

ASPECTS OF GEOTOURISM IN SOUTH KOREA*

– Min Huh¹, Kyung Sik Woo² and Andy Spate³

Director, Korea Dinosaur Research Center, Chonnam University, Gwangju, Republic of Korea¹; Director, Cave Research Institute of Korea, Kangwon University, Republic of Korea²; Andy Spate, Optimal Karst Management, Hall, ACT³

Korea has had a very long history of geotourism with mountains, hot springs, rivers and coastlines having special significance to the Korea people for spiritual sustenance as well as for the provision of natural resources. The people of the Korean Peninsula particularly recognise and respect seven sacred mountains across North and South Korea which reinforces the significance of geological features to the Korean peoples.

In the Republic of Korea there is a comprehensive system of national and provincial parks as well as nearly 500 sites identified under national legislation as 'natural monuments'. Many of the natural monuments have been designated because of their geological values. These include 13 show cave operations and five sites currently being nominated as World Heritage for their highly significant dinosaur fossil trackways and egg sites. In July 2007, three sites on Jeju Island were inscribed on the World Heritage list largely for their spectacular volcanic features and scenic values. The sites on Jeju Island and the Korean Cretaceous Dinosaur Coast are very important for regional tourism.

This paper discusses some aspects of the use and conservation of Korean natural World Heritage, inscribed and potential, and of show caves and dinosaur trackway sites.

In spite of the population of around 50 million, a booming industrialized economy and the despoliations of centuries of invasions culminating in the Korea War much of the country displays considerable scenic variety summed up in phrases such as 'The Land of the Morning Calm' and a land of '10,000 peaks, 10,000 islands and 10,000 waterfalls'. The Korean people pay particular homage to their natural and cultural heritage and the country has many fine national and provincial parks dedicated for their natural resource values. Always overlapping, cultural values are also critically important.



Protective infrastructure in Cheongok Cave



Interpretive sign at Cheongok Cave

Introduction

The Republic of Korea (South Korea) is a small, heavily populated country occupying about half the Korean peninsula and measuring about 1,000 km long by 215 km at its narrowest. Only about 20% of the land area can be classified as 'flat land' – the rest is mountainous with the highest point being Hallasan (san = mountain) at 1,950 metres. As well as the mountains there are many other features of geotouristic interest including hot springs, caves, evidence of dinosaurs and extensive and very beautiful rocky coastlines.

Mountains

There are seven especially sacred mountains in North and South Korea although the suffix san attached to a place name indicates that mountains hold a very special place in Korean culture. This suffix is attached to the names of the majority of the country's national parks. Although there is a clear interest in the natural values of the very extensive mixed evergreen and deciduous forests and the often spectacular scenery very often the focal point for visitors to the mountain-based park system lies in temples, tombs and other items of cultural significance. In fact it is often impossible, and probably foolish, to differentiate between natural and cultural significance.

However, if geotourism is held to include the appreciation of scenery – hopefully coupled with an understanding of how that scenery has been created – the importance of Korea's mountains cannot be underestimated and very large numbers of Koreans do climb their mountains to enjoy the scenery and other natural values. For example, about 500,000 visitors climbed Hallasan each year between 1995 and 1999. The pressures on the mountain peak and its crater lake were intense especially following the promotion of a 'Royal Azalea Festival' by a national TV channel in the mid 1970s.

Stairway in Danyang Chodonggul Cave



This has led to the closure of the summit area itself and extensive track and vegetation rehabilitation works. Proposals for cable car access to the summit were investigated by Australian consultants. These proposals were rejected but the fact remains that many of the tracks and trails on Hallasan and other Korean mountains are heavily used and, in many cases, require considerable maintenance work.

Natural World Heritage

Korea has had a number of places inscribed on the UNESCO World Heritage list. Until 2007, these were all cultural sites. In 2005-06 the Korean people prepared and submitted a serial World Heritage nomination for three sites on the southern island of Jeju-do. This nomination was successful and the place was inscribed in July 2007.

All three of the separate sites were already very important from a geotourism viewpoint and receive many hundreds of thousands of visitors annually. The three elements are Hallasan (discussed briefly above), the Seongsan Ilchulbong Tuff Cone and the Geomunoreum Lava Tube System.

The Seongsan Ilchulbong Tuff Cone is an impressive Surtseyan-type eruptive center on the far eastern end of Jeju-do. It is also known as Sunrise Peak as it spectacularly catches the light of the morning sun. Its base has been eroded by coastal processes such that the internal structure of this unusual type of eruptive center has been exposed for study and interpretation. This site is one of the mostly heavily visited sites on the tourist industry-dominated island of Jeju-do.

The Geomunoreum Lava Tube System consists of the eruptive center (oreum = parasitic volcanic cone) and a number of lava tubes. One of these, Manjanggul (gul = cave), has more than a kilometre of passage open to visitors and has recently been re-lit and had improved interpretive material installed as befits its World Heritage status.

Two other caves in the lava tube system, Yongcheondonggul and Dangcheomulgul, are unusual in that they contain extraordinary displays of calcite speleothems on a scale far beyond that found elsewhere in the world. The calcite is derived from wide-blown calcareous sands deposited above the lava tubes.

The publicity leading to the formal nomination as World Heritage and upon the subsequent inscription to the list has generated huge interest in the geologic features of Jeju-do. Many other sites on the island such as the Jusangjeolri Seashore, Jeongbang Waterfall, Seopseom Island, the lava tubes at Hallim Park and Micheongul contribute to the undoubted geotourism potential of Jeju-do. The geologic interpretation of these sites varies greatly, with new signage on the World Heritage sites greatly assisting the visitors understanding of this island. Plans are well advanced for additional visitor facilities.

In the center of Jeju-do there is a 'stone culture park' under development thanks to substantial private donations and national and provincial government contributions. This consists of a museum and other buildings and a remarkable array of volcanic rock items such as sculptures, stele, stone arrangements, volcanic bombs and so on.



Kim Ryeon at a 'rather bright' light in Gossi Cave

Show Caves

The use of Korean caves as refuges during times of invasion stretches back a millennium or more. Seongrygul, near the east coast city of Uljin, is mentioned in a book written by a Mr Gok Lee in 1349. There are two examples of Chinese script engraved in the rock at the cave entrance which are said to date from this time. Caves such as Ondalgul and Gossigul have direct connections with the Japanese invasions of the 14th Century.

Year Opened	Name of cave	Remarks
1963	Seongryugul, Uljin*	The first cave to be opened to the public in Korea
1971	Hyeopjaegul-Ssangryongul, Jeju-do*	Lava tubes
1974	Gossigul, Yeongwol*	
1976	Manjanggul, Jeju-do*	Lava tube
?	Gosugul, Danyang*	
1978	Cheondonggul, Danyang#	
1980	Nodonggul, Danyang*	Now closed
1996	Cheongokgul, Donghae	Closed?
1997	Hwanseongul, Samcheok*	
?	Yongyeongul, Taebaek#	
?	Ondalgul, Danyang*	
?	Micheongul, Jeju-do	Lava tube
1993	Hwaamgul, Jeongseon#	Re-opened in 2000 with additional gold mine display
2006	Mulgolgul, Samcheok*	Subject to flooding

*Denotes National Monument; #Denotes Provincial Monument

Interpretation in Korean show caves is not good – especially in languages other than Korean. All caves are self-guided and interpretation is generally only provided by fairly comprehensive signage at the cave entrance with occasional sites named in the cave.

Most caves appear to be operated with profit as the major rationale for their opening. This is disappointing given the status of most sites as national or provincial monuments. The one exception is probably the World Heritage site, Manjanggul.



Interpretive signage at Gosu Cave

Dinosaur trackways

South Korea possesses a number of sites where evidence of Cretaceous dinosaurs has been discovered. These include only a limited amount of skeletal material but very extensive dinosaur

However, the modern show cave industry did not commence in Korea until 1963 with the opening of Seongrygul. The table below shows the caves that have been developed for tourism in the ensuing 45 years. Two have been closed and the most recently developed, Mulgolgul, is subject to catastrophic flooding from time to time. Many of the caves are very small and are subjected to very heavy visitor loadings with, for example, more than 17,000 through Hwanseongul in one day.

trackways and eggsites exists mainly along the southern coast of the peninsula in Jeollanam-do and Gyeongsangnam-do provinces over a distance of about 180 kilometres. Five of these sites have been nominated as a serial World Heritage property and will be evaluated through 2008-09. These sites span the whole Cretaceous to the end of the 'Age of Dinosaurs' and provide considerable insight into the ecology and behavior of dinosaurs in contrast to the more abundant, but less-securely dated, nearby Mongolian and Chinese body-fossil deposits.

Although protection, development and promotion of these sites for scientific, geotourism and public education purposes has only taken place within the last decade they have already become very heavily used. All five sites are protected as National Monuments.



Professor Kyung Sik Woo, Director of the Cave Research Institute of Korea, and Dr In Seok Son, Director of the Jeju Island Cave Research Institute, explore Yongcheongul July 2005

Interpretive signage in Hwansongul Cave



Haenam is of Late Cretaceous age and is situated on the shores of an estuary. Wave action and scientific excavation have revealed a number of significant features including 528 dinosaur and 443 pterosaur tracks. The pterosaur is the largest known with a wingspan of some 14 metres. There are also countless web-footed bird tracks – the oldest in the world – as well arthropod tracks and fossil wood.

A large museum, three exhibition halls protecting different sets of trackways, outdoor dinosaur models and interpretive features have been provided. Many hundreds of thousands of visitors use the site annually.

Hwasun is a disused quarry site near the provincial capital, Gwangju. Nearby are important resorts dependant on hot springs and their attendant spas. This site is of Early to Mid Cretaceous age and contains about 1,500 individual footprints and sixty trackways. It displays a diverse variety of gaits with unusual walking patterns and postures of mainly theropod dinosaurs.

A board walk and interpretive material have been provided here and plans are afoot to develop a visitor center and a boardwalk linking the nearby hot springs resorts. A further proposal is to light the trackways for nighttime viewing utilizing low angle, high intensity LED lights to throw the tracks into stark relief.

Wave action and subsequent scientific work at Boseong have revealed more than 200 dinosaur eggs in clutches of three to 16. All eggs have hatched and remarkable site fidelity is indicated by the stratigraphic superimposition of nests. The nesting sites occur in diverse stratigraphic and sedimentological settings thus giving an opportunity to understand the palaeogeographic and palaeoenvironmental conditions in Late Cretaceous times. There are also turtle eggs and bones from this site as well as a well-articulated portion of a hypsilophodontid dinosaur. A large museum is currently under construction at Boseong which will supplement an outdoor exhibition plaza containing models of dinosaur egg clutches.

Five islands in the coast off Yeosu City make up the Yeosu Late Cretaceous site. There are more than 3,500 tracks and 82 trackways representing

use of the site by ornithomimid, theropod and sauropod dinosaurs. One ornithomimid trackway at 85 metres length is the longest trackway of this species anywhere in the world. The presence of fossil indicates mesic environmental conditions in an estuarine or lacustrine environment as these dinosaurs walked across a drifting world.

The easternmost site, Goseong, is particularly impressive with 410 trackways on up to 320 stratigraphic levels. This is the largest sample world-wide in a single geological formation. It is of Early Cretaceous age and as well as the dinosaur trackways there are numerous bird tracks and dinosaur and turtle eggs.

Many of the 249 ornithomimid trackways have parallel orientation indicating gregarious behavior; the 22 theropod trackways indicate a high predator/prey ratio and the 139 sauropod trackways include the world's smallest sauropod.

Facilities to support geotourism at Boseong include a very large and modern museum, outdoor dinosaur models, a very large dinosaur sculpture, boardwalks and interpretive signage. Again many hundreds of thousands visit annually.

A striking feature of the Korea dinosaur sites is the intense interest in utilizing the sites for school and community education.



Modern infrastructure and lighting in Ondal Cave

Conclusions

In addition to the features discussed above there are many other geologically-based natural environments valued by the Korean people. These include hot springs, rocky seashores, waterfalls, spectacular gorges and river systems. Given the pressures exerted by past wars, competing land uses, high population and rapid industrialisation it is astounding that so much has survived to be available for modern Koreans to enjoy, appreciate and understand. In recent years the appreciation of natural scenery has started to spread to the Democratic People's Republic of Korea (North Korea) with the opening of sea-based tourism to the Geumgangsan (Diamond Mountains) on the east coast of that 'hermit kingdom'.

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