverine Islands: On our way to Hanu Yogma village we witnessed this landform in the course of the river. Riverine Island is a depositional landform, which is formed by the depositional activity of the river when it slows down. The following sketch shows the riverine island on our way.
- Alluvial fans: Each tributary coming in the river Indus builds an alluvial fan out into the main valley (Picture 2 & 3). The town of Leh stands on such a fan. The very apt example of the alluvial fans could be sought from the village that we stayed in. The name f the village is Chushot, which is the principal village of Leh and is situated long the river bank. The alluvial flat here is half a mile wide and several miles long. This makes it the largest cultivable tract in Ladakh. The village comprises of three parts: Chushot Yogma, Chushot Gongma and Chushot Shama. This village is also the longest in stretch in Asia. The following sketch shows the village Chushot. Drew (1983) provided the scientific description of the arid-zone alluvial fans in the Indus river of Ladakh region. Alluvial fans are the most conspicuous form of superficial deposits in this region. The fans are found at the mouth of side-ravines. The radius of the fan is about a mile long; the slope is five to six degrees. The fan is properly a flat cone having its apex at the mouth of the ravine. The reason of formation is the sediment carried down by the stream of the side ravines. The hill slope alluvium also contributes to it.



Picture 2 Braided Channels and Alluvial Fan

Picture 3 Gully Erosion

- Levee and Gravel Terraces: the river all along its course deposits the load that it carries along the sides. These form a kind of levees along the sides of the river. It also deposited gravels and pebbles along the bank. The image below Gravel terraces is visible on the sides of the river Indus. These are deposited all along the course of the river wherever the river is considerably slower in pace.
- Associated Livelihood: the region as a whole is characterized by traditional way of living. The chief anthropological characteristics of the region are:
- Seasonality of employment: Agricultural practices in summer season only, rest of the year the people either migrate to a more habitable downsides or either stay at home and do nothing for the vagaries of such harsh climate does not allow for any work.
- Land Use Pattern: The land is chiefly used for the cultivation and pastoral purpose as is clear from the pie drawn below. Since this region encompasses he region of Chushot, which is the largest cultivable land in Ladakh, the agricultural activities become prominent. The people that we talked to also said that apart from the winters (when the whole area is covered with snow), they indulge in agricultural activities. Also since their livelihood depends on the rearing of horses, Yaks, and other cattle, there is also a good share of pastoral use of the land (Figure 1.1).

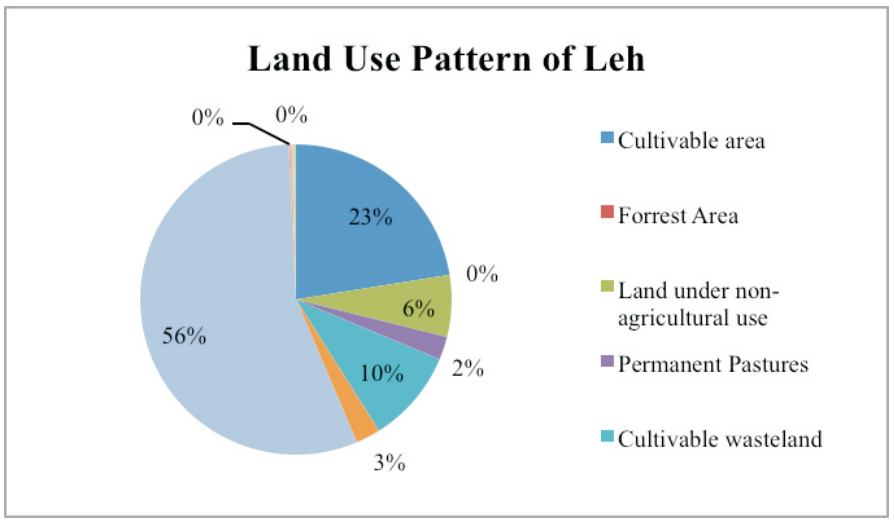


Figure 1.1

- ❖ Agricultural Practices: The enormous mass of the Himalayas creates a rain shadow, denying entry to the moisture-laden clouds of the Indian monsoon. Ladakh is thus, a high altitude desert. The main source of water is the winter snowfall and glacial melt water. But this region owing to large alluvium tracts does indulge in a lot of agricultural practices. The chief crops that are grown are: barley of two to three species, wheat, buckwheat, vegetables (peas, tomato etc.), and orchards.
- ❖ Poplars and willows are to be found in the deep river beds and in sheltered corners watered by side streams. Lucerne (Chunpo) is extensively cultivated. In the Hanu village there were large trees locally known as Youlat and Jerpa were panted alongside the river. These are extensively used for construction purposes.
- ❖ In the region traditional agro-forestry system in the form of agrisilviculture system persists. Which is combining agricultural crops with boundary plantation of willow and poplar species. Which are also the main source of fuel and fodder.

Breach in the Livelihood

The region particularly that of the Choglamsar that lies in the Indus valley on the opposite side of the Chushot village was completely devastated on that ill-fated day in the month of August in the year 2010 when there was a massive cloud burst followed by a flash flood. The Indus river and the Sabu nala passing through the villages of, Saboo, Tashi- Gatsal and Choglamsar got badly affected by this destructive event. Almost the whole of the region got drowned in water, the house, agricultural fields got washed off, there were deaths and casualties. The destructive build of the flas flood could be understood from the very fact that we witnesse very large boulders brought by the overflown nala still scattered over the whole region. We talked to pepole and asked them about the loss, everyone said that they have lost all the produce and the compensations gien by the governmet were insufficient. It led to extensive losses in terms of agricultural fields, livestock etc. This led to a very massive breach in the livelihood of the people inhabiting the area. They are still fighting with the implications of the event where here are still large boulders in the fields.

Type of Farming: The crops are grown mainly for subsistence purposes apart from a few who grow vegetables to sell in the local markets. Terraced cultivation is done in the region. Only in the Chushot village a vast stretch of plain fertile land is to be seen. The people in the Chushot village grow crops like wheat, barley, vegetables etc. in this vast stretc of land. In the rest parts of the region due to the lack of plain land the terraces are formed on the mountain sides. As it is clearly visible in the image below there is terraced field cultivation (Picture 4).

Picture 4 Terraced Cultivation

Type of Irrigation: The irrigation is done through small nalas that pass through the village. In some villages as in Choglamsar village near Leh the nalas are diverted to pass from the houses of people. The image below shows diverted nalas from the main river for irrigational purposes (Picture 5).

Picture 5 Irrigation System

Crops Grown: Naked barley, normal barley and wheat are the staple crops all over Ladakh, along with mustard (for oil), lentils and other pulses, and vegetables.

Manure and Fertilizers: the people have access both to the natural and chemical fertilizers. They use these fertilizers to increase the productivity of the land. Though some still use the traditional manure from the dung of the cattle they rear.

Agriculture is very important livelihood in Leh. A lot of efforts have been made to facilitate betterment of agricultural practices. There is Leh Agricultural Meteorology Division, Agricultural research unit, Agricultural colleges, The Annual Vegetable cum Fruit Exhibition (Kissan Mela), Agriculture Stakeholder's meet-2013 Organized at Leh etc., and all these efforts to encourage agriculture. Diversification of crops is needed to be practiced as well as commercial plantation of medicinal plants and herbs, which are found in the region, will be a huge change in the traditional agricultural practices.

Economic Activities: Plants introduced in the 1970s by Indian researchers have given rise to orchards and vegetable fields. Pastoralism-notably yak herding-long has been a vital feature of the Ladakh economy; breeding of sheep, goats, and cattle has been encouraged.

Hydroelectricity Project on River Indus: Village Alchi, in the Leh district of Ladakh is a famous tourist place with most of the tourists visiting the Buddhist monastery here, known for the great murals. Nimmo-Bazgo dam, that has come up near this village is a 57 meter high concrete gravity dam. It has 3 nos. of 3.3 meter diameter penstocks to carry the water to 3 Nos. of turbines with 15 MW capacity. All the water released from turbines would flow back in to bed of river Indus. This dam also is one of the highest hydel power projects in the world, located at over 10,000 feet above sea level. The Alchi dam remains dependable for 90% of time in a year, except few days in winter. The water here does not freeze at the greater depth of the river, where the turbines are located.

Recreational activities: Leh receives about 25,000 foreign and 50,000 domestic tourists annually. River rafting in Indus is quite famous among tourists, e.g. Ladakh kayaking tour in Indus.

Suggestions for Livelihood: The present pattern of the livelihood of the people of this region has been like this for a really long period. It is time to incorporate some changes. There can be improvements in the present activities and there can be some new practices introduced.

- ❖ Diversification of Agricultural Crops: Diversification of crops is needed to be practiced; this is beneficial not only for the economy but also for the self-reliance. As the region has to import various food materials from the other parts of the state.
- ❖ Commercial Plantation of Herbs and Medicinal Plants: Commercial plantation of medicinal plants and herbs, which are found in the region, will be a huge change in the traditional agricultural practices.
- ❖ Dairy Farming: Actually this practice is very restricted in the region, because of the lack of availability of fodder and green grazing land for a longer part of the year. But, as the region has a very high inflow of tourists it generates a high demand for milk.
- ❖ Dairy farming can become a very important part of the economy, if it is planned and incorporated with the modern technology, artificial environments, milk storage etc. This can prove to be very fruitful for the economy.
- ❖ Goat Farming: The pashmina goat, which produces the Cashmere wool, can and should be raised at a big commercial scale just like the Gobi desert of Mongolia. Since these goats are native to Himalayas and are acclimatized to the climate very well, there is need to implement modern tools and techniques to make this business economically more profitable and sustainable. So, it is an ideal condition and a new and improved way of earning more.

CONCLUSION

The Indus valley in the Ladakh region encompasses a wide variety of landforms that in turn decide the livelihood of the people. The region of the valley that we surveyed is that of the Leh region (Chushot Village) which is a large fertile tract of alluvium and thus provides a lot of scope for agriculture. People here are mainly indulged in agricultural activities. The livestock needing pastures to graze also is one of the very important requirements of people as many of them are dependent on these livestock for their livelihood. Thus in Chushot, we can see a very apt example of how the natural setup of the region supports the livelihood of people in the region for, unlike in the mainland of the country, the people of the region and of Ladakh in particular are very much closer to the nature yet this proximity and interdependence cannot be termed as environmental determinism as people are very much aware of their abilities to get over the natural barriers but instead choose to stay rustic as close to the nature as possible.

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