DEVELOPMENT OF GEOTOURISM IN ARCHEOLOGICAL SITE OF CHITHARAL, KANYAKUMARI DISTRICT TAMILNADU-AN INNOVATIVE APPROACH

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Research Paper

Received: 30.03.2023 Revised: 15.04.2023 Accepted: 28.04.2023

ABSTRACT

Geotourism is an emerging form of tourism, based on the geological environment and geomorphological environment. The study area Chitharal (Kanyakumari district) is now preserved as the monument which has been declared to be of national importance under the ancient monuments and archeological sites. The present work is mainly aimed to identify the potential area to conduct geological studies and field works. The outstanding geological features, geomorphological, stratigraphical, sedimentological and structural features of Chitharal has a national or to a small extent international relevance. Peninsular gneiss, Charnokite, Warkalai sandstones, Alluvium types of rock and rock particles are present in this study area. Because of the presence of hard rock with quartz veins and garnet patches and sedimentary rock the area has geological importance too.

INTRODUCTION

Geotourism is a new form of tourism, based on the geological environment. Ecotourism and biodiversity have been described in the academic literature for over thirty years and now geotourism and its attendant concepts of geoheritage, geodiversity, geoconservation, and geotours, is relatively new. Geotourism is dened as tourism which focuses on areas of geology and landscape as the basis of fostering sustainable tourism development. The study begins with an understanding of the Abiotic (non-living) environment, to build greater awareness of the Biotic (living) environment of plants and animals as well as the cultural environment of people, past and present. It is argued that geotourism offers a new form of sustainable tourism which is more holistic than previous niche forms of tourism. The study area Chitharal, Kanyakumari district is now preserved as the monument which has been declared to be the national importance under the ancient monuments and archeological sites. The present work is mainly aimed to identify the potential area to conduct geological studies and field works. The outstanding geological features, geomorphological, stratigraphical, sedimentological and structural features of Chitharal to national or to a small extent international relevance. Peninsular gneiss, Charnokite, Warkalai sandstones, Alluvium types of rock and rock particles are present in this study area. Because of the presence of hard rock with quartz veins and garnet patches and sedimentary rock the area have geological importance too.

Kanayakumari is the southernmost district of Tamil Nadu State. The District is bounded by Tirunelveli District on the North and the east, Gulf of Mannar by south eastern, Indian Ocean and Arabian Sea by south and south west and Kerala by west and North West. The place has a warehouse of impressive and wealth full of archeological and geological features. The people of Chitharal are middle class and have a rich cultural heritage which is very well acclaimed. The data collected from Chitharal says that the Jain monuments are seen there and presently they are

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No. of Pages: 7 References: 15

Keywords: Chitharal, Geological tourism, Geotourists, Sustainable development.
called as Chitharal Malai Koil which was Jain's Training Centre in small rocky hills called the "ThirucharanattuMalai". The place is such a scenic beauty and is a very excellent and a calm place. The monument was located at the hill top and to reach the monument in the hill top, the people has to walk almost 850 to 900 meters for around 20 to 25 minutes in the steep steps built in the hills. Once reach at the top of the hill there is abundance of scenic beauties are present like rivers, mountains, lakes, villages, coconut fields etc. Overall geomorphology of Kanyakumari district can be seen once we reach at the hilltop. Because of all these factors are idea gained from the field states that Geotourism can be applicable in this particular destination. Why because, Geotourism plays an important role in displaying the geological features resulted from the processes that began 205 million years ago. Ignoring the rare features is a loss to the nation particularly the local community. The present work is mainly aimed to identify the potential area to conduct geological studies and field works. The outstanding geological features, geomorphological features, stratigraphical evidences, sedimentological facts and structural features of Chitharal to national or to a small extent international relevance. Without any hesitation we can say that Chitharal can be select one of the major destination for geology studies especially for geotourism. Nowadays Geotourism will be proving to be a remarkable achievement in India's growth in tourism as well as in science and technology sectors (Swarna et al2013). Geotourism may be defined as a special form of tourism which mainly centring the geosites (Newsome & Dowling, 2006). Specifically we can say that, geosite as a landform represents all the particular aspects of relief which is determined by the morphogenetic and the geographic processes (Ilieş & Josan, 2009). The geosites are mainly including three types of landforms; they are macro, meso and micro landforms. These are available on the landscape attracting the attention due to their peculiarities and recreational uses. Chitharal is one of the site comes under this speciality (Chakrabarty, et al 2018). Being a mosaic of all geological entities of special scientific importance, rarity or beauty, these features are representative of the region's geological history and of the events and processes that formed it (Zouros, 2007).

1. GEOTOURISM

A person should be environmental responsible, culturally responsible and synergistic means that that person should promote geotourism. For many years, researchers and academicians have been defining geotourism in many ways according with their understanding. First “Geotourism” word was coined by Tourtellot and his wife Sally in 1997. But after that the first definition was given by Thomas Alfred Hose in 1995 who rebuilt it in 2011. Geotourism is defined as tourism which focuses on an area's geology and landscape as the basis of sustainable tourism development. It begins with an understanding of the Abiotic (non-living) environment, to build greater awareness of the Biotic (living) environment of plants and animals. It is argued that geotourism offers a new form of sustainable tourism which is more holistic than previous forms of tourism (Dowling 2013 et al). Geotourism or geological tourism is a global activity that mainly represents an area which has both geology and tourism. Geotourism adds the special quality of its locale, visitor and resident alike benefit. It is an emerging type of sustainable tourism (Santangelo, N 2020). Geotourists can comprise both dependent travellers and independent travellers, and they may visit natural areas or builded areas have a geological attraction. There is a key distinction between geotourism and other forms of tourism. An increasing amount of research and field articles has been conducted with the aim of presenting geosites and their geotourism potential (Ólafsdóttir, et al., 2018). Geotourism is a sustainable tourism with a primary focus on experiencing the earth's geological features. Geology is the study of the earth while geomorphology is the study of landforms. The ‘tourism’ part means visiting, learning from and appreciating geosites. Overall, geotourism comprises the geological elements of ‘form’ and ‘process’ combined with the components of tourism such as attractions, accommodation, tours, activities, interpretation as well as planning. Geotourism is an activity and form one element of nature tourism, while in some respects at one with nature, also provides the opportunity for the investigation of geological heritage elements and a better understanding of nature. Geotourism is a developing field of international academic study (Hose et al 2012). The Indian Subcontinent is endowed with huge cultural heritage, a rich historical milieu and prominent physical attributes, which this project intends to cover (Ranawat et al 2019)

2. STUDY REGION

Chitharal is located in Kanyakumari district, which is about 45 kilometers away from the district headquarters (Fig 1). It is the southernmost part of Indian subcontinent. The District is bounded by Tirunelveli District on the North and the east, Gulf of Mannar by south eastern, Indian Ocean and Arabian Sea by south and south west and Kerala by west and North West. It is believed that the rock monument is built in during 9thcentury. Chitharal Bhagwati Hindu Temple, famous as the rock cut Jain monument in Kanyakumari district is a renowned Jain and Hindu site. Chitharal is an ASI marked monument which
stands lost in history and standing here you would want to get lost in time too. Historically, it is considered that Chitharal is to be a place where the Jain saints would come and meditate in the caves. Therefore, Chitharal Jain rock cut temple is an important site in Jainism (Fig 1).

3. GEOSITES
Section of river valleys, road cutting, cliffs, ridges, lakes, ponds or manmade trenches which expose important geological features are defined as geosites. Generally a geopark is mentioned as a large area, in which several important geological sections will be present. During a continuing dynamic period detailed work continues to be carried out by experts on the

![Study Area Locations](image)

Fig 1 Study area map of Chitharal Rock Jain Temple.

Kazanci, 2010). Our study area Chitharal is now not under threat of destruction. Geotourism is defined as tourism which focuses on areas of geology and landscape as the basis of fostering sustainable tourism. Our area is mainly comes under this category. Why because Chitharal is pointing that a good geosites, i.e, a geosite is a natural structure such as group of rocks, minerals or fossils, stratum, ground formation or geological structure resulting from an event during the creation or evolution of the earth's crust, that put a process or formation into existence, that has a need for scientific documentation and in some case visual attraction qualities too (Wimbledon, W.A.P., 1996 et al). Conservation of geosites for scientific, educational, geotourism and other uses is an essential part of the conservation of geoheritage (Prosser, C. D 2018 et al). India has a lot to show in the field of geological and geomorphological features of its vast landscape area. Geoheritage sites are otherwise geological areas which have scientific, cultural and educational value. But the development of geoheritage sites and this area hasn't been the significant when compared others fields. In
India geotourism and Geoheritage remains as poorly documented, and it suffers constant damages to its geological wealth and doesn't realise the economic contribution, which can arise from its geological wealth. Geoheritage of our country presents an economical, sociocultural, educational and a unique opportunity which everyone can reap (Ranawat et al 2020).

4. RESULTS AND DISCUSSIONS
The study area is mainly come under Kanyakumari district. The geographical extent of Kanyakumari District is 1,67,184 hectares (1671.84 sq.km). While considering the total geographical area of Tamil Nadu State it is 1.5%. The Chitharal area is underlain by the peninsular gneissic terrain of India. Within the area, sediments of middle Miocene era also deposited and identified as the Warkalai sandstone. Also, the sands of recent origin are noticed along the coast. Rest of the area is underlain by the crystalline rocks of Archean age.

Peninsular gneiss, Charnokite, Warkalai sandstones, Alluvium types of rock and rock particles are present in this study area. Abundance of quartz can be identified. The peninsular gneisses occupy in some area with garnetiferrousillimanite, graphic gneiss and garnetibiotite gneiss. Another major rock type present in the study area is Charnockite. The group consists mainly of Charnokite, pyroxene granulite and their associated migmatites. Charnokite are also exposed within the gneisses as bands and lenses (Fig 2). Granites and pegmatites are the derivations from the derivations from the migmatites of the peninsular gneisses. Quartz veins are also present in the study area. It indicates the veins that form early in the process is fine-grains quartz aggregates, whereas the veins that form later are coarser aggregates (Fig3). The simplest type of a quartz vein is the filling of an already present crack in rocks. The crack might form during folding of the rock in mountain-building processes, by shattering during tectonic events, by a decrease in pressure during tectonic events, by a decrease in pressure during the uplift of a rock, or because a rock cools down and shrinks.

On the other hand while discussing about geomorphology the area is boarded by Western Ghats. Western Ghats form an elevation of 200 m amsl from these foothills in the west. The areas gently slope to southeast towards the Gulf of Mannar attaining an elevation of 25 to 30 m amsl. The eastern and central tracts are quite barren, but there are a few isolated knife edged hillocks. The coastal tracts are occupied by the marshy swamps and number of sand dunes (Teri sands). The prominent geomorphic units identified in the area are 1) Structural Hills 2) Valley Fill, 4) Flood Plain 5) Pediment etc.

Geomorphologically a natural pond is present in this study area, where natural ponds are those caused by environmental occurrences (Fig 4). These can vary from glacial, volcanic, fluvial, or even tectonic events. The water present in the pond is fresh water; water is mainly originated from rock cleavages. At the same time natural springs are also present here (Fig 5). On the eastern part of the pond side there consist of stone beds with inscriptions, and two monuments are presents, one rock cut Jain temple with outer wall reliefs and one Hindu goddess temple next to it that is a combination of rock-cut and stone that was added during the reign of Vikramaditya Varaguna Pandya. On the behalf of spiritual mind the area is built with...
natural rocks and they are preserve as well as (Fig 6). On the surface of rock bodies some imprints are present which may either indicate any type of game activities from that time (Fig 7). Once we reach the top of the Chitharal rock monument the behind scenes are just awesome and mind blowing. The whole geomorphology of the area is well seen once we reach at the top. Drainages, agricultural lands, ponds, rivers can be seen (Fig 8). The wind blowing from the Western Ghats was a super experience. Those who are visit Chitharal on the basis of spiritual mind can also spend some time here (Fig 9).

5. RECOMMENDATIONS

- Proper flyers and brochures should be made available at these places.
- Conservation measures of Chitharal monument require site management plans, visitors plan and all universal languages sign boards.
- Regular cleaning of premises and regulation needs to be conducted in Chitharal. Even though natural calamities cannot be handed. So a dedicated team of people should report this archeological come geological site yearly once.

CONCLUSION

Finally, we can say that the practice of Geotourism creates unforgettable trips. Enthusiastic visitors and nature lovers are return home with exciting new information and understanding, and their stories
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encourage others to plan their own adventure, continuing healthy business for the destination. Geotourism is like a barter system, there every components regarding the area needs to go from one hand to another. It is a relatively new concept to be implemented in every geologically based area which probably has the maximum potentialities. Another major thing is geologically important area may be very much help for students and academicians also. Hence we know that the conservation of objects in Geosites are maintained a high level maintenance because of two main reasons a) Preservation of the value of geoheritages b) To cope with the threats increasing with human activities. During the study Geotourism understanding of geology and geomorphology was the key important thing. The geotourism space wants to set up in the form of working landscape, where our nature and common people come together for geoconservation perspective. The importance of this paper is firstly, that it is critical to know about the geological diversity and richness that exists around us. Secondly, for the Government and the concerned authorities, to realise the huge economic potential that can arise from these sites in a sustainable and eco-friendly manner. Thirdly, to induce a sense of care in the individuals of the society with regards to Geoheritage sites, geological features of our planet go through millions of years of development and formation and they can be easily tampered by human intervention. Both geotourism and geoheritage have their own significant impact on us as well as our country’s economy. Even though in our country tourism are promoting day by day but not geotourism. Services can be established in these areas are too good for the beneficial of the local area Chitharal too. ATMs can be set up in this area, if any bank asses need so. Shops can be established if consumers can buy brochures and takeaway goodies from this place. Finally we can say that the point of this paper is to being promote Chitharal rock Jain Temple towards Geology audiences as a part of Geotourism.

ACKNOWLEDGEMENT
The authors thank the Head of the Department, Department of Geology, University of Madras, Guindy Campus for support and encouragement for publish this paper. The authors than the RUSA – for funded the project (Ref: No.C3/RI&Q/RUSA 2.0/Theme-3/Group-6/Award 2021/043 Dt: 03-04-2021).

Conflict of Interest
The authors declare that they have no conflict of interest.

Author Contributions
GSG & MSG involved in overall project design and coordination. GSG carried out the field, analysis, discussed the results, wrote and revised the manuscript. MSG advised and reviewed the manuscript. AMKG designed the map and corrections.

REFERENCES


7. **Kazancı, N.** 2010, Jeolojik Koruma (Kavram ve Terimler), Jemirko ve TMMOB Jeoloji Mühendisleri OdasiYayinlari, p 60, Ankara


