

## Protection and Conservation of our Geodiversity: Geoheritage Tourism Parks

Earth is endowed with unique geological features which are significant in tracing the expression of its evolutionary history through 4.5 billion years of its age. The chronicals of this evolutionary history are inscribed in these unique physical features (landscapes) providing an insight into earth science. These physical features document evidences of the past narratives of geology, processes of formation of earth, past ecosystems and climate record, and evolution of biotic and abiotic spheres. “Geodiversity” is the major abiotic component supporting landscapes, biodiversity, and ecosystems. Broadly speaking Geodiversity is the geological expression that holds enormous potential with *examples representing major stages of earth's history, including the record of life, significant past and on-going geological processes in the development of landforms, or significant geomorphic or physiographic feature of aesthetic significance*. Studying these elements of Geodiversity allows us to trace the evolutionary history and understand its natural environment for better resources management. Geodiversity of a place is classified as “Geoheritage” site when a certain uniqueness or value is attributed to it. For example, Geoheritage sites encompass significant elements which possess geological, educational, scientific, aesthetic and cultural values.

Societies and cultures have always been influenced by the geology and landscape of site specific regions. For example Indian Subcontinent is blessed with captivating landforms which have played a key role in shaping its civilization and rich cultural diversity. The subcontinent exhibits imprints of varied geological processes evolved through geological ages and is a storehouse of interesting geological features of aesthetic and educational values. India has rich Geodiversity with geophysical attributes, eventful geological history and rich cultural heritage. The diversified territory of India comprises of rocks and landscapes of various geological periods spread over the entire span of geological time scale. It extends right from oldest Eoarchean era to Cenozoic era, including evidences of earliest fossil records from plants, vertebrates, invertebrates and stromatolites. The richness of various rock formations, geophysical features and fossil record, and structural events in the country occur at the diverse geosites offering scientific and aesthetic interest. India exhibits imprints of varied geological processes evolving earth through space and time and is a storehouse of interesting geological features. There is an increasing interest in the development of Geoparks as an initiative aimed at

promoting knowledge and earth science education. Efforts are being made for preservation of geological heritage, natural conservation and geo-tourism as an alternative means of local development, particularly in indigenous communities. Geological Survey of India has already enlisted some of those locales as ‘National Geological Monuments’. But none of the reference stratigraphic sections in the country has been included in this list. The Permian-Triassic boundary sections in Kashmir and Spiti are the best potential sites to qualify for the reference “Stratigraphic Boundary” sections of the world for preservation of the record of mass extinction of “Great Dying” also known as “Mother of Mass Extinctions”. The Kashmir section at Guryul Ravine was a candidate for Global Stratotype Sections and Points (GSSP) along with three Chinese sections including Meishan D section in South China (now GSSP for Permian-Triassic boundary) for defining the international geologic time scale. China has established 10 such GSSPs in the country and unfortunately India has none.

The Geoheritage features are vulnerable if once destroyed cannot be recreated. Unique geological landscapes have evolved through millions of years and have witnessed the downfall of several civilizations. In the present age, many anthropogenic activities, natural hazards and climate changes have rendered them vulnerable to rapid deterioration. As a result, much of our landscapes have already been destroyed and many more are likely to be deteriorated beyond recognition in the course of development. During the recent years protection of geological and geomorphic features has received appropriate attention internationally. These efforts of protection and preservation of geological and geophysical features have resulted in newly coined concepts of Geodiversity, Geosites, Geomonuments, and Geoparks.

Preservation of Geodiversity rests in “Geoheritage and Geoconservation”. Geoconservation is preservation for heritage, science, or educational purposes and aesthetic values. Geoconservation measures include identification, protection, and management of valuable elements of Geodiversity and their preservation as tourist-friendly educational Geoparks. Internationally, a number of agencies are working for the protection of geo-heritage sites, viz, 1) Global Geoparks Network (GGN) which works under the aegis of UNESCO. GGN provides developmental framework which integrates conservation of geological heritage sites with sustainable economic development. 2) The International Union for Conservation of Nature -

World Commission on Protected Areas (IUCN - WCPA) has a specialised group (Geo-heritage Specialist Group) which assists the conservation and management of protected geoheritage sites. 3) A European agency ProGEO, in association with IUGS & UNESCO is focused on the conservation of the Geological Heritage in Europe. The fourth world conservation Conference (2008) held in Spain was a major mile stone in the efforts of protection and preservation of Geoheritage. In this conference a resolution was adopted by IUCN regarding conservation of Geodiversity and Geoheritage. Following this resolution in June 2015, IUCN-WCPA organised its first international Geoheritage conference in China. This conference focused on conservation and management of geoheritage sites and resolved that geoheritage sites be promoted and developed as Geotourism parks.

Tourism plays a major role in showcasing the country's culture internationally. In the Indian context of late, significant initiatives have been taken in promoting tourism even in remotest parts of the country. It is imperative that the tourist map of India should be enriched by the inclusion of the geological

monuments, geoheritage sites, reference stratigraphic sites and the alike, so that the scientists and tourists from within the country (India) and overseas can have an insight in the geological past - the formation of the landmass, the orogeny, the palaeoenvironment and the paleo - flora and fauna particularly of extinction events preserved in the country across the stratigraphic sequence boundaries. Workshops need to be organised for the students, technocrats and general citizenry focusing on principal objectives of presenting Geoparks from the perspective of UNESCO for the preservation of Geodiversity. We need to generate conscience among local authorities and natural resource managers, about the importance of geo-conservation and how it can become a strategy in local development. We need to encourage the creation of local groups for promotion and creation of Geoparks in the country for conservation of our rich Geodiversity and Geoheritage.

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