

# Geological, Archaeological and Natural Heritage of Union Territory of Jammu & Kashmir: Its Prospects and Challenges

Raj Kumar

Deputy Director, Geology and Mining Department, Jammu, India

Email: [rajkumargeologist74\[at\]gmail.com](mailto:rajkumargeologist74[at]gmail.com)

**Abstract:** *Jammu and Kashmir Union Territory is brimming with Geological, Archaeological and Natural heritage. Heritage is a treasure we inherited from our ancestors, each and everything they created, assembled or produced. It is right time to explore and identify our heritage and conserve it for future generations. Various Geo - Heritage sites include: Siwaliks which harbor fossils of different animals that lived on the face of earth; Extremely Rare Bentonite Deposits of Purmandal, District Samba; Gold flakes or Placer deposits of Nathal Khad and adjoining area of Chowki Choura, Tehsil Akhnoor; Magnesite Deposits of Panthal area of District Reasi; Coal Mines of Kalakot and adjoining areas; of District Rajouri, Reasi and Udampur, Bone Bed of Siyal Sui, District Rajouri harboring yet another set of Fossils; world famous Sapphire Mines in Paddar area, District Kishtwar and many others. Archeological Heritage sites are the well constructed and exceptionally designed age old Monuments, which include Forts, Palaces, Buildings, Temples, Tombs, Ponds, Dug wells, besides many other structures/creations of our ancestors. The Lakes, Caves Springs, Waterfalls and areas of Scenic Beauty, etc. are included in the Natural Heritage which has a lot of significance for living organism and human beings. All these sites of wonder whether Geological, Archaeological or Natural heritage must be put on the tourist map by the Tourism Department of J&K and other Associated Agencies of Jammu and Kashmir as well as Government of India to make it easily accessible to the tourists and pilgrims from all over the globe. If conservation of these age old treasures will be done well in time by exploration and development, it will definitely create employment opportunities to the unemployed youth and generation of huge revenue to the exchequer of Government of Jammu and Kashmir.*

**Keywords:** Heritage, Exploration, Conservation, Tourism, Archaeology, Geology, Jammu and Kashmir

## 1. Introduction

The term heritage signifies the art and craft of our ancestors inherited by us which was created by them using their skill, intelligence and interests. Our ancestors have constructed most wonderful structures like (Buildings, Palaces, Bridges, Tunnels, Temples, Tomb, Dug Wells, etc.) which are beyond imagination even today despite of the advancement in science at large. Not only ancient structures i. e. Buildings, Roads, Bridges, Temples Mosques, Churches, Tombs and Dug Wells/Ponds are our heritage but even ancient Clothing patterns, Paintings (Art and Craft) and variety of creations are considered as Archaeological Heritage. Anything constructed by our ancestors or created by the nature and preserved by the human beings is called Heritage. Some glaring examples are Amar Mahal, Mubarak Mandi Palace, Bahu Fort, Raghunath Temple, Peer Kho, in Jammu, besides Forts of Akhnoor, Reasi, Chenani in District Udampur, Jasrota and Basholi Forts in District Kathua, Poonch Fort, Shree Mata Vaishno Devi Caves Katra, Shivkhori Caves Ransuh District Reasi, Baba Amarnath Caves, Shankerachyarya Temple and Mohra Power Project in Kashmir and many more. There are some other aspects which too can be called as heritage such as Geological resources/sites. An attempt has been made to focus and throw some light on the wonderful age old sites of heritage of union Territory of Jammu and Kashmir.

It is to mention here that the Gandhi Memorial Science College (GGM Sc. College) Jammu itself is an archaeological heritage and the Museum of Geology Department is one of the best Geological Heritage of

country. Huge collection of Fossils, Minerals/Rocks specimen by eminent and renowned Researchers like D. N. Wadia, C. S. Middlemiss, R. C. Mehndirata, S. K. Chadha, and many others have been displayed which always memorize about such dedicated researchers for their magnificent work. Some old aged Geological Equipments are also displayed in the Museum by the Geology Department seems to be Geo - heritage.

Besides, there are various other Geo - sites having a lot of significance from Geological point of view. The promotion of those sites for the awareness among the people engaged in Geo - scientific studies and to promote Geo - tourism in the UT of J&K should be done on war footing by the Government. A little investment is required for the promotion of the Geo - heritage/Archaeological/ Natural heritage due to which a lot of amusement, recreation and knowledge can be provided to young generation beside can also become a source of Revenue and Employment in UT of Jammu and Kashmir.

The important Geo - sites, Ancient Creations and Natural Wonders which may be taken into consideration for development as Geo - heritage, Archaeological and Natural heritage may be depicted on the **Tourist Map of UT of Jammu and Kashmir.**

### Geo - heritage:

Geo - heritage of a country has a lot of significance in order to explore mineral wealth and establish Mineral based industry besides promotion of tourism. A nation can flourish if it is rich in mineral wealth as well as possess sufficient important Geo - sites. The Geo - heritage may become the

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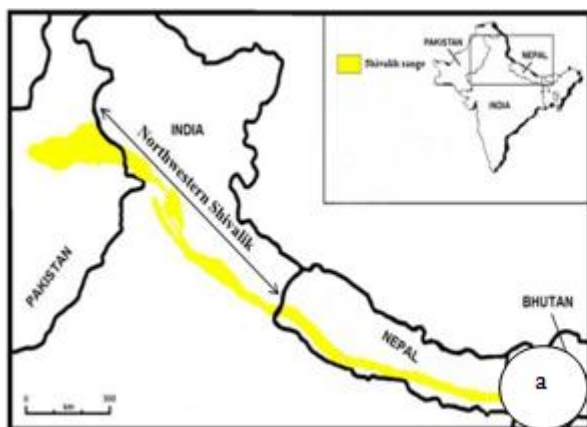
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source of inspiration to the coming generation having thirst to hunt natural resources i. e. Minerals/Rocks of extensive geological characteristics and economic importance. There are various virgin areas which yet have not been covered to explore their potential in respect of mineral existence as well as their conservation. A lot of policies have been made with amendment in Legislation from time to time for the safe guard of the Geological Resources, Geo - sites as well as Geo - heritage. These Geo - sites have key role in economic growth of a country as well as the area concerned. Although the Government of India as well as State/UT Governments are putting their best efforts to conserve the natural/geological resources by amendments in regulations from time to time for the conservation of valuable resources, but still there are numerous challenges, yet to be addressed for protection and conservation of these valuable sites. Various Geo - heritage sites in J&K especially located in Jammu province have been detailed as under:

### 1) Siwalik a House of Mammal fossils:

The Siwaliks stretch from Arunachal Pradesh in the East and up to Pakistan in the West along the Northern boundary of the Indo - Gangetic plains at the foot hills of Himalayas (Fig.1 - a). These have lateral extension more than three thousand kilometers. The best exposures of the Siwaliks are near Haridwar from where their name has been derived.



These are treasures of remarkably varied and abundant vertebrate fauna in which class Mammalia preponderates. The fossils reported from the Siwaliks are of Primates, Carnivores, Elephants, Ungulates, Rodents and even Birds and Reptiles. The ideal sites may be identified by giving task to the students of Geology from reputed institutes/universities of the concerned state/UT as a special assignment during Geological Tour as a part of their practical work in the field. The identified sites shall be developed and conserved for future generation. It will be most significant from Geological point of view for promotion of Geo - tourism in the country as well as in Jammu because the Siwaliks are well exposed adjoining the periphery of Jammu city (Fig.1 - b). There are various areas in Jammu and Kashmir from where fossils have been reported by various researchers. Recently a fossil of a Mammoth was found in village Galander, Tehsil Pampore, in Kashmir. All the important sites in the Union Territory of Jammu and Kashmir which have such type of resources may also be developed besides; some effective steps should be taken up immediately for their conservation. At least two Fossil Parks one each in Jammu and Kashmir Division should be established which would be a positive step for the conservation of Geo - heritage and to boost Tourism as well as Geo - tourism in Jammu and Kashmir.



**Figure 1:** (a) Extension of Siwalik from East - North West (b) Exposures of Siwalik Rocks adjoining Jammu

### 2) Bentonite Deposit of Purmandal, District Samba:

Purmandal area has a lot of significance from religious point of view due to presence of a famous Temple of "Lord Shiva". It is faith of some religious Preachers that the Basanter River flowing in the area has similar significance like the "Holy River Ganga". It is about 20 Kilometers from Jammu and well connected to Jammu as well as Samba District Head Quarters. The Purmandal area is considered as type area for the occurrence of Bentonite deposit and is Depicted in Survey of India Toposheets 43P/2 and 43L/14 (Fig.2 - a. & b) The Geology and Mining Department has carried out exploration of the Bentonite deposits and reported its thickness 0.07 meter wherein bands of red clay having thickness 1.5 meters and white clay with thickness 1.5 to 3.0 meters Sharma (1991). The Bentonite band of such quality has not been reported so far from anywhere in J&K or in India. It is a rare deposit in entire J&K and may

not be auctioned or leased out to any Government as well as private entrepreneurs. If it is not preserved and concrete steps are not taken up well in time, our future generation will read only in books about the Geological characteristics of occurrence of the Purmandal Bentonite deposits. It is a fact, that practically Geo - fraternity will never see this valuable commodity in future. The State Government as well as Geological fraternity is apprised about the Geological importance of this significant and rare deposit. Concerned Authorities are requested to take immediate steps for the conservation of this valuable commodity for entire Geo - scientific community of the Jammu and Kashmir as well as country in particular and local public in general by promoting the area as **Tourists Resort from Geo - heritage** point of view since the area already has significance and religious importance.

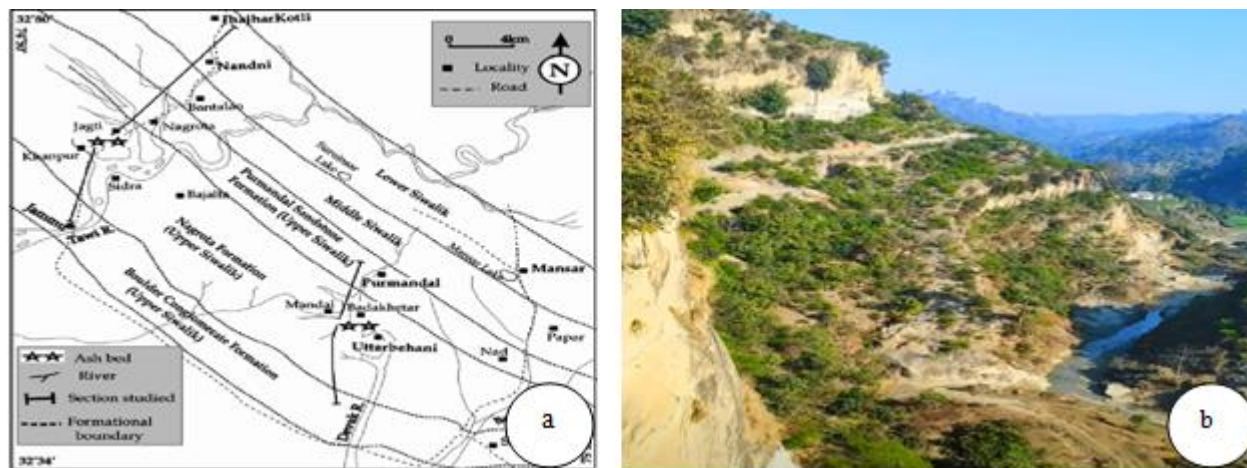


Figure 2: (a) Siwalik Map of Nagrota - Purmandal area (b) Siwalik rocks exposures, Purmandal (Google Pics.)

### 3) Placers Deposit of Nathal area of Akhnoor, District Jammu:

Nathal area of Tehsil Akhnoor District Jammu is about 50 Km from Jammu and easily approachable via Akhnoor - Rajouri - Poonch Road may also be considered as Geo - heritage since **Placer Deposits (Gold Flakes)** in Siwalik sand have been reported by the Geologists from Geology and Mining Department, Jammu as well as some other associated researchers from different organisations. Some locals in the area remain engaged for collection of Gold placers by Sieving and Panning of the sand deposits in the Nathal Khad and adjoining areas (Fig.3 - a & b). There is no need to explain about the significance as well as Geological characteristics of the gold as all of us are already aware

about its scarcity in occurrence and economic importance. It is a fact that in India Kolhar Gold Mines in Karnatka are the only reliable Mines for the production of the Gold. The Nathal area needs extensive exploration by the investigating agencies to determine the real content of the gold in the Siwalik sand. This would definitely be helpful to the Geo - scientists engaged in exploration of Gold at Nathal as well as base metal studies of economic importance in said area. If the results are found encouraging, this would definitely be a boost to the entire Geo - scientific community of Jammu and Kashmir. On conclusion of the exploration in said area, some part of it possessing the gold flakes may be preserved as Geo - heritage site by putting on the Tourists Map of the Jammu and Kashmir.



Figure 3: (a) Natrhal Khad, Chowki Choura, Akhnoor (b) Miner doing Sieving & Panning to collect gold flakes

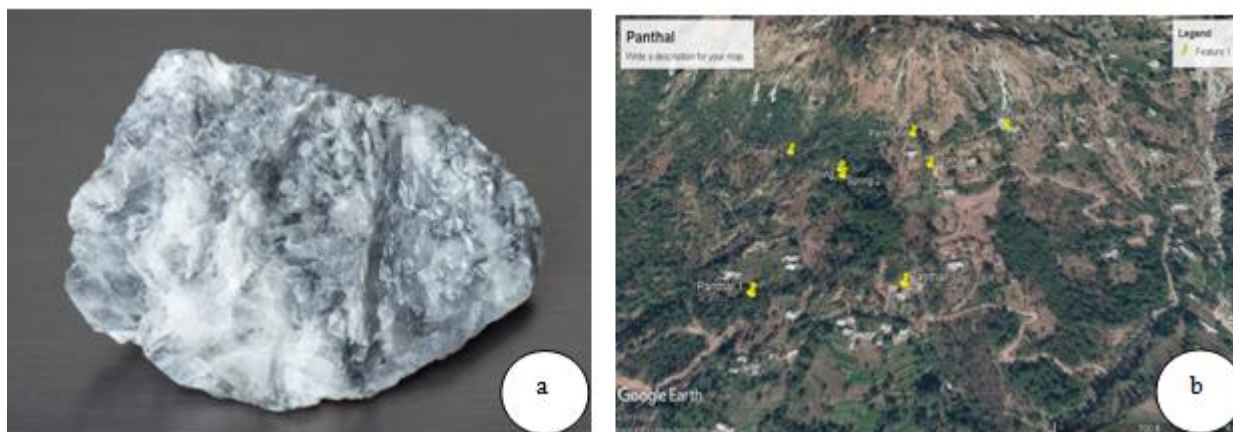
### 4) Panthal Magnesite

Magnesite is an important mineral since it has very limited occurrence in J&K as well as in India. It occurs at village Chapperiyan in and around Panthal area of District Reasi (Fig.4 - a & b) which is depicted in Survey of India toposheets 43L/13 and 43K/16. It is just 03 to 04 Kilometers away from the Holy Town Katra, a hub of tourists for "Mata Vaishnoo Devi Caves" where around 2.5 to 3.0 lacs tourists visit in a month. Although it has a variety of uses from economic point of view but at least a part of this valuable commodity should be conserved and may be developed for the attraction of the tourists visiting Mata Vaishnoo Devi Caves. It is to mention that an area of 1.408 Sq. Km bounded by Latitude N 32°59'16" to 32°59'51" and Longitude E 74°58'53" to 724°59'30" of the said deposit was

leased out to M/S. National Mineral Development Corporation in joint venture with JK NMDC. The operation of the said mines is standstill due to some reasons for the safe guard of the Shrine Board despite of establishment of mines and deployment of machinery for extraction of this valuable commodity Kumar (2012). It is to mention that there are a number of small caves in the Sirban/Trikuta/Vaishnoo Devi limestone in the adjoining areas Kumar (2020). Efforts should be made to locate all those caves and put them on the tourist map of Jammu and Kashmir. The caves area should be handed over to Mata Vaishnoo Devi Shrine Board for development on the similar pattern to lure more and more tourists. While doing this the far flung areas can also be benefitted not only from development point of view but also from generation of

employment for the needy and unemployed youth for their livelihood. For the development of such caves/areas no huge investment is required since these caves are located

adjoining such a Holy Town which is already developed and remains centre of attraction of devotees to the Holy Shrine of "Mata Vaishnoo Devi".



**Figure 4:** (a) A specimen sample of Panthal Magnesite (b) Panoramic view of Panthal area (Google Images)

##### 5) Coal Mines of Kalakot and adjoining areas of Rajouri, Reasi & Udhampur Districts:

The occurrence of natural coal in Jammu region has been reported at Kalakot, Metka, Badough, Dali, Mahogla area of District Rajouri, Beryal, Kotla, Chakkar and Magal area of District Reasi, depicted in Survey of India Toposheet Nos.43K/8, 43K/12 and 43K/16 besides Jangalgalli, Sukhwalgalli and adjoining areas of the Districts Udhampur and Sawlakot area of District Ramban by various researchers not only from State Geology and Mining Department and Geological Survey of India but also by researchers from various colleges, universities and reputed Institutes of India and all over the globe like Medlicott (1876) followed by La Touche (1888), Wadia (1928), Middlemiss (1929), Karuna Karan and Ranga Rao (1976), Arora (1984, 1991) Singh and Singh (1995), Sharma and Sharma (1997), Dutt et al (1998), Kumar et al (2017, 2018 and 2018). A lot of work has been done by the investigating Department to explore this valuable fuel mineral resource. On the basis of the presence of the coal deposit in the area a Thermal Power Plant was established in kalakot District Rajouri to meet up the

demand of the electricity by utilization of the coal. Later the power plant was put on hold since the coal was supplied to other industrial units in Jammu as well as other parts of Jammu and Kashmir to promote industries. Although its reserves are limited but quality wise it is semi - anthracitic in nature. A number of coal mines have been developed by the M/S. JK Minerals Ltd. being only single Department who has been engaged since more than five decades for the exploitation of the deposit (Fig.5 - a & b). It is to mention that the said deposit is non renewable so that at least any one of the coal bearing area or coal mine be kept reserved for future generation as Geo - heritage site. It would not only become benchmark but inspiration to the future generation for practical knowledge. The site can also be promoted as Geo - heritage for attraction of tourists and pilgrims who visit world famous Caves of "Mata Vaishnoo Devi" at Katra and nearby Baba Shivkhori Caves of "Lord Shiva" located in the lofty ranges of Sirban/Trikuta Limestone adjoining Ransuh, District Reasi and Geo - scientific fraternity from the country as well as abroad.



**Figure 5:** (a) Coal Mines at Western Mahogla (b) Miners working in Coal Mines at Eastern Mahogla

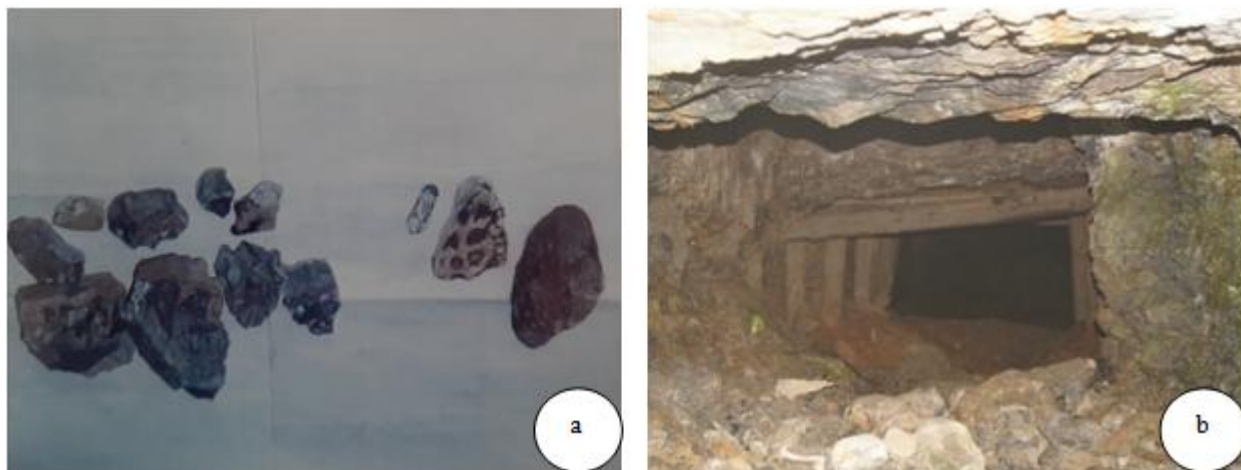
##### 6) Bone Bed of Siyal Sui, District Rajouri:

Siyal Sui area has been depicted in Survey of India Toposheet No. K/8 and is located about 200 km away from

Jammu via Kalakot District Rajouri and easily approachable by all weather road from Jammu as well as Rajouri. The area is famous from Geological point of view since the Fossils of

the Fishes, Crocodiles, besides various Mammals have been reported by various researchers (Fig.6 - a). The Paglot and Jigini villages are also located adjoining Siyal Sui village where such fossils have also been reported. The rock band from which fossils are found is also called as Bone Bed comprised of alternate band of purple shale and sandstone of Murree Group of rocks of Early Miocene to Middle Eocene age. The site has a lot of significance for the Paleontologists conducting research on various aspects of life existing in past and its comparison with present life to determine the similarities as well as their living environment and

adaptation which would be quite helpful to determine the palaeoclimatic conditions of the area. It should be brought on the Tourist Map of Jammu and Kashmir for the awareness of common masses as well as Geo - scientists. The area can also be developed by way of establishment of Fossil Park and preserved for future generations by promoting it as Geo - tourist Resort. It may be developed as Geo - heritage site as it is an ideal place having Geological importance, scenic beauty as well as easy approach and located nearby the Coal Mines of Kalakot and adjoining area (Fig.6 - b).



**Figure 6:** (a) Fossils found in Siyal Sui Bone Bed. (b). Coal Mine adjoining Kalakot area, Rajouri

### 7) Sapphire Mine Padder

The world famous sapphire occurs in Sumcham Area of Padder, District Kishtwar at an altitude of about 4000 meters a m s l. It has blue colour and found in the Actinolite/Tremolite rocks of Metamorphic origin. It is located more than 50 kilometers away from Gulabgarh (Atholi) and approachable on foot along the Bhutna River a tributary of mighty river Chenab. It has sporadic occurrence and found occasional crystals in the Pegmatite veins. It is worthwhile to mention that various Geologists of the Department of Geology and Mining Department, Government of Jammu and Kashmir have carried out extensive exploration since its inception in 1960 on ward from time to time like Hussain (1962), Ahmed and Koul (1969), Koul (1977), Mir (1998), Raj and Rana (2008), Jamwal et el (2011), besides renowned Geologists from Geological Survey of India like Raina (1962), Parimoo and Raina (1967), Singh and Singh (1981), Singh and Sharma (1986). Although the area has hostile climatic conditions and working in such area remains limited for a period of three to four months especially from June to September in a year despite extensive work was conducted by the investigating departments. It is to mention that the area has been leased out to M/S. Jammu and Kashmir Minerals Ltd. who is the

sole agency for exploitation of the said precious commodity for the Government of Jammu and Kashmir, UT (Fig.7 - a).

It is to mention that a lot of Valleys, Meadows, Thick Forests of Deodars, Waterfalls, and Snow Claded Mountain ranges come across the way to the said site of Sapphire Mine area. Besides, there is a Temple of "Mata Chandi Devi" located at Machel remains an attraction of thousands of Devotees especially in the month of July - August each year. If the site is developed by construction of a road as well as air connectivity the tourists may visit throughout the year to the holy shrine of "Mata Chandi Devi". There are famous passes i. e. Umansi Laa Pass through which the tracking route may also be established as so many trekkers are adopting the route to visit the Padam and the Leh area of Laddakh, a world famous cold Desert. The Tourism Department may also construct huts along the approach road/route to the Holy Shrine of Mata Chandi Devi as well as in Bhuzas Valley adjoining Sumcham area (Fig.7 - b) to lure more and more tourists by way of which lot of employment avenues can be created for the unemployed youth of the backward areas besides generation of huge revenue to the Government exchequer.



**Figure 7:** (a) Miners segregating Sapphire Crystals (b) Vill. Sumcham near Sapphire Mines (Google Images)

### Archaeological Heritage

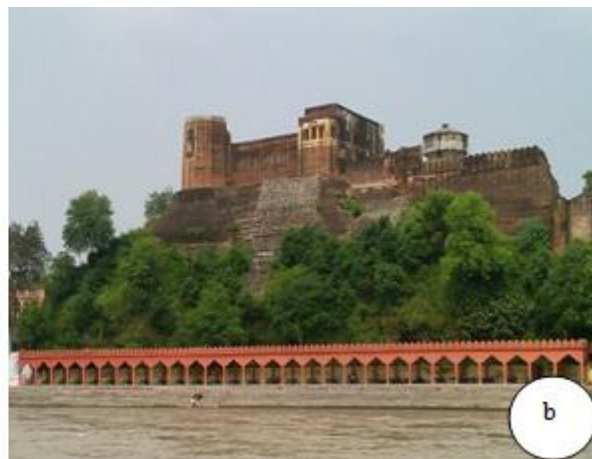
The architecture of India is famous not only in India but all over the world whether it is Buildings i. e. Palace, Forts, Bridges, Dams, Tunnels, or Art and Craft, etc. Some of the Buildings are designed in such a way that it is almost impossible to understand the technical knowhow employed for their construction without advent of science and technology at that time. Some old buildings have arches without support of iron/steel and have had prolonged life when compared to buildings/bridges made today even by consumption of sufficient quantity of stainless steel/iron bars. Attempt has been made to discuss about some wonderful architecture of older times constructed by our ancestors and declared as Archaeological Heritage at present.

#### 1) The Forts

The architecture of India is one of the best over the globe. The Palaces and Forts of India have remained centre of attraction for developed as well as developing countries. There are a numbers of Forts/Palaces in Jammu Province whether it is Amar Palace, Mubarak Mandi Palace, Bahu Fort, Jasrota Fort, Poonch Fort, Chings Fort, Akhnoor Fort, Ramnagar Fort, Chenani Fort, Reasi Fort, Basholi Fort, Hiranagar Fort, and many more are our archaeological heritage. All the Palaces/Forts were built by the Rulers of the time with a mega investment. A number of workers have spent their whole life for the construction of these Palace and Forts. Some of the structures were constructed on such difficult unimaginable locations in ancient times which are still difficult to construct even today, despite the use of advanced machinery and techniques. At present a few of them are in good condition whereas majority of them are still waiting for an intervention by the Government for their renovation to return their glory again (Fig.8 - a). The maximum number of these Palace and Forts were constructed along the bank of rivers or ideal sites which indicate the vision of the rulers of that time (Fig.8 - b). It is appreciated that the J&K Government has taken up the renovation of the Mubarak Mandi Palace in Jammu. Similar attention is also required for the renovation of all other Palaces and Forts on the same lines for the revival of glory of Jammu and Kashmir. It will be a big opportunity to young Engineers of J&K to have practical knowledge of the

wonderful construction made by our ancestors in earlier times if renovation is taken up on the direction of Government of J&K. The architecture and technology used for the construction is beyond imagination. Renovation of such structures will be helpful not only to attract the tourists, but will also generate employment and revenue to the exchequer of the Government.

A number of temples were constructed earlier either by the Rulers of the time or by different communities. Some examples of such religious Temples/Structures are Pandav Temples of Krimichy, Udampur; Apshambo Temple at Bilawar, District Kathua. It is believed that both the temples were constructed by Pandavas in their exile period. Such sites should be given special attention keeping in consideration belief and faith of concerned community as well as villagers residing in the areas. A number of people may be attracted towards them due to their religious and cultural significance. There are so many Temples as well as Shrines which are yet to be connected with common masses. Such temples are Kali Mata Temple, Jasrota, Mah Nal Caves of Lord Shiva at Forelain, Tehsil Kathua, Bala Sundri Mata Temple, Tehsil Billawer, Jodiyan Mata Temple at Jodiyan, Banjal, Dhoulayan Mata Temple near Dullangal, Tehsil Bani District Kathua besides, Sarthal Mata Temple in adjoining areas. The other such Temples/Shrines are Buda Amarnath Temples, District Poonch, Chandi Mata Temple, Machail and Mindel Mata Temple, Padder District Kishtwar, Shadra Shariff, Thanamandi, District Rajouri, Pir ki Galli in district Poonch besides so many other religious places which are governed by the Pujarries/Priests. The major part of the donation contributed by the public/devotees is being taken by the Priests/Pujarries and only a meager part of the donation offered by the devotees is being used in the development of the Temple/Shrine area as well as for the public residing in the adjoining areas. If all these Temples/Shrines are governed by a Board to be constituted by the Government on the pattern of Shree Mata Vaishno Devi Shrine Board it will not only promote tourism in the area but definitely generate employment avenues for the unemployed residing in the area beside significant contribution to the exchequer of Government of Jammu and Kashmir.



**Figure 8:** (a) Fort at Jasrota, Distt Kathua (b) Akhnoor Fort, Distt Jammu (Google images)

## 2) Government Gandhi Memorial Science College, Jammu:

The Government Gandhi Memorial Science College, Jammu (GGM Sc. College) is situated between the Old University Road, Company Bagh and Jewel Chowk in the Jammu city. It is the oldest college of Jammu, the erstwhile Prince of Wales college and now known as Government Gandhi Memorial (GGM) Science College which has produced many genius alumni including former Chief Minister of J&K Sh. Gulam Nabi Azad, former Deputy Chief Minister of J&K, Late Pt. Mangat Ram Sharma, former Army Chief Gen (Retd) N C Vij, Former chief Justice of India, A S Anand, Santoor Vada Late Pt. Shiv Kumar Sharma, former Chief Secretary of J&K, Sh. S S Baloeria and many others personalities of national as well as international name and fame.

It is imperative to mention that the GGM Sc. College Jammu is a fusion of antiquity and dates back to 1905 AD. The then Maharaja of the J&K State Sh. Pratap Singh who ruled the J&K state from 1885 AD to 1925 AD, announced the opening of this college as Prince of Wales college. This was to commemorate the visit of Prince of Wales, the future King George V to the state. It was believed that Maharaja Pratap Singh was a compassionate ruler and a great visionary of his times who constructed the only institution of higher education learning in the entire Jammu region.

Prince of Wales College actually started its functioning from April 20, 1907 in the then Ajaibghar Building now used as Assembly Hall of J&K Legislative Assembly in Jammu. In the beginning, 26 students were on roll in its first year under the administrative control of Prof. R N Mukherji, officiated as principal. Prof F M Dadina took over as the first formal principal of this college and its foundation stone was laid in

July 1907 over an area of about 65 acres. On September 18, 1912 the college was shifted to the present campus with Prof S. Robson as the principal. It is astonishing to imagine that the founders of the college were undoubtedly men of great wisdom and vision, which is evident by the infrastructure planned more than hundred years ago, is sufficient to meet the ever - increasing needs of the institution even today despite of intake of students increased many fold.

In May 1908 the Prince of Wales College was affiliated to the then Punjab University, Lahore where English, Mathematics, Chemistry, History, Persian, Sanskrit and Philosophy were taught up to intermediate level. Two more subjects, Geology and Arabic were introduced in January 1910. From 1931 onwards the college admitted both male and females students until 1944 when a separate Maharani Mahila College was established in the present Luthra Academy at Kachi Chawni, Jammu where the medical stream female students continued on its rolls until 1966. However, with the dawn of independence, Prince of Wales College could not escape the spirit of freedom and excitement across the country and was renamed as Government Gandhi Memorial Science College on May 20, 1948 (Fig.9 - a).

The Geology Department is one of the best in the country having inadequate space despite well established laboratories (Fig, 9 - b). The Museum of Geology Department of GGM Science College Jammu may be established in a separate building and the specimen of Minerals/Rocks and the available Geological Equipments may be displayed in proper order which may become a source of attraction to the tourists and inspiration to the young generation who have already opted or are interested to choose Geo - science as their career.



**Figure 9:** (a) GGM Sc. College, (Pic. Daily Excelsior) (b) Geology Deptt. GGM Sc. College (Google images)

### 3) Mohra Power Project

Mohra Power Project was built about 117 years ago by the Dogra Ruler, Sh. Pratap Singh, in the undivided Jammu and Kashmir. The Mohra Hydroelectric Project is located in North Kashmir's Baramulla District near the Line of Control (LOC) is set to be showcased as a master piece of architecture of the 20<sup>th</sup> Century. Mohra Power Project made Srinagar the second city in the Indian Sub - continent to be electrified during that era. The Project, a runoff river scheme was constructed in 1905 over River Jehlum at Boniyar, 35 kilometers downstream of Baramulla, with an installed capacity of 4 MW, later its capacity was enhanced to 9 MW (Fig.10 - a). It was constructed against the most challenging topography of the area by constructing an 11 Kilometers long wooden flume (artificial channel) to carry water to run the turbines to generate electricity (Fig.10 - b).

It is proud moment to know that on the direction of Hon'ble Lieutenant Governor of Jammu and Kashmir Sh. Manoj Sinha, the Administration has started taking steps towards the revival of such a prestigious Hydroelectric Project constructed by the then Ruler of Jammu and Kashmir Sh. Paratap Singh. It is well understood that Jammu and Kashmir has great potential of production of hydroelectricity and so many Hydro - electric Projects are already functional or under construction. A day will not be far off when J&K will be surplus in Electricity and even earn a huge Revenue by supplying Power (Electricity) to nearby states, but it is obligatory that we should not ignore or forget such a wonderful gift of our ancestors rather call it as archeological heritage which will always remind us the era of advent of light in J&K.



**Figure 10:** (a) Mohra Hydel Project Distt. Baramulla (b) Wooden Flume, an Artificial Channel (Google images)

### 4) Ponds and Dug wells

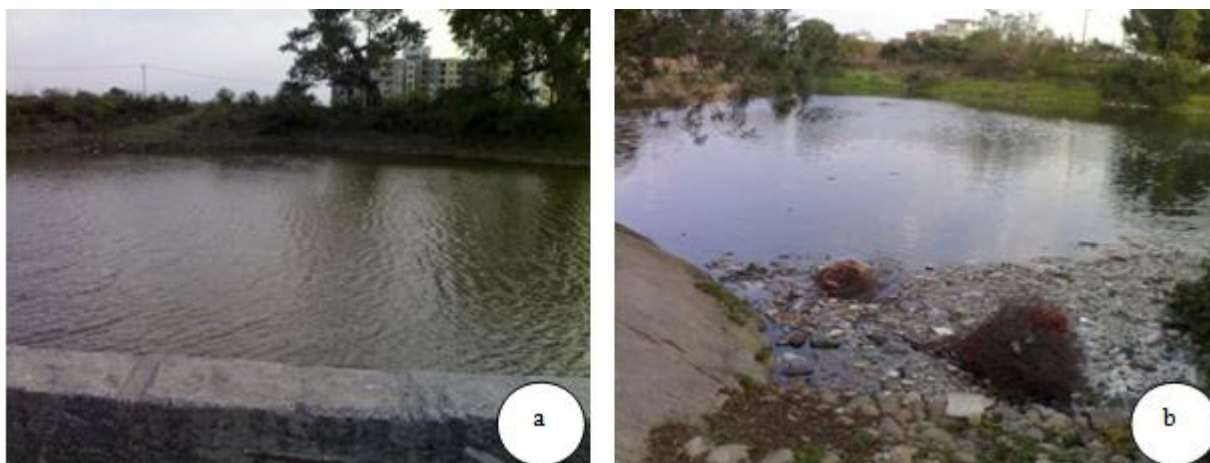
The ponds and the dug wells are also our archaeological heritage. Once upon a time the ponds and dug wells were the source of drinking water to the inhabitants of J&K especially entire Kandi belt, which were constructed to meet up the water requirements both for drinking as well domestic purposes (Fig.11 - a). All were governed by the village committees responsible for the maintenance of the ponds and the dug wells. The village committee put their efforts to clean the ponds and dug wells especially before the onset of the summer monsoon. The people of the villages used to sit under the shades of the trees planted along the bank of the

ponds and the dug wells. The pond/dug well sites were used as source of recreation by the villagers. But it cannot be ruled out that the condition of the some of the ponds and dug wells in entire Jammu region is dilapidated beyond imagination (Fig.11 - b). Some of them are totally defunct due to improper management, encroachment of the catchment area and diversion of the recharging nalas/sources. With the passage of time all these resources are depleting at alarming rate. The sites have been encroached, over which private buildings and multi - storied shopping complexes have been built. The left over ponds and dug wells are in shabby conditions. It is a fact that the



sewerage, garbage and city waste is being thrown to the ponds/dug wells Kumar (2014). All of us are aware that water, a valuable commodity rather can be called as **Mineral** is depleting day by day and it is predicted that the reason of next world war will be water. We all are well aware of what is happening between Karnataka and Tamil Nadu, Punjab and Haryana and J&K and Punjab. All these states/UTs have dispute over the distribution of water. Revival of the ponds/dug wells will definitely contribute to meet up the requirement of the public living in the vicinity of ponds and dug wells especially in Kandi areas. It is imperative to constitute village committees to educate the common masses of their surroundings to aware them about the significance of

our ancestral heritage which we are destroying due to our own greed and misdeeds. These can be saved from downsizing/shrinking by organizing special awareness programs by the controlling authorities. It is appreciated that Government of India has launched a Program “**Mission Amrit Sarovar**” wherein it has aimed to develop and rejuvenate 75 water bodies in each District of the country as part of the celebration of “**Azadi Ka Amrit Mahotsav**”. The Government has taken welcoming step and all of us should contribute for the protection of the water bodies from being destroyed or polluted. The government should appoint at least one person from the same vicinity to look after for the safe guard of renovated ponds and other water bodies.



**Figure 11:** (a) A Pond at Chowadi, District Samba (b) View of a Pond at Deellee, District Jammu

### Natural Heritage:

Nature has played magnificent role in the origin of earth by blessing it with different source of attraction. We see all around us the Oceans, Rivers, Mountains, Lakes, beautiful Meadows, Waterfalls, Springs whether Hot Water Spring or Cold water Spring and mighty Glaciers over the Mountains. Each creation has its own contribution and importance. Their role cannot be ignored since they contribute for the survival of living beings in many ways. The Forest Mountain which provides a source of food to various living beings along with a habitat to dwell. They are also a source of commercial products like wood. The lofty mountain remains clad with snow/ice and are the source of water throughout the year. An attempt has been made to describe about some natural heritages which has significant role for the recreation and survival of living beings.

### 1) Lakes:

The lakes are the natural heritage gifted by “Almighty” for the living beings. They are not only a source of recreation of the mankind but also home to numerous aquatic lives. It is to mention that the lakes of Nainital, in the Kumaon region, Uttarakhand are world famous. There are so many lakes in Jammu and Kashmir like Mansar and Surinsar lakes in Jammu region, Dal and Wullar lakes in Kashmir region and Pangang and Psomarari in Ladakh region. These lakes attract so many tourists not only from our country but even from abroad. But the irony is that these lakes are downsizing day by day at an alarming rate due to deposition of clay/silt from the surrounding besides addition of the garbage and sewerage into them (Fig.12 - a & b). It is to mention that the

areas in the periphery of most of the lakes have been encroached either by the inhabitants or taken in possession by the Government in the name of development of the site. Check dams should be constructed in the recharge nala at the catchment of the lakes to avoid input of clay/silt to prevent them from downsizing/shrinking. Stringent laws should be made to avoid encroachment of the land adjoining these lakes. It has been observed that the city waste as well sewerage is being added to them on large scale. Proper drainage system has to be planned to divert the city waste to prevent polluting these lakes which in turn will play a significant role in protection of the aquatic life. By the diversion of drains of city waste the water of these lakes can be easily used for drinking purposes to meet up the requirement of drinking water of the locals residing in the vicinity. They are not only the source of scenic beauty but are also the source of fresh drinking water for the people living around them. They are a treasure which provides shelter to the aquatic life some of which are on the verge of extinction. The addition of garbage and waste in them is a serious concern and needs immediate enforcement of laws for the violators. Although these lakes have been depicted on the tourist map of Jammu and Kashmir but until unless some effective measures are taken, it is impossible to protect them from pollution and shrinking. These lakes are the livelihood of so many unemployed youth of the areas who earn their livelihood by providing Shikara services and Boating to the visitors and tourists. With the protection of such sites the livelihood of so many people can be protected by Government of Jammu and Kashmir.

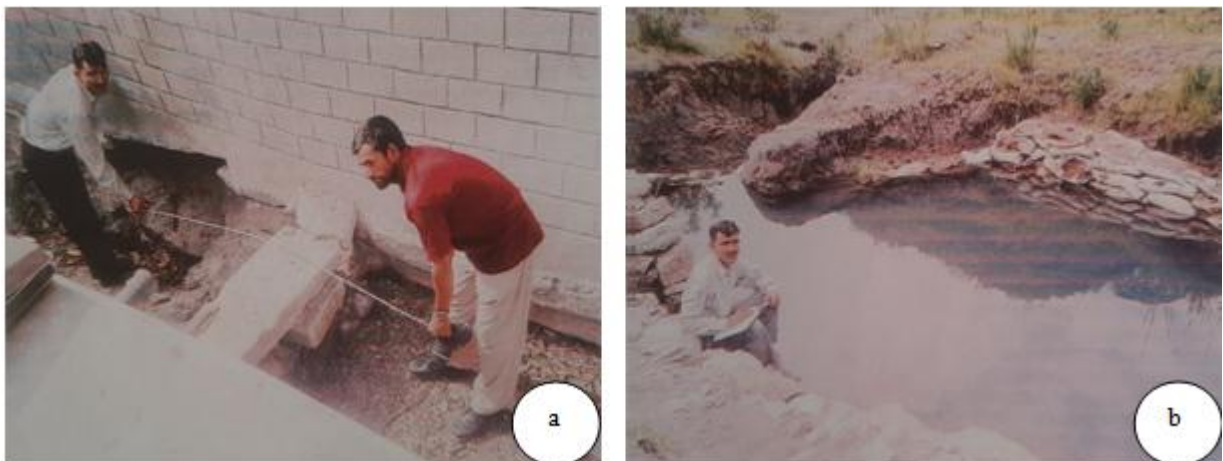


**Figure 12:** (a) Panoramic view of Mansar Lake, Samba (b) Catchment view of Surinsar Lake (Google images)

## 2) Hot water Springs:

The hot water as well as cold water springs are the important natural heritage of Jammu and Kashmir, India and world. The hot water springs of New Zealand are famous world over and are the source of attraction of tourists from all over the globe. In India there are various famous hot water springs like Gouri Kund enroute Kedarnath Temple, Uttarakhand, Manikaran in Himachal and Tatapani in Jammu and Kashmir. There are so many cold water as well as hot water springs in J&K. The famous among them are the Chasmashai, Verinag, Kokernag cold water Spring in Kashmir region and various cold and hot water springs in Jammu region. The water of cold water spring is being used by the locals for drinking purposes. The Hot Water Spring of Tatapani Tehsil Kalakot, District Rajouri, Kumar and Rana (2007) and Tatapani Spring at Atholi area of Padder, District, Kishtwar and so many hot water springs in Pooga valley of Laddakh region are most important. These springs are the natural heritage of Union Territories of Jammu and Kashmir and Ladakh. They are not only the source for visitors from tourist point of view but also provide relief to the people suffering from chronic disease like arthritis and

cure skin allergies. It is bitter to digest that there is no proper development in the areas adjoining the hot water springs. It is to mention that that the main Hot water Spring at Tatapani, Tehsil Kalakot became dry after the occurrence of 8<sup>th</sup> October 2005 Earthquake and the water gushed out at lower altitude at a distance of about 01 Kilometer (Fig.13 - a & b). The areas adjoining the hot water springs may be developed by constructing roads for safe and smooth approach. Department of Tourism may construct huts to provide comfortable stay to the visitor who are suffering from arthritis/skin disease. The hot water springs have a potential to generate geothermal energy, provided, it has to be channelized in proper way with the advent of new techniques and methodology. The potential of the springs at Pooga Valley in Laddakh region may be channelized for the generation of Geo - thermal energy which would be a splendid gift to the locals residing in the vicinity by illuminating their houses by providing electricity. Effective outcome will definitely be seen if sincere efforts are made, to up keeping the interest of not only thousands of tourists but arthritis and skin disease patients too by conservation of this valuable natural heritage splendid by Almighty.



**Figure 13:** (a) Dried Hot Water Spring at Tatapani (b) Oozed out Hot Water Spring at Tatapani

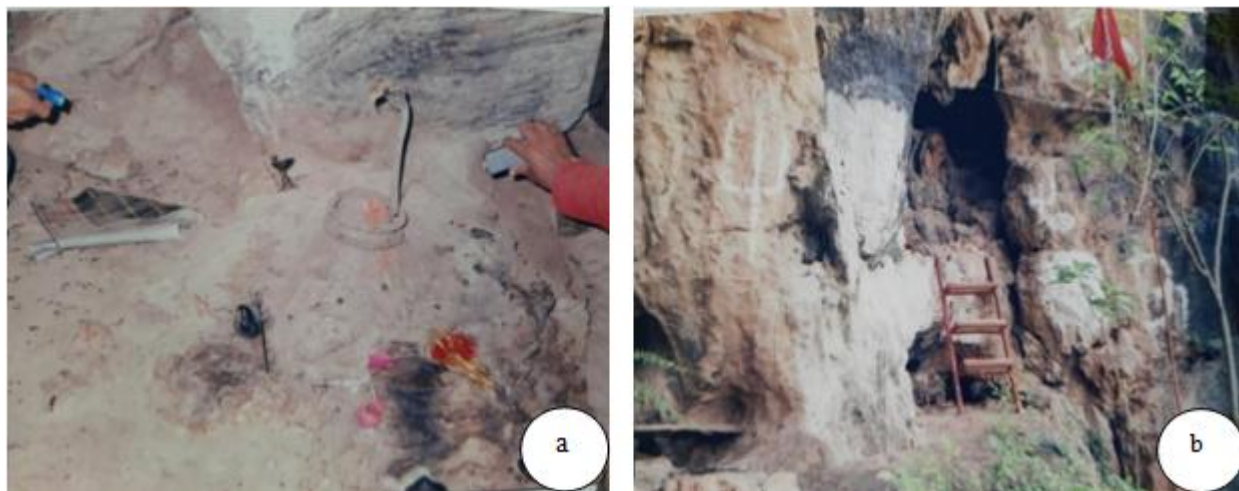
## 3) Caves

The caves have their own significance in an area and provide shelter to so many birds and wild animals. In earlier times the caves were used to hide the arms and ammunition by the rulers. The caves occur in variety of rocks but most of them occur in the Limestone or Dolomitic Limestone. Although there are some caves in sandstone rocks but the number is

less than the caves occurring in the rocks comprised of Calcium Carbonate. There are so many caves in Jammu and Kashmir. The famous and world known caves in Jammu are Shri Mata Vaishno Devi Cave at Katra, and Shiv Khouri Cave at Ransuh District Reasi whereas most important cave from religious point of view is 'Shri Amarnath Cave' in District Anantnag, Kashmir. Baba Amarnath cave remains

open for devotees for a short period due to harsh climatic conditions. It may be considered as natural as well as Geo - heritage of the Jammu and Kashmir. It is expected that more than three fourth of the total tourists of J&K are being fascinated and attracted only due to “Shri Mata Vaishno Devi”, “Shiv Khori” and “Baba Amarnath” caves alone. The caves are also helpful to Geoscientists/researchers to determine the palaeoclimatic conditions of the area. There are a number of caves in Great Limestone in and adjoining Katra area. Some caves have also been reported in Kotla, Khuen, Kalakot and adjoining areas (Fig.14 - a & b) of District Rajouri, Kumar (2020). It is vital to discover them and put on tourist map of J&K to connect them so that a

tourist zone may be developed to promote and boost tourism. If all the caves which have religious sanctity and scenic beauty are brought on the tourism map of the J&K, it will not only attract the tourists from the country, but even from abroad too. A number of such caves are present not only in Reasi and Rajouri Districts, but in other Districts of Jammu and Kashmir too. The development of such caves and creation of tourist zones will become source of inspiration to the Geo - scientific community and hub of the tourists, besides a source of employment to number of unemployed youth and generation of revenue for J&K Government.



**Figure 14:** (a) View of Cave near Kalakot Distt Rajouri (b) New Cave in Dolomite at vill. Kalakot, Distt Rajouri

#### 4) Scenic Beauty and Waterfalls:

There are a lot of areas of scenic beauty especially the Ridge Tops, Meadows, Deep Georges, Valleys besides, Waterfalls, etc. in J&K. The “**Siyar Baba Waterfall**” located in District Reasi and “**Noori Chamb Waterfall**” in District Poonch are glaring example of scenic beauty and natural heritage (Fig.15 - a & b). These sites may be developed as tourist resort since a lot of tourists are fascinated to visit throughout the year. The number of tourists may be increased many fold to visit Siyar Baba Waterfall and Noori Chamb waterfall

only due development and providing day to day required facilities. Siyar Baba Waterfall is located at about equidistance from Mata Vaishnoo Devi Cave at Katra and Shiv Khori Cave at Ransuh, District Reasi. Similarly the Noori Chamb Waterfall is located along the Mughal Road an important road link to Kashmir form district Poonch to Shopian district an alternative of National High Way 244. The development of both the sites would be a splendid gift to the tourists and a real approach for creation of jobs for unemployed youth of the area.



**Figure 15:** (a) A view of Siyar Baba Waterfall, Reasi. (b) Panoramic view of Nooriee Chamb Waterfall Poonch

I would not hesitate to point out that the renowned retired Officers/Officials from various posts/position from different Government Departments as well as Colleges/Universities and Institutions are most important heritage. They must be recognized, honored and invited for sharing their life long experience with young generation who can be benefitted with their valuable suggestions and advices. They may also be requested to donate their valuable literature pertaining any subject to the libraries of any college/university in their vicinity which would be of immense importance to the students as well as public. The Retired Geoscientists/ Researchers have worked in India and even in different countries of the world and Antarctica too in diverse climatic and topographic conditions. To relate with their experience and knowledge would not only be a pride for the young generation but also to whole Jammu and Kashmir, since they are the True Living Heritage of Country who must be honored at any cost.

## 2. Conclusion

The Union Territory of Jammu and Kashmir is blessed with abundant Geological, Archaeological and Natural Heritage which are a treasure not only to J&K, but India as well as the whole world. If not explored, developed, and conserved timely these will only remain in memories and future generation will never behold their beauty and magnificence. Each of these wonderful heritage sites has historical significance, societal importance, scientific impact and their preservation is worth every step we take, which will not only create job opportunities for unemployed youth but will also promote tourism industry and will contribute revenue to Government exchequer.

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