

# PROPOSING GEOPRODUCTS FOR LY SON GEOPARK, VIETNAM

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## Abstract

Ly Son district includes two off-shore volcanic islands: Ly Son island (Re isle) and Little island (Bo Bai isle), located in the eastern of Quang Ngai Province, central of Vietnam, covers approximately 9.97 km<sup>2</sup> of land. Ly Son and surrounding area will be applying to become a Geopark in UNESCO Global Geoparks. The island district is a product of volcanic activity that creates a wide variety of geomorphology forms: modern marine deposition, marine sediment, basalt flow and volcanic eruptions and other geo-features. As a result of the geosite inventory, together with the assessment of scientific value and additional values (ecology, culture - history, economics, aesthetics), the study was conducted to propose a wide range of geo-products for Ly Son Geopark. The suggested products include: tourist center; interpretation system: introduction, explanation of scientific values and additional values of some geosites: Hang Cau –Chua Hang and Thoi Loi Geosite, To Vo Natural Gate, Bai Tien Geosite – Bo Bai Isle; geo-trail, geo-road, geo-adventure; as well as local products. Geo-products will definitely contribute to support local economic development, appealing tourists and also effectively enhancing the Earth Science education and conservation.

**Keywords:** *Ly Son geopark, Geosites, geo-products*

## 1. Introduction

The term of geotourism, defined more than 20 years ago, is a part of sustainable tourism that plays an important role in the development and preservation of geological heritage. Today geotourism is also considered as a science of modern geology and a subject taught in universities around the world. Geotourism is a new niche market [1]. Therefore, geotourism had to introduce their attractions and targets to visitors and it should set up strategies to attract more tourists to geoheritage. In these destination, geosites with their geo-products are very important pedagogical tools and educational activities for tourists. According to UNESCO Global Geoparks Network Guidelines, some geo-products such as museums, interpretive and educational centres, trails, guided tours, popular literature and maps will provide supports, tools, and activities to communicate geoscientific knowledge and environmental and cultural concepts to the public [2].

Ly Son district consists of two off-shore islands: Ly Son Island (Re Isle) and Little Island (Bo Bai Isle), locates in the eastern part of Quang Ngai Province. This small island is 15 nautical miles off the South-central coast of Vietnam, covers approximately 9.97 km<sup>2</sup> of land. The island district is a product of volcanic activity that creates a wide variety of incredible landscapes. Ly Son geomorphology is based on basaltic characteristics: the erupting volcanoes on island released the prominent craters; basaltic flow formed low covering at the foot of volcanoes; marine sediments are mainly coral sandstone; coral reefs distributed around the island are often flooded with tides. Significant destruction of the waves into the volcanic slopes and basaltic cover forms has created many splendid landscapes and historical sites along the island such as sea-cliffs, caves, rocky coasts, stone towers. [3]. The inventory has identified 18 geosites on Re Isle and 9 geosites on Bo Bai Isle of four categories: Geomorphology, Complexity (Geology and geomorphology) Hydrology and Landscape – Geomorphology [4]. Geosites were evaluated for scientific and additional values based on the prior studies and geological scientists - field surveys that identified morphology, structure, boundaries, stratigraphic features, geomorphology at each site. The most attractive geo-spot of this island is the volcanic sea-cliff from Hang Cau to Chua Hang (the stunning caves on Ly Son Island), from which the volcano structures as well as the stratigraphic relationships between volcanic rock crushed on coral sandstone (calcarenite) layers are visible. This potential global geosite could be qualitatively evaluated with the criteria of rarity and unique in Vietnam. [4]

## 2. Methods

Geoproducts were proposed according to: fieldtrips and after that, the basic classification and assessment of scientific and additional values for geosites. After identifying all values would develop to geoproducts, the research proposed specific types of products and services based on the classification systems of Reynard (2008) [6] and Diana Dryglas & Krzysztof Miśkiewicz (2014) [5] Frey et al. (2006) emphasizes that geo-tourism products should be pedagogical approaches in environmental education, geological multidisciplinary guidance and research, economic issues, and sustainable development [7]. The core products, which are abiotic components of nature, should presented to show a wide range of geo-information in research area [5]. Therefore, the most basic category (objects) would develop firstly.

Table 1. Proposed geo-products in Ly Son Geopark

| Level   | Type            | Geoproducts                                                                                                                                                                                            |
|---------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic   | Objects         | - Printed material: geo-tourist/geo-map; brochure; geological guides<br>- Geo-interpretative panels system<br>- Promotional geo-souvenir, local foods with logo or geosite imagines of Ly Son Geopark. |
|         | Entity          | - Geo-center<br>- Geo-museum                                                                                                                                                                           |
|         | Event           | - Local festival exhibitions to introduce Ly Son Geopark<br>- Geo-conferences; geo-presentations                                                                                                       |
|         | Service         | - Guided geo-services                                                                                                                                                                                  |
| Complex | Tourism package | - Package geo-tour<br>- Geo-adventure for students                                                                                                                                                     |
|         | Geo-trail       | - Geo-tourist trail                                                                                                                                                                                    |
|         | Place           | - UNESCO Geopark                                                                                                                                                                                       |

## 3. Result and discussion

In this research area, the proposed geoproducts to promote tourism growth would be listed below: Tourist Geo-center; The interpretation system of scientific and additional values; Geo-trail; as well as suggesting the development of Local products for geotourism.

### 3.1. Geo-Center

- Position: Geo-Center should be located in An Hai communal house and the monument of “Hoang Sa Bac Hai Fleet”, a symbolic assertion of Vietnam’s sovereignty over the Hoang Sa (Paracel) archipelago.

- Name: Ly Son Geo-Center.

- It consists of:

- (1) Hoang Sa - Bac Hai Fleet Exhibition Hall: keeping entirety
- (2) Geotourism center: providing information of Geopark such as: geosites, geological services and geo-tour services
- (3) Geo-museum: there are two rooms
  - (3a) Geological features in Ly Son room
  - (3b) Gallery and other art products
- (4) Geo-souvenir area: introducing local products such as geo-handicraft, geo-ornament, local foods.

### 3.2. The Geo-interpretation system

#### 3.2.1. Logo for Ly Son Geopark

Designing logo will accelerate the promotion Ly Son Geopark to visitors. Products with the logo such as t-shirt, cup, hat, badge and other local products are sold to visitors as souvenirs as well as promoting the image of Ly Son Geopark quickly.

The image in logo comes from the shape of Thoi Loi volcano on Re Isle. On the way to island, the volcano looks like a ship riding the waves to the east. It is very simple but significant image, the study suggests for the logo of Ly Son Geopark (Figure 1)



Figure 1a. Thoi Loi volcano on Ly Son island [8]



Figure 1b. Ly Son Geopark Logo

### 3.2.2. Geo-interpretation System

Geo-interpretation system in Ly Son Geopark is performed by the panels and several printed products: geo-tourist/geo-map; brochure; geological guides.

The geo-interpretation panels provide precise scientific and additional values. They should be located for every geosites that tourist can read without instruction. Their contents conclude: (1) Geosite location on the map (2) Geo-description (3) Scientific and additional values (Table 2) (4) Imagines for illustration.

Table 2. Some information in Geo-interpretation panel

| <i>Location</i>            | <i>Content</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <i>Scientific information</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Entrance of Ly Son Geopark | <p>Ly Son Island is a product of volcanic activity with a very young age (Holocene age). The Island holds an important strategic position in the East Sea of Viet Nam and contains diversified tourism potential and valuable documents on Hoang Sa (Paracel) Archipelago</p> <p>This geopark has 18 geosites on Re Isle and 9 geosites on Bo Bai Isle classify to 4 categorized: Geomorphology - Stratigraphy geosites, Geomorphology geosites, Hydrology geosites and Landscape - Geomorphology geosites. Significant destruction of the waves into the volcanic slopes and basaltic cover forms has created many splendid landscapes and historical sites along the island such as sea walls, caves, rocky coasts, stone towers. Some popular attractions in Ly Son are: Hang Cau and Chua Hang (stunning sea cave), Thoi Loi volcano, To Vo gate (natural stone arches) in Re Isle and Fairy beach in Bo Bai Isle.</p> |

### 3.3. Geo-trail

A geotrail links geologically significant sites and creates an educational journey for people to follow. Typically, trail information is contained in a field guide brochure and includes an introduction to the geological history, maps and diagrams, details and photographs, self-guided tours and safety guidance. The information is also usually scientific in nature. [9]

One of the important goals of the geopark is to preserve the geosite's integrity. In addition, two isles with small area, this study proposed geo-trails by two ways: traveling by road (cycling or walking are encouraged) and traveling by waterway (by ship). The suggested geotrails are listed in Table 3 and illustrated in geotrail map in Figure 2 and some images of geosites in Figure 3.

Table 3. Proposed Geo-trail on Re Isle

| No. | Geo-trail Name                                                                              | Distance | Mean of transport | Total traveling time | Description Route                                                                                                                                                                                                                                                                                        |
|-----|---------------------------------------------------------------------------------------------|----------|-------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Following the lava flow<br>(From Hang Cau to To Vo Natural Gate)                            | 9.5 km   | Cycling           | 4 hours              | Sightseeing and finding out about the formation of Hang Cau sea-cliff, sea cave, Chua Hang (Pagoda in cave), Duc Pagoda, Gieng Tien Volcano, To Vo Natural Gate.                                                                                                                                         |
| 2   | The Way to Two-tiered Volcano<br>(From Ly Son Flagpole to Thoi Loi Reservoir on the crater) | 1.3 km   | Walking           | 4 hours              | <ul style="list-style-type: none"> <li>• Observing two-tiered volcanic structure; stone towers, stone mushrooms.</li> <li>• Enjoying the scenery of Ly Son from above</li> </ul>                                                                                                                         |
| 3   | Following the Sun<br>(From Mu Cu Islet to To Vo Natural Gate)                               | 8.8 km   | Cycling           | 12 hours             | <ul style="list-style-type: none"> <li>• Enjoying the dawn at Mu Cu Islet</li> <li>• Visiting An Hai Temple, Hoang Sa Bac Hai Exhibition Hall (Geo-Center), King Well, Am Linh Tu Temple, Hoang Sa Soldier Graves</li> <li>• Joining in planting, caring, harvesting garlic with local people</li> </ul> |
| 4   | Hang Cau – Chua Hang Coastal Geo-trail                                                      | 1.2 km   | Walking           | 12 hours             | <ul style="list-style-type: none"> <li>• Walking along to the modern sea cliff from Chua Hang (Pagoda in cave) to Hang Cau</li> <li>• Night camping on Hang Cau beach.</li> </ul>                                                                                                                        |
| 5   | Gieng Tien Geo-trail<br>(From Duc Pagoda to To Vo Natural Gate)                             | 1 km     | Walking           | 3 hours              | <ul style="list-style-type: none"> <li>• Visiting Duc Pagoda</li> <li>• Climbing up the Gieng Tien crater</li> <li>• Watching the sunset at To Vo Natural Gate</li> </ul>                                                                                                                                |
| 6   | Duc Pagoda – Chua Hang<br>(Pagoda in cave)                                                  | 2.8 km   | Shipping          | 3 hours              | <ul style="list-style-type: none"> <li>• Enjoying the sightseeing of Gieng Tien Volcano, Dong Ho beach and Hang Pagoda from the sea.</li> </ul>                                                                                                                                                          |
| 7   | Hang Pagoda – Mu Cu Islet                                                                   | 3.4 km   | Shipping          | 4 hours              | <ul style="list-style-type: none"> <li>• Observing the two-tiered volcanic landscape.</li> <li>• Watching An Hai lighthouse and Mu Cu fishing port from the sea.</li> </ul>                                                                                                                              |

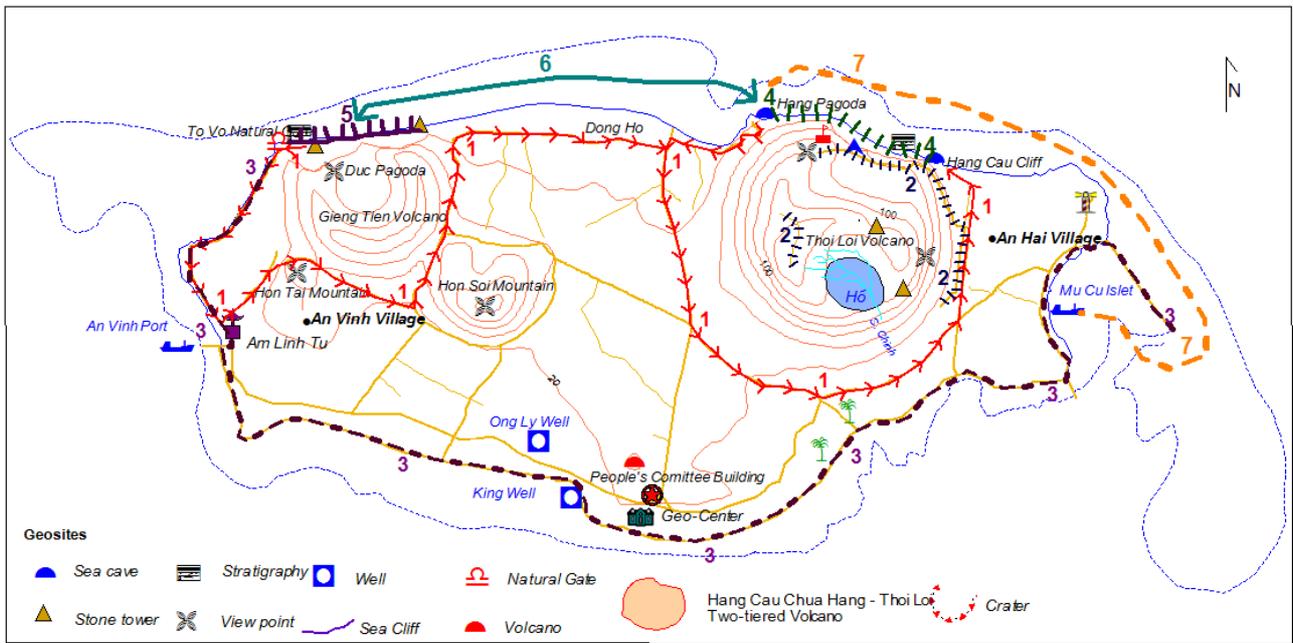


Figure 2. Route of Geo-trail on Ly Son Island (Re Isle) Map

|                       |                                                        |                       |
|-----------------------|--------------------------------------------------------|-----------------------|
|                       |                                                        |                       |
| <p>Hang Cau Cliff</p> | <p>The most impressive geo-trail in Ly Son Geopark</p> | <p>Chua Hang Cave</p> |

Figure 3. Illustrated pictures for Geotrail number 4.

3.4. Local product for geotourism

3.4.1. Cuisine

Cuisine with special foods is one of the important geo-product with high additional value that making brand for Ly Son Geopark. Ly Son is the kingdom of garlic which have strong – smelling and distinctive delicious tastes that other products of its kind cannot compare with. In addition, fresh seafood such as crab, oyster, fish, sea-urchin, seaweed are also attractive. For culinary enthusiasts, Ly Son is an ideal place to enjoy fresh seafood, combined with spices and rustic recipes. Developing cuisine is an irreplaceable geo-product for Ly Son Geopark.

Moreover, combining some activities such as: planting, caring, harvesting garlic; picking seaweed; fishing and other activities with local people also bring new experiences and attractions to tourists.

3.4.2. Cultural heritage and local special festivals

Cultural and historical values of Ly Son Geopark are highly appreciated by scientists. Ly Son is a lively museum of legends, stories, folk songs, spiritual festivals, etc., especially Feast and Commemoration Festival for Hoang Sa Soldiers. The cultural and historical value of this area should be developed into plays, cultural-show and other kinds of art to enrich the tourism products.

4. Conclusion

Geotourism creates opportunities for the development of the local economy and conservation of geo-heritages. Therefore, making more geo-products is a strategy to identify geosite as a new tourist

attraction. This study proposed basic to complex geo-products for Ly Son Geopark such as: Geo-center, Interpretation System; Geo-trail for and other potential local products. Ly Son Geopark has been researched and proposed to become a Global Geopark. Thus, geotourism development, especially geo-products, will definitely contribute to support local economic development, appealing tourists and also effectively enhancing the Earth Science education and conservation.

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