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Geodiversity and geotourism utilization of islands: Gwanmae Island of South Korea



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Abstract The island area has well preserved geodiversity and biodiversity due to minimal exposure to humans. UNESCO has maintained things and sites with geological importance as geoheritage. Although a number of natural heritages and national parks exist on 'geological' bases, geodiversity concepts are less concerned about biodiversity due to a lack of recognition. Recently, geotourism linked to geodiversity has been activated in worldwide and geopark programs have been established in many countries. These precedents offer good chances for the use of geoheritage and preservation of geodiversity. Geopark programs can lead to the preservation of geodiversity and public geoeducation through tour of geosites. In particular, it is necessary to understand oceanic nature and culture including islands through geoeducation programs used by geodiversity of islands. Gwanmae Island is the first luxury village named by the Korea National Park Service. This study suggests plans of geotourism by geosites with noticeable geodiversity of the island.

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Introduction

The core elements of World Heritage are composed of geodiversity and biodiversity. Geodiversity is the counterpart of biodiversity, composed of rocks, minerals, fossils, topographies and so forth. Of them, geological heritage sites that have to hand over to our descendants are called as sites of geoheritages (Lee, 2014).

Since the end of the 20th century, areal geology has been considered an important heritage, which contains the histories of lives and human evolution (Sohn, 2014). In addition, it has aroused sympathy that phenomena and sites with geological importance must be preserved as worldwide geoheritages for human beings (Brocx and Semeniuk, 2007). A number of world heritages and national parks are existed on geological bases, but geological meaning and importance of them are not fully recognized for the public. The viewpoint to geodiversity had to preserve do not approach as that to biodiversity (Carcavilla et al., 2009).

Recently, new chances for uses of geological heritages and the preservation of geodiversity are set up, as geotourism is motivated in worldwide and geopark programs settle in many countries. Particularly, geopark programs are evaluated

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valuably in viewpoints of the preservation of geodiversity by geotourism and geoeducational search (Dowling, 2011). The purpose of a geopark is development as sites of geologically valuable sites by connecting with other meaningful natural and cultural elements (UNESCO, 2014; Woo, 2014). Geoparks can improve the local economical benefits by areal geology and motivation of tourism through the preservation and educational visits to famous geosites (Fig. 1).

Many islands are distributed around the three coastlines of South Korea, a peninsular country. The island areas are good in geodiversity and biodiversity because of minimal exposure to humans. Korea National Park Service (KNPS) is establishing 'National Park Luxury Village' to restore natural ecology and to improve benefits of these falling behind areas through the supports to island and mountain ones. KNPS picked up Gwanmae Island as the first Luxury Village (Oh et al., 2012). This study considers using plans on geotourism and geoeducation by the investigation to geosites and geodiversity of Gwanmae Island.

Geosites and their uses

Internationally valuable areas in geology are designated as World Natural Heritage, and the value is called Outstanding Universal Value (Dingwall et al., 2005; Williams, 2008). Geosites mean valuable sites geologically. They include important geographical development stages of volcanic eruption, erosion and sedimentation in the history of the earth and geomorphological characters of volcanic and fault zones (Brocx and Semeniuk, 2007; Cowie and Wimbledon, 1994). On the other hand, geosites possess geologically important information of solid earth science, ore deposits, geological engineering, geomorphology, glacial geology, ground water, mineralogy, paleontology, petrology, sedimentology, speleology, stratigraphy, structural geology and volcanology.

Wimbledon et al. (2000) suggest the following qualifications of geosites:

- (1) The special, typical or unique features in space and/or time should be demonstrated in the proposal for a site.
- (2) The representativeness of a site in the geological column as a whole should be demonstrated.
- (3) A candidate should have an assessment within a named context (time/space), so that informed judgments and comparisons with other candidates can be made.
- (4) Sites with complex records, a long history of research, etc., are to be preferred as candidates (but new and unexploited sites should certainly not ruled out).

That is, geosites should have four elements: representativeness, suitability for correlation, comprehensive multidisciplinary study, and availability and potential. In addition, educational effects and approaches should be considered together in geosites because geosites are valuable in geotourism and improvement of local area, together with geological values.

Location and setting

Jindo-Gun is composed of large and small inhabited/uninhabited islands. Gwanmae Island is located in the southwestern part of Jindo-gun. Many islands of the southwestern part of this area are suitable places of Archipelago National Park. Of them, Gwanmae Island, located in Jodo-myeon, has excellent diversity of geomorphology, geology and landscape (Fig. 2). The coastal area around the island is assigned to the submerged coast of ria type. It is reported that this type of coast in Korea was formed about 7000 years ago, in the Early Holocene (Jang et al., 1996). In the study area, tides are semi-diurnal types showing diurnal inequality and are mid-tidal, measured about average 2 m of tide interval (Davies, 1964). The climate of the study area shows 14.2 °C in mean annual temperature, 1074.4 mm in mean annual precipitation and 1106.3 mm in mean annual evaporation. In the study area, winds are mostly northwesterly cold and dry ones in winter and southeasterly high temperature and humid ones in summer, respectively, representing 4.1 m/s of average annual speed. Storm days of above 13.9 m/s of wind speed average 22.9 days and concentrate in winter in the study area, and typhoons with above 17 m/s of wind speed mainly appear in summer. The typhoons pass around Mokpo city in the frequency of average 1.9 times/year (KMA, 2013). Geology around the study area is mainly composed of the Cretaceous volcanic and sedimentary rocks assigned to the Yucheon Group (KIGAM, 2002).

Geodiversity and geosites

Beach area

The beaches of Gwanmae Island exist along NNE-SSW direction, having an average width of 1.5 km, and show average intertidal zones of about 100 m due to tidal ranges. The sediments of 2–3 phi of mean size in the area are very well sorted. In the beaches, ripple marks from long shore currents develop along upper tidal zones, and ebbs around gravel in the beach make obstacle scours' appearances in forms of ridges. The beach areas with 100 m in depth do not show suspended sand grains, displaying transparent emerald color, which equates to clean seas (Fig. 3).

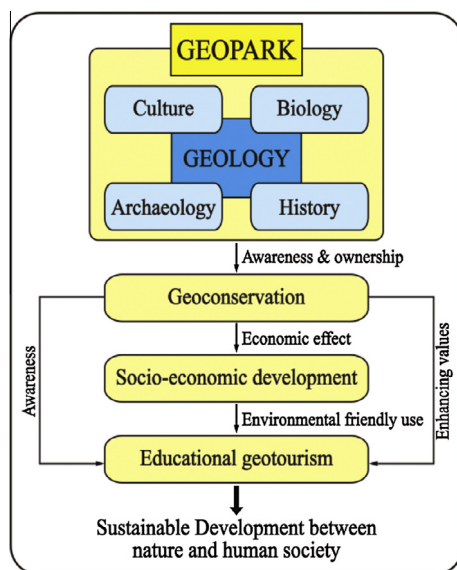


Fig. 1 A schematic diagram showing the functions and requirements of geoparks (after Woo, 2014).

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