

## Geo-tourism in Kumaon region of Uttarakhand, India- A latent catalyst for business, employment and economic growth

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### ABSTRACT

*Geotourism encompasses not just the thrill and adventure of tourism but also adds to the preservation of geology, environment, culture and heritage of the area with a sustainable approach leading to regional economic growth. Embedded with a holistic approach to maximize tourism benefit for a community and minimize negative impacts of development in environmentally sensitive region, Geotourism is a potential game changer. Kumaon hills have immense potential for the development of Geotourism as it is a part of the youngest and loftiest mountain chains, the Himalayas, having a unique geological setting. Despite abundance of geodiversity, the area has not yet been explored with regard to its Geotourism potential. This paper contributes to identifying various natural resources of the Kumaon region and establishing a network of geosites which will further act as an influential platform for the young and local entrepreneurs to create profitable and sustainable business ventures. Besides, this paper also suggests ways in which geotourism can propel other forms of tourism in this region.*

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### INTRODUCTION

The Indian sub-continent has varied and incredible physical features vacillating from the loftiest Himalayan mountain ranges to the hot desert to vast plains to longest glaciers. These physical variations are melting pot of cultural, social, biological, and geological diversities. Though the cultural diversities of different geographical and geological settings are well recognized and promoted as tourist attractions, the geological significance of the landscape and geographical locales has not received much attention mainly on account of ignorance. Contrastingly, in societies with wider knowledge base, geological features are considered as major tourist attractions. An example can be cited from Scotland where out of the fifteen top-rated tourist attractions, Arthurs Seat, a volcanic rock forming a highland, rates fourth spot in the capital city of Edinburgh.

Tourism is one of the largest industries of India, generating around \$240 billion in 2018 and accounting for 9.2 % of nation's GDP. It helps to create 42.6 million jobs which account for 8.1 % of total employment. As per tourism competitiveness report 2013, India stands at 11<sup>th</sup> and 65<sup>th</sup> position in Asian-pacific region and world-wide respectively (Theme Paper: Tourism Fest 2013).

India's spectacular geological diversity, besides its diverse culture and astonishing natural resources and biodiversity, could make it one of the most favored destination for tourists from around the world. Geotourism, hitherto unexplored and underdeveloped in India, is the most sustainable form of tourism. With the participation of local people it can precipitate community development. Geotourism is not limited to Geodiversity of a region or a locality but also encompasses its biodiversity, history, and culture with the main purpose being showcasing of the geological features, protection of the environment as well as overall development of the region/ locality. The concept of Geotourism can be taken to prospective tourists through young entrepreneurs with innovative ideas which will not only generate employment, but will also prove to be effective in changing mindsets, edging towards sustainability, protection and preservation of our heritage.

### GEOTOURISM

Geotourism is a relatively new form of tourism and comes under the category of niche tourism. Its definition has undergone many modifications since its inception. It is believed that the term 'Geotourism' was first coined in 1997 by Tourtaellot and his wife Sally Bensusen (2002, A report by TIA America & National Geographic Traveller). Since then, many definitions of this

term have come from different researchers and organizations around the globe (Hose, 2005, 2016, Larwood & Prosser, 1998). Early definitions were closely linked to visit and interpretation of geo-sites with recreational value.

According to National Geographic Society, Geotourism is defined as, “Tourism that sustains or enhances the distinctive geological character of a place, its environment, heritage, aesthetics, culture and the well-being of its residents” (National Geographic, 2008).

Nekouie-Sadry defines Geotourism as, “A knowledge-based tourism, an interdisciplinary integration of the tourism industry with conservation and interpretation of abiotic nature attributes, besides considering related cultural issues, within the geosites for the general public.”(Nekouie-Sadry, 2009).

The definition used for the present study follows that of D. Newsome and R.K. Dowling which says “Geotourism is a form of natural area tourism that specifically focuses on landscape and geology. It promotes tourism to geosites and the conservation of geo-diversity and an understanding of Earth sciences through appreciation and learning. This is achieved through independent visits to geological features, use of geo-trails and viewpoints, guided tours, geo-activities and patronage of geosite visitor centers” (Dowling and Newsome, 2010).

Hose (2016) presented “4Gs model of Geotourism” which includes Geoconservation, Geohistory, Geo-interpretation and Geosites/geomorphosites as its main components making it more comprehensive. However it is likely to get modified from place to place due to the impact of prevailing forms of tourism. In India, religious tourism is the most prevalent form of tourism and its proximity with nature can only be understood with historical development of the society. (Fig.1).

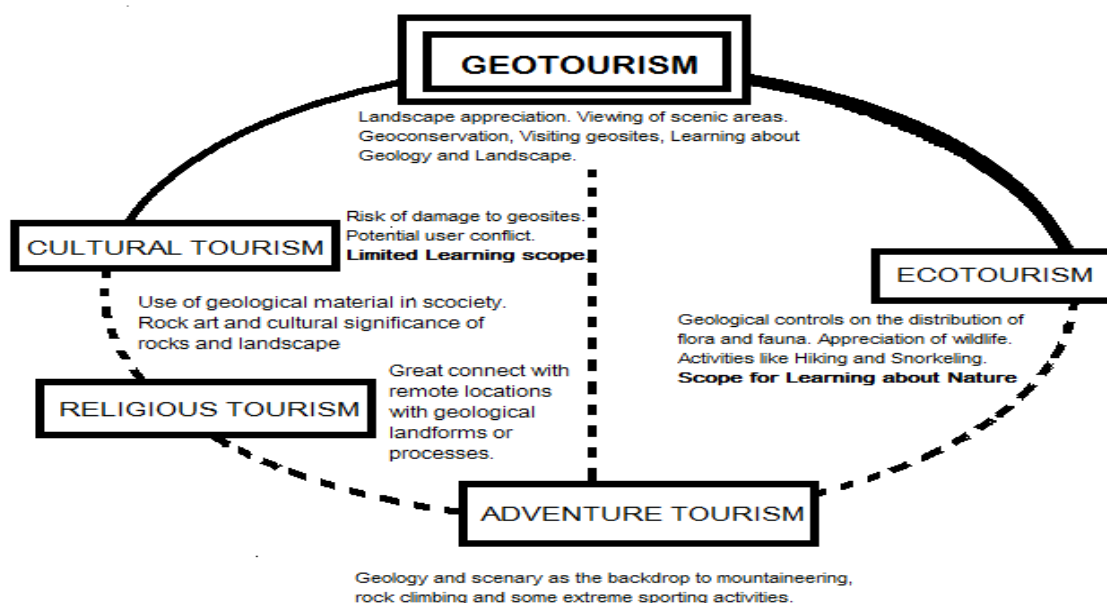


Fig.1. Components of Geotourism and their inter-relationship with other forms of tourism. Solid and dotted lines represent interconnecting pathways. The connection between eco- and geo- tourism is represented as a particularly strong relationship (modified after Dowling, 2011).

In India, one of the facilitating factors for geotourism is religious tourism as the hills (particularly in the study region) are adorned with several ancient temples dedicated to popular deities in the Hindu religious pantheon. Most of these temples are located on the rocks representing geological changes stretching over millions of years. These are additional attractions for potential geo tourists.

A sustainable Geotourism model can help the region move towards green development. The geoheritage of the nation can be put on display broadly in two ways by establishing the following:

1. Geosites
2. Geoparks

**Geosites** are sites representing geodiversity of the region. Geosites can occur alone or in collaboration with the other geosites. In case of developing a geosite, tourism infrastructure such as accommodation, access roads to the spots, and the related management to that attraction and so on are the important aspects to be considered. A geosite defines a place with scientific, historical, cultural heritage interests and reachable for visits and studies, and is well acknowledged internationally. (Wimbledon, et al. 1998)

Geotourism promotes Geoheritage among the general public as it aims at observing and understanding the geological phenomenon and processes that goes on in nature. It is a multidisciplinary activity and includes recognition of geotouristic potential sites or geosites in any region of interest. A possible categorization of these sites is as follows:

- 1) Glacial lakes
- 2) Rock forms (small and single outcrops were passed over)
- 3) Hot springs
- 4) Waterfalls & caves
- 5) Wild life habitat
- 6) Volcanoes

**Geopark** means an area that has well defined boundaries and must have enough geological phenomenon and processes within its boundary to claim it as a geopark. Wherever few geosites occur in close association with each other, then these can be grouped under Geopark. The Geoparks should affect the economic development of the region and special authorities are assigned for the same (Amiri Kazemi, 2012). Geoparks, all around the globe, have proved to be economy boosters and tourist inflow generators in the region where they have been established (Ahluwalia, 2006).

Geotourism offers a required aid for geosites under threat of destruction, reduction and cover. It plays an important role in displaying and protecting the geological features, resulted from the processes that began millions of years ago. If the concept is efficiently implemented it can become a source of enormous job opportunities and huge revenue collection leading to significant rise in GDP. This would hold particularly true for our study area.

Geological Survey of India has declared 26 sites, located in different parts of the country, as National Geological Monuments which include four fossil parks, eight rock monuments, four geological marvels and six stratigraphic and economic locations. As a significant initiative, GSI has undertaken the responsibility of protection and promotion of such features. Unfortunately, no part of Himalaya falls in this list perhaps due to inaccessibility and lack of infrastructure (<https://www.gsi.gov.in/webcenter/portal/OCBIS/pageGeoInfo/pageGEOTOURISM>).

#### GEOTORISM POTENTIAL IN THE KUMAON REGION

The Kumaon region, being predominantly a hilly terrain, has an abundance of natural spots of geological and geomorphological importance. Hence, any model of Geotourism in this region will not only make people aware about their immediate surroundings but also motivate people to opt for sustainable development leading to preservation of our Geoheritage and creation of employment opportunities leading to their economic upliftment.

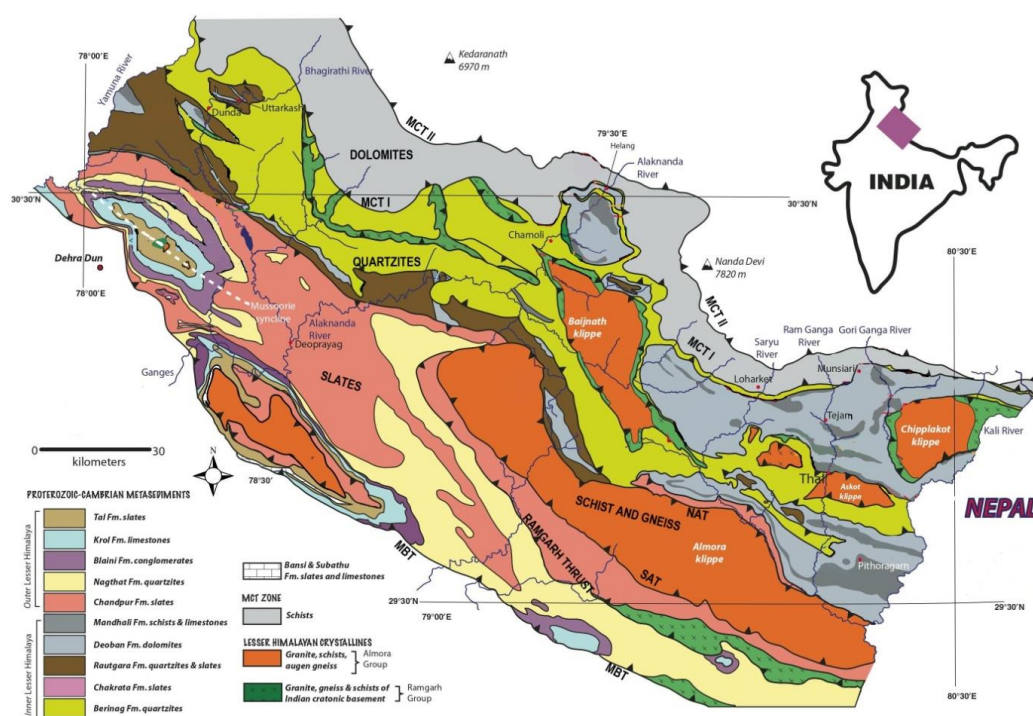


Fig. 2. Geological Map of Uttarakhand (after Célérier et al., 2009)

Kumaon is one of the two (the other being Garhwal) administrative divisions of Northern hill state of Uttarakhand, India. Being a part of youngest mountain chain in the world, there is a great diversity of geological structures and relief. In a tract not more than 225 km in length and 65 km in breadth there are over thirty peaks rising to elevations exceeding 5500 m. The Kumaon division consists of six districts out of which four are truly hilly regions and incorporates the Glaciers (Kaphni, Milam, Pindari and Ralam), Rivers (Kali, Kosi and Ramganga), Mountain peaks (Trishul, Panchchuli and Omparvat) and Lakes (Nainital, Bhimtal, Sattal and Naukuchiatal). Mesmerizing peaks, rivers, lakes, gorges and limestone caves of the Kumaon region grounds selection of geosites, are valuable in the local, regional and national scale. Geologically it represents a part of Himalaya with several thrust and faults (Fig..2).

**METHODOLOGY**

The study included collection of all available data in both soft and printed format and acquisition of various past surveys/literature related to geospots. This involved procurement of Survey of India topographic sheets, aerial photographs and satellite imagery of all the six districts of Kumaon region at higher resolution and scale. A digitized tourist map of all the districts of Kumaon region and all information related to geography and geology was also clipped to these maps. A field work was conducted to identify the spots with touristic and geological importance of the region. All the data procured was analyzed to propose few routes of geoheritage in the region.

As a part of present study several routes/paths were identified and they were evaluated on criteria like accessibility, state of preservation, scientific worth, educational significance and potentiality for economic growth of local population. The different routes proposed were:

1. Rudrapur → Lohaghat → Pithoragarh → Binsar → Naukuchiatal → Rudrapur
2. Champawat → Pithoragarh → Munsyari → Chaukori → Binsar → Champawat
3. Nainital → Ranikhet → Gairsain → Almora → Mukteshwar → Nainital
4. Champawat → Pithoragarh → Almora → Nainital

**OBSERVATION AND OUTCOMES**

Out of these four, the track selected for study is route 4, which has been named as **C-P-A-N**. Looking into the importance of the tourist infrastructure in promotion of any kind of tourism, the concern was also to provide a systematic approach to the identified potential geosites. Hence, a Geocorridor was designed on the basis of the fieldwork that connects all the geosites in the region. Availability of the infrastructure has been the main concern while developing the corridor (Fig.3a and b).

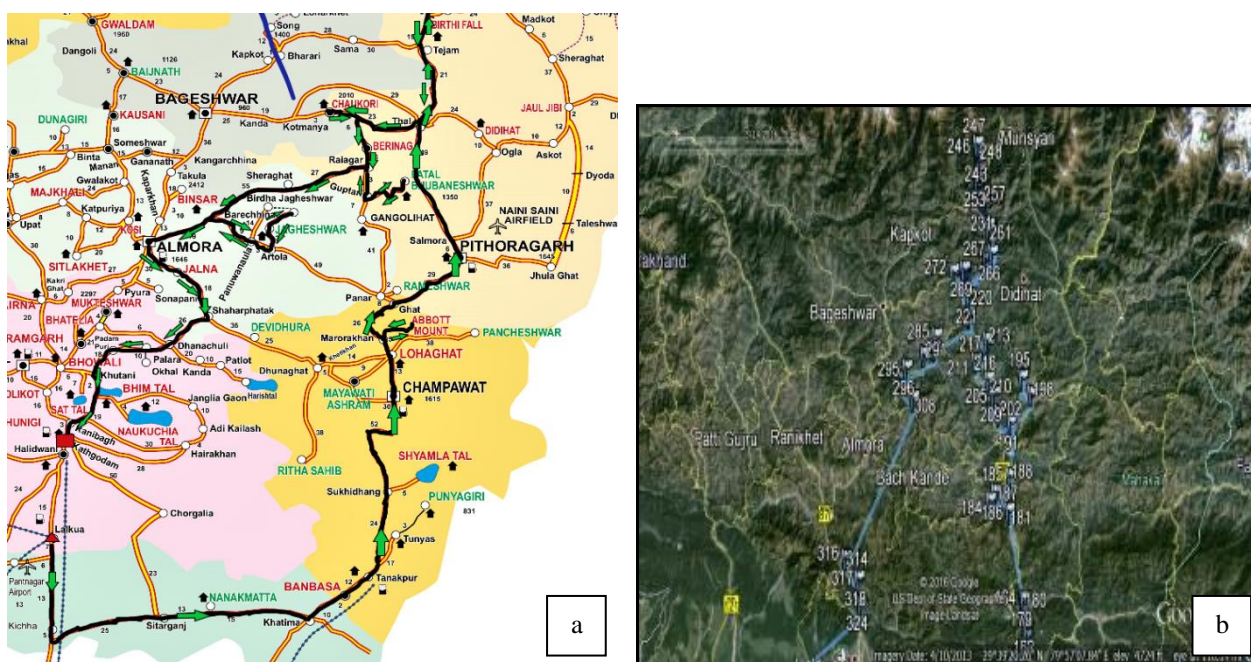


Fig. 3(a) The proposed corridor: Champawat – Pithoragarh (Gangolihat – Chaukori – Birthi) – Almora (Dhaulchhina – Jageshwar) – Nainital (Bhowali) (b) Superimposed locations (with numbers) studied during the fieldwork, on Google Earth map.

Based on the field work, following sites have been identified with a brief description and its potential to become geo-attraction for tourists.

**1. LADHIYA RIVER:** The River Ladhiya is a perennial tributary of the Kali River. It rises as two small springs fed by underground water in an area to the NNE of Nainital in Kumaon. The river flows towards SE in its upper and middle courses, turns towards east and flows into the Kali River upstream of Tanakpur (Negi, 1991) (Figs.4a, b).

Two small springs are the headwaters of this river. They rise at a distance of about 20 kms from each other. Thereafter they merge and flow towards east. A number of smaller streams flow into the Ladhiya River, particularly from the northern flank of its valley. The Ladhiya valley is deep and V-shaped in its upper course but opens up towards its mouth. Many small paired and unpaired terraces occur along the river. These are composed of the deposits laid down by the river over thousands of years. Broad terraces occur near its confluence with the Kali River.

At Chalthi, Bhimtal formation and South Almora Thrust (SAT) are well exposed along the Ladhiya river valley. South Almora Thrust (SAT) is a major thrust sheet separating Almora crystalline from Outer Lesser Himalaya while the Bhimtal formation is surrounded by south Almora thrust (SAT) in north and main boundary thrust (MBT) in south with common exposures of Quartzite, Chlorite schist. Other prominent geomorphic features include incised meanders and ridges. It is a beautiful river and the surrounding areas carry the potential to be developed as camping site were identified.



Fig. 4(a) Meandering of Ladhiya River (b) Human-face rock on near Ladhiya River

**2. BANASUR FORT:** Banasur fort is at an elevation of 1859 m and is 7 km from Lohaghat and 20 km from Champawat. One needs to trek about 2kms to reach this fort. Construction of the fort is dated approximately to 16<sup>th</sup> century over the ruins of Old Durga fort of early medieval period. Local legends relate this fort to the assassination of Banasur by Lord Krishna, which adds spiritual value to the site with an interesting folklore [Source: Archeological Survey of India (ASI)] (Fig. 5a, b).

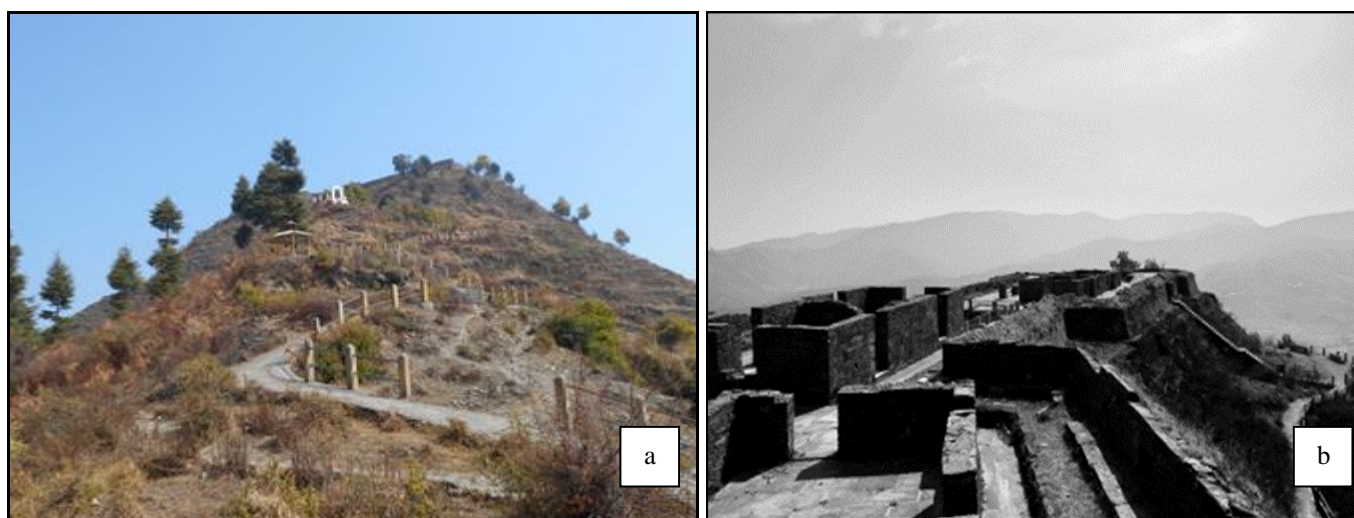


Fig. 5(a) Trek to Banasur fort (b) Ruins of Banasur Fort at the top of the hill.

Metamorphic rocks like Biotite-schist and Boundinage structures are exposed in this area. The precursor rocks represent deposition in a paleo-ocean as layers of contrasting composition and strength. Therefore, it can be said that the layers which made up the rocks units at those regions had high competency contrast between them for which the boudins were formed. The

compressive forces acting between the layers of rocks were from the shearing stress during the mountain building process which results in compression of rocks.

About 3kms from Karnkarayat, Champawat Granite has been recovered. The grains are medium sized consisting of minerals like Biotite, Plagioclase, K- feldspars and quartz. Some traces of muscovite have also been recovered. The site is already under the care of concerned authorities as a geo-heritage site. Various mythological views and fables are also associated with the place which peaks further interest. The area provides perfect combination of history and mesmerizing view of Panchachuli, which makes it a perfect trekking spot.

**3. ABBOTT MOUNT:** It is one of the most picturesque, huge and leveled ground at a height of 6600 ft above the sea level which can be reached though spiral trek of few kilometers. It is one of the most popular destinations for recreational activities along with bird watching and photography of snow-clad Himalayan peaks (eUttaranchal Abbott Mount- a Himalayan Abode). It also serves as a base camp used by anglers for fishing of Mahseer at the confluence of Saryu and Mahakali. The spot represents the geomorphic process of plateau development in the midst of high relief and demonstrates that plateaus are not confined to orogenic domains (Fig.6). This area can be developed as a camping site due to availability of abundant space, water and good soil cover. Star gazing and astrophotography is additional attraction of this site.



Fig..6. Abbott Mount- A huge ground at the top of mount.

**4. RAMGANGA RIVER:** This river (a part of the Ganga system) drains towards south-western Kumaon. Its catchment area in Kumaon is relatively small. The main stream of this river rises from the middle Himalayan slopes on the southeastern flank of the water divide with the Alaknanda river system. It is essentially fed by springs emanating from reservoirs of subsurface waters. Channels from a number of such springs merge to form the main stream of this river. Thereafter it winds its way across the lower Himalayan hills of Almora district. This river has carved a steep V-shaped valley. This signifies a steep rate of rise of Himalayas as the river eroded at a faster rate to keep flowing and thereby developed the deep gorge. Amongst the prominent geomorphic features found in this tract are incised meanders, paired and un-paired terraces, inter-locking spurs, waterfalls, rock benches, cliffs and towering bridges (Fig.7a, b). The spot makes perfect relaxation site for tourists and study site for geologists. At places one can also find well developed camping sites at the banks of river.



Fig.7(a) Rock beddings exposed on the banks of Ramganga (b) A picturesque site for recreation and river channel studies.

**5. PATAL BHUVNESHWAR CAVES:** The 160 m long and 90 feet deep limestone caves are believed to be the abode to thirty-three crores gods and goddess (Figs.8a, b). Legend and folklore have it that this underground cave enshrines Lord Shiva. Forms of legendary Sheshnag, Kal Bhairav and Ganesh can be seen here. (Source: ASI). It is near Gangolihat and in itself is a mesmerizing experience. Patal Bhuvneshwar is marked as a famous religious site of the Hindus.

The way to limestone caves goes through the long and narrow tunnel formed due to action of groundwater. Caves represent solution action of ground water on carbonate rocks. When carbonate- and CO<sub>2</sub>- saturated groundwater enters air-filled caves, carbonate precipitation occurs on a massive scale owing to loss of CO<sub>2</sub>, probably as a result of decreased pressure and evaporation. Dissolution is not the only process as at surface temperatures, the solute-laden water often becomes supersaturated and the dissolved carbonates redeposit to produce fantastic structures. Therefore, caves in carbonate terrains are the sites of extensive carbonate deposits, which are referred to collectively as speleothems (Tewari, 2011). Abundant speleothems can be seen inside the caves in the form of stalactites and stalagmites. Crystal deposits formed on the floors, walls and ceiling of the caves of the caves are speleothems. They are formed by the erosional activity of groundwater on limestone as it dissolves the carbonate matter. Rainwater turns acidic by absorption of carbon dioxide from plants and animals when it seeps through the ground and travels through various discontinuities like fractures and cracks. The paleo-current direction can also be interpreted on the basis of ripple marks present inside the cave which shows the flow direction of the Paleo Rivers

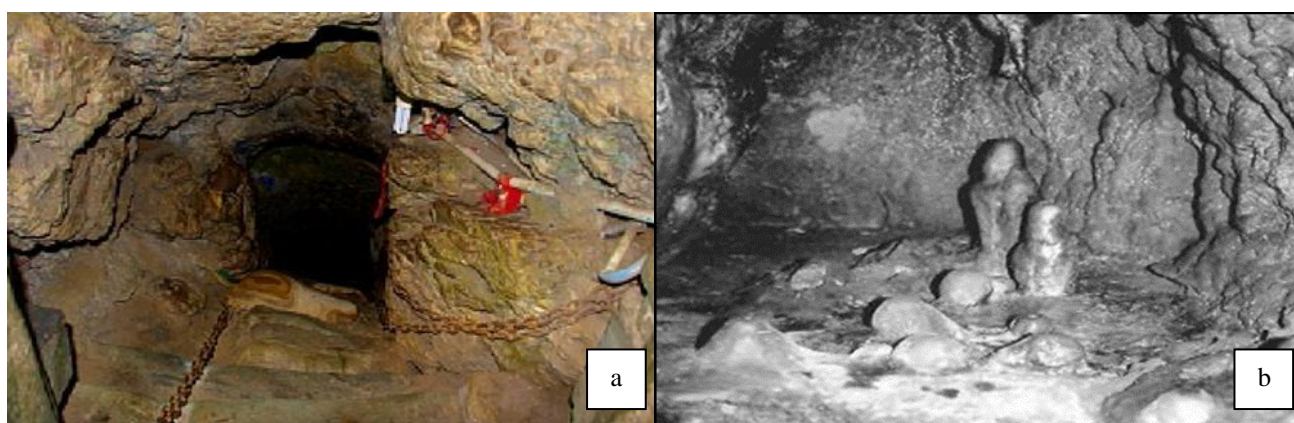


Fig.8 (a). Cave entrance at Patal Bhuvneshwar (b) Idol of a worshipped deity.

Besides its geological peculiarities, the area provides an essence of religious beliefs of the people in the region. It displays the immaculate craftsmanship of Mother Nature. Besides it is an excellent area for the study of cavern deposits.

**6. BIRTHI FALL:** Birthi fall is a Ribbon type horse tail waterfall situated at the elevation of 7218ft above sea level and is situated 14km from Tejam and 31km from Munsiyari on Thal-Munsiyari road. This 126 meters enthralling waterfall is surrounded with dense forests of Deodar, pines and Rhododendron trees and is also very rich in fauna like leopards, Himalayan bear, Barking deer etc.

To experience the exotic view of the Birthi fall (Fig.9a, b) one has to trek approximately about 250 meters of gradually elevating small pathway to reach the base of the waterfall from KMVN guest house or the main road. Birthi fall is one of the best Geo-tourist destinations where a full day can be spent relaxing, meditating and admiring the spectacular and inexplicable sceneries of the majestic Himalayas.

The base of the waterfall has some large to medium size boulders of Biotite Augen Gneiss (High Grade metamorphic rock) and Biotite schist (Medium Grade metamorphic rock) which were exposed due to the eroding action of icy cold water of Birthi fall. It is also a site to show the time dependent erosive action of water over very hard and structurally competent rocks. Both this action and Proterozoic age of the rocks is illustrative of the concept of geological time.

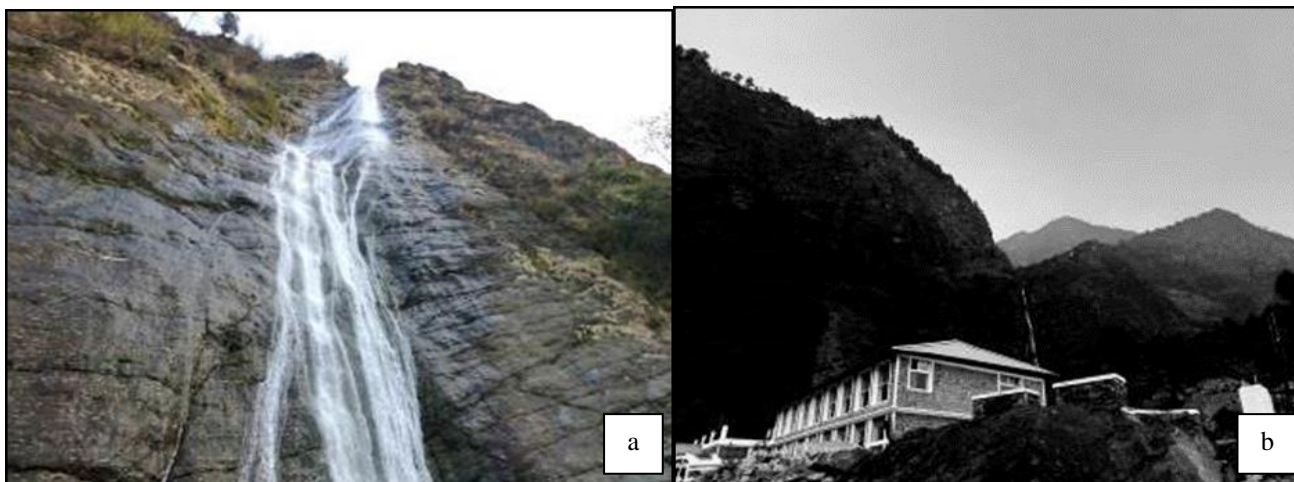


Fig. 9(a) Mystic View of Birthi fall (b) Birthi Fall from KMVN guest house.

**7. CAVE PAINTINGS AT LAKHUDIYAR:** It is a Rock Shelter located on the bank of the Sayal River nearly 3.5km from Bادهchinna and 21km from Jageshwar dham on Almora-Pithoragarh road. This 3.7 meter ordinary Quartzite rock exposure from Almora crystalline of lesser Himalaya (> 1000Myr old) marks some very fascinating and astonishing prehistoric rock paintings from early Palaeolithic era (Fig. 10a).



Fig.10 (a) Lakhudiyar Rock shelter a well known archeological heritage, near Almora.

At Lakhudiyar, there are three types of motifs and panels of Humans, Animals and some geometric figures representing artistic imagination and skills of our homo sapiens ancestors. These engraved pictographs are of human beings, represented in a stick-like form. (Fig.10b,c), wavy lines, rectangular filled geometric designs and a group of dots have also been seen. A long-snouted animal, a fox, a multi-legged lizard are the dominant animal motifs of early paintings with many other animals drawn later by different hands. These motifs appear ritualistic in nature. There are some superimposed figures as well – earliest is Black, and then red and later white indicating sharing of the shelter by different inhabitants. Another interesting group of paintings are of hand-linked dancing human figures and some geometric patterns. It is interesting to note that these drawings and paintings could survive on account of the competent nature of rock which is relatively inert to chemical weathering. (Source: ASI)

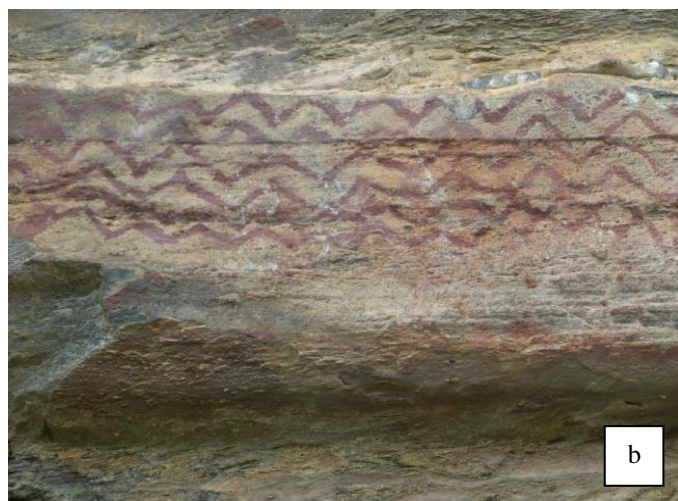


Fig.10 (b) Zigzag/wavy geometric patterns



10(c) Drawing depicting some social ritual.

**8. JAGESHWAR TEMPLE:** This temple, dedicated to Lord Shiva is said to have been constructed during 9th – 10th century A.D. by the Katyuri rulers. The temple consists of 14 subsidiary shrines [Source: ASI] (Fig. 11a, b). The Archeological museum of Jageshwar is another tourist attraction point which houses several ancient and medieval bronze sculptors. Samples of Garnet containing gneissic rocks were found in one of subsidiary shrines. These garnetiferous rocks (Fig.11b) were quite evident of pressure and temperature conditions during the course of its metamorphism. Other minerals like that of Biotite, Muscovite and Quartz are also observable.

This is an outstanding site not only for those who come for religious purposes but also for those interested in history as well as Geology. Besides, the place is also a glowing example of architectural style popular in the hills of north India.

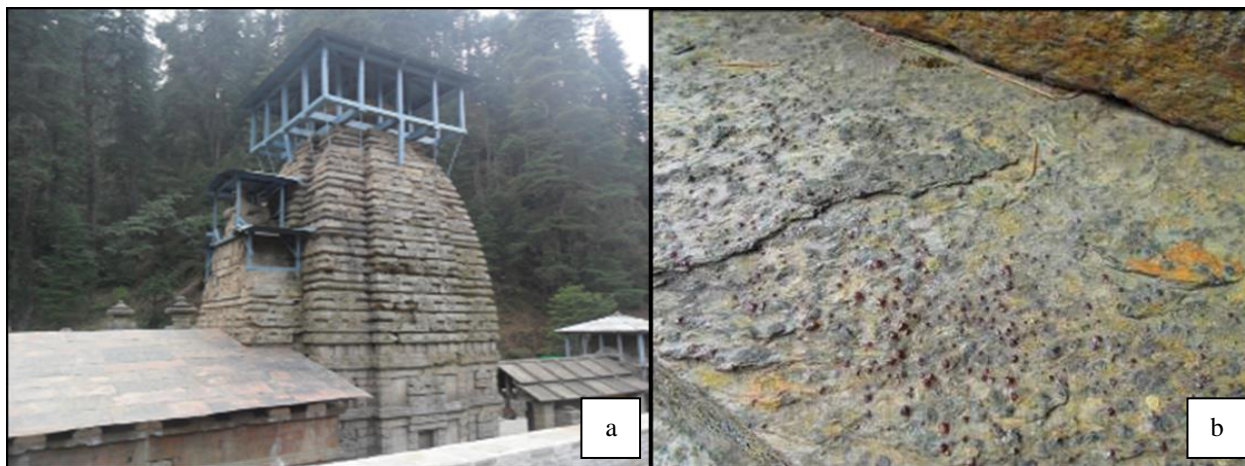


Fig.11 (a) Jageshwar Temple, Almora (b) Exposures of garnet schist on the floor.

**9. DOLOMITE QUARRY:** The region of the dolomite quarry is exposed to the chemical dissolution which resulted in formation of Elephant skin weathering (Fig. 12a, b). This weathering pattern also denotes presence of calc silicate minerals into the rock which were probably formed by the metasomatic processes. Presences of stromatolites in dolomitic-limestone make it an interesting place for geologists. The dolomites had veins of quartz which were probably due to the movement of the fluids within the pore spaces. Bedding was not that prominent for which the attitude of the structures wasn't appropriately taken. The grain size of the rocks was medium sized. About 15km away from it also exists an old magnesite mine (Fig. 12b). Magnesite is mainly used in conjunction with lime in the steel making process. The site carries the potential to showcase various geological phenomenon to the tourist. A visit to an old quarry in itself is a lifetime experience.



Fig.12 (a) Stromatolites and elephant skin weathering in dolomitic limestone exposure (b) An abandoned Magnesite plant, Chandak, Pithoragarh.

**10. FOLDED ROCKS:** The place for pure geological importance explaining the major reasons for the formation of the chevron folds (Fig.13) with variations in the direction of the axial plane were observed. This explains that the region was formed by the polyphase deformative stresses. The direction of limbs was  $150^{\circ}$  NW-SE. The rock type is quartzitic chert and was fine grained. At some spots, the limbs were itself deformed and hence revealed the severity of the force involved in the deformation. It is also a potential geo-excursion site for students.



Fig. 13. Chevron folds, Pithoragarh district.

#### IMPACT OF GEOTOURISM ON EMPLOYMENT AND OTHER ECONOMIC ACTIVITIES

Outmigration in large numbers from the mountain areas to the cities and towns all over the country in search of employment has resulted in drastic decline in agricultural operations. There is an urgent need of alternative employment for the local populace to augment their income and in the long run arrest the process of outmigration. Geotourism development in the region has the potential not only to provide alternative employment to the local community but also propel village tourism. The fact that unorganized tourism practices are harming the ecology in multiple ways like deforestation, waste disposal in improper ways, trail degradation, to name a few is disturbing. In this context, it would not be out of place to mention here that geotourism with its sustainable approach is capable of bringing about long term economic and ecological benefits too. (Fig.14)

Infrastructural needs for promotion of geotourism would require development of geoparks, accommodation, food, transport etc. which would provide employment opportunities to members of the local community. Throughout the developed geo-corridor, there are several places which can be developed and used as camping grounds for a good part of the year (Oct-Dec or Mar-June). The basic and running costs of a camp-ground can be recovered in one season of a good tourist inflow as camping is a popular outdoor activity. Since geo tourism falls under niche tourism category only genuine geotourists would visit who would not hesitate in spending money in return for life time experiences in the

Himalayas. The camping authorities will be responsible for detours around the area and will provide local guides for the nearby geo-spots. This will add to the list of beneficiaries emerging out of this form of tourism.

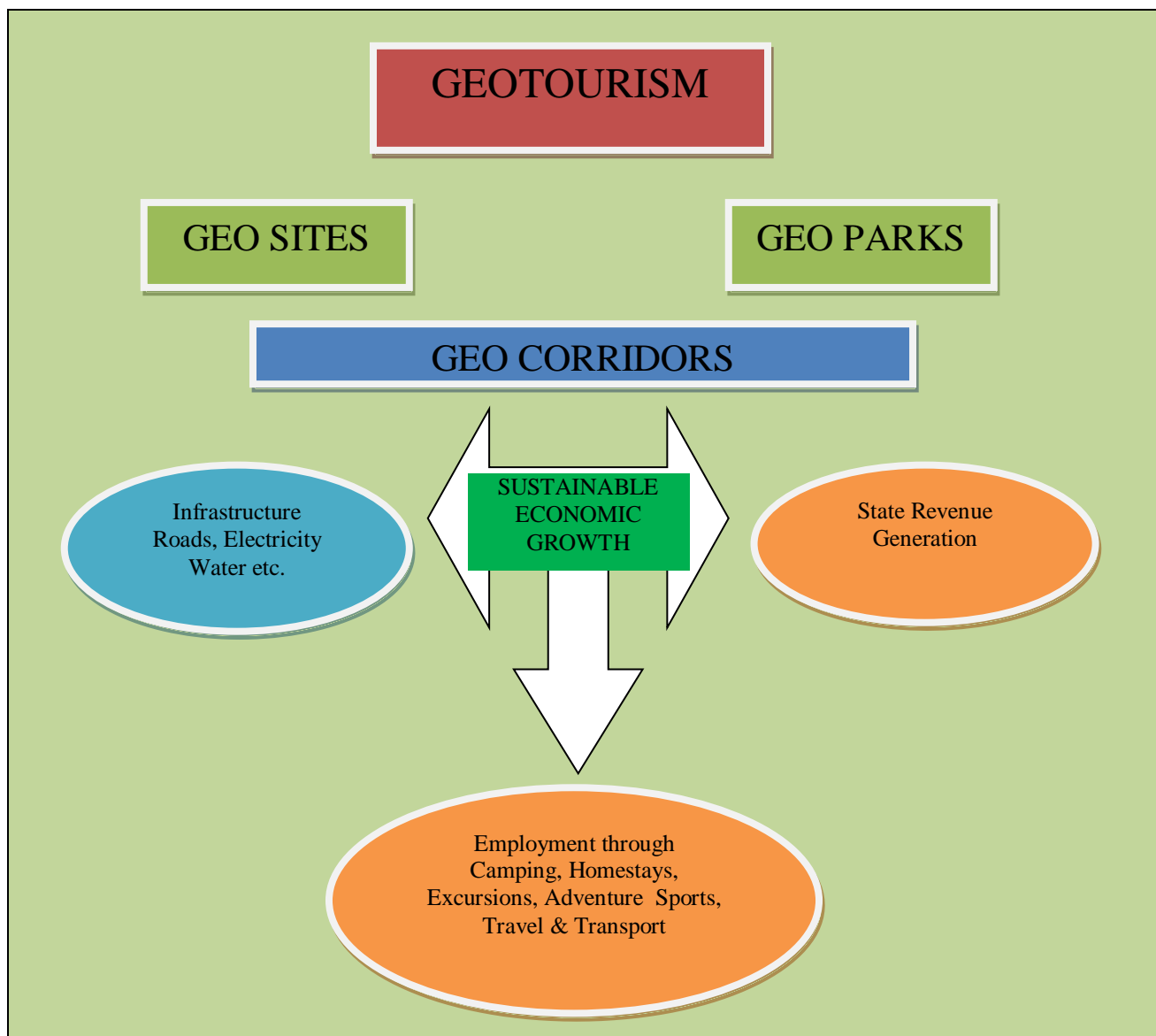


Fig.14. Geotourism model showing it’s impact on economy of the region through various interventions to strengthen the sustainable environmental of Kumaon Himalaya.

Development of home stays near the geosites/geoparks as low cost accommodation would not only add to the income of the villagers but also reduce perils of unorganised tourism in the form of mushrooming of hotels and attendant ecological problems. Skill based training given to the local residents in housekeeping, laundry, food etc. would increase the number of beneficiaries and bring about an overall economic growth for the community. As many geosites hold potential for the development of recreational activities, trainers would be required for organizing sports and recreational activities. Local guides can be trained and in the long run they can conduct their own local excursion tours. Thus jobs will be created and revenue will be collected on a large scale. However, for this to succeed community participation is imperative.

Development of geotourism also has the potential to promote other forms of tourism such as village tourism. The campsites located in the vicinity of villages will also include farm visits to local farmers and cultivators, as an additional activity. This will enable the tourist to delve into the lives of the villagers and provide an insight into the local culture and traditions thus promoting village tourism.

**CONCLUSION**

The incredible terrains of Kumaon region in Uttarakhand show a great potential for the development of Geotourism and its propagation. The geosites identified, offer a platform to understand the workings of nature and all the processes that shape the existing landforms in the region. The area is unique with the mountains, the valleys, river confluences, gorges, caves and many other geological features enchanting the tourists to understand nature in better ways. In addition, this area has a rich history and

architectural traditions. This will boost other forms of tourism (Agro-Tourism, Village tourism etc.). Increased tourism activity will bring about addition in GDP with ample employment opportunities for the local People from diverse fields and sectors and will improve their standard of living. On the other hand knowledge base of the tourists about geological phenomenon, rural landscape, green agriculture and local culture and traditions would increase manifold. In addition a well maintained geosite will become geo-heritage assets to of the state. But to realize the above, there is an urgent need of legislation for protection of our geoheritage sites as well as to make geotourism community oriented and sustainable in the long term.

The government is currently working on developing a Himalayan Policy, which will give boost to more sustainable forms of tourism. Geotourism can act as a model for development of green tourism under special Tourism Development Master Plan initiated by Uttarakhand which focuses on developing tourism infrastructure by 2022 (*Uttarakhand Tourism Development Master Plan 2007 – 2022*, 2008).

Study of Himalayan Geology (beyond the scope of present study) is another significant aspect closely connected with geotourism. Globally, there is an increasing attraction for the study of Himalayas as it is the youngest and active folded mountain belt. The ongoing activity of the Himalayas is manifested in neo-tectonic features which are reflected in drainage reorganization, deformation of younger sediments and even landslides. This has a very high yield geotouristic potential and needs to be technology driven involving advertisement through internet, online booking and financial transactions, tempering local cuisine with the global needs and can be conceived as one of the high end component of Geotourism on the proposed route at a later date.

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