Journal of African Earth Sciences xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Journal of African Earth Sciences

journal homepage: www.elsevier.com/locate/jafrearsci

Geotourism, Medical Geology and local development: Cape Verde case study

F. Rocha *, E. Ferreira da Silva

Geobiotec Research Centre, Geosciences Dept., Univ. Aveiro, Portugal

ARTICLE INFO

Article history:
Received 22 July 2013
Received in revised form 12 April 2014
Accepted 15 April 2014
Available online xxxx

Keywords:
Cape Verde
Geotourism
Geomedicine

ABSTRACT

Geotourism and Geoparks in particular are real opportunities to rural developments promoting the rate decline of unemployment and emigration through engaging the local communities in geopark activities and tourism marketing in the form of adventure tourism, ecotourism, rural tourism and health geotourism. Geotourism is closely linked with Medical Geology. The intake of minerals and chemical elements for food, water, soil (through geophagy) or dust can be accomplished by ingestion, inhalation or dermal absorption. Pelotherapy or "Mudtherapy" is the use of mud/clay for therapeutic applications, internal or external. Cape Verde archipelago is located in Atlantic ocean, 400 km westwards of Senegal coast. Geotourism is being developed, mainly focused on the development of a geopark in Fogo island huge caldera, but also trying to take advantage of their potentialities for Geomedecine. A cooperative program established between Cape Verde University (UCV) and Aveiro University (UA, Portugal) is under way, aiming, on a first stage, to identify Geotouristic potentialities and, on a second stage, to develop products. Geotourism is being developed, mainly focused on the development of a geopark in Fogo isl. huge caldera, but also trying to take advantage of their potentialities for Geomedecine.

1. Introduction and aims

The concepts of geotourism and geoheritage have evolved significantly the last decade. Traditionally, the valuing and use of geological valuable areas as touristic resources has been linked to areas characterized by the beauty of the landscape, the spectacular rock formations or relevant/impressive features (mountains, glacier formations, rivers, canyons, caves, etc.) interesting for people loving geology or at least nature. However, both geologists and the Administration should design products and facilities making geology an attractive issue for any kind of tourists.

In strict sense, geotourism is a tourism segment focused on the sustainable usufruct (by geotourists and local communities) of the geoheritage fruition. Geoheritage must be considered as all the natural abiotic elements present in the Earth surface, emerged or submerged (representing the geodiversity of the Earth), that should be preserved due to its heritage value.

In broad sense, geotourism can be considered as a tourism segment mainly focused on the sustainable usufruct (by geotourists and local communities) of the geoheritage fruition, which can be added the cultural heritage (material and immaterial) of the areas. In this sense geoheritage is the driving force of the geotourism itineraries, but the cultural heritage it is also added to increase the value of the visited regions. This broad concept of geotourism strengthens its ability as an additional resource to be included in a sustainable model of promotion and development of areas that preserve a rich and diversified heritage. Thus, Geotourism represents a fundamental tool to promote local economic development and cultural and social support to/from the community.

When we speak about Geotourism the attention is usually preferentially paid to two main aspects involved in this concept:

(1) the geology itself, and the geological values of the area, i.e. the scientific interest of the site, as the main subject of attraction for both geologists, students, visitors and tourists;
(2) the administrations, at local or national level, which should set an adequate legal framework, in close agreement with geologists, to define, promote, arrange, restore and support the maintenance costs of the protected sites.

Unlike the traditionally assumed view of Geotourism as an activity mainly depending on scientific and administrative factors, the potentiality and development of Geotourism depends (Fig. 1) largely on purely touristic constraints such as (Meléndez et al., 2011):

* Corresponding author. Tel.: +351 917696175.
E-mail addresses: tavares.rocha@ua.pt (F. Rocha), eafsilva@ua.pt (E. Ferreira da Silva).

http://dx.doi.org/10.1016/j.jafrearsci.2014.04.015
1464-343X/

Fig. 1. Main factors controlling the Geotourism development (from Moreira et al., 2008).

- financial sources,
- touristic merchandising and facilities,
- easy connections with other touristic products,
- financial agreements and "bridges" with local administrations.

All these factors lie far behind the purely scientific interest of the site.

The definition of protected areas and the quick growth of the number of geoparks and proposals for new candidates have meant a significant step forward in the process of:

- protect the Geological Heritage;
- create social concern and making geology a valuable instrument to foster local development and tourism.

However, in the process of making Geology and Geodiversity a touristic attraction, both Geologists and the Administration often (Moreira et al., 2008) design products and facilities that are more related with research and with geodidactics or with explaining geology to school teachers, students, organized groups and occasionally for tourists than with making geology an attractive issue for tourists (see Fig. 2).

Scientific research, teaching of Geology, social valuation and use of Geology and Geological Heritage and Geotourism are activities that require a decreasing amount of scientific transfer but, conversely, an increasing share of touristic (economic) benefit and possibilities for development and wealth for the area or the communities (Meléndez et al., 2011).

"Real" Geotourism protagonists are groups of tourists with minimum, or none, knowledge of Geology, which come to visit the area (geopark or other) attracted simply by the beauty of the landscape or by having been told or seen it in a Nature or touristic guide. They may probably consider geological concepts and processes difficult but they will find it an exciting visit and will enjoy seeing beautiful and interesting things guided by good posters giving clear and simple explanations (Moreira et al., 2008).

For socio-cultural sustainable development, Geoparks hold local workshops, festivals, fairs, and educational programs. Geoproducts which are made base on geological elements of Geoparks not only introduce the local products and the local handicrafts to visitors, but increase the public knowledge of visitors about geology and geomorphology.

Nowadays the majority of geoparks are located in rural areas. Geoparks and geotourism are opportunities to rural developments and also promote the rate decline of unemployment and emigration through engaging the local communities in geopark activities and tourism marketing in the form of ecotourism, rural tourism and health geotourism. The establishment of a Geopark can be a way to promote regional food and crafts businesses as cultural components in rural areas. Creation of Geoparks can play a role in promoting local cuisine, products, and handicrafts as cultural components. It may be said that geotourism encompasses rural tourism and sustains or even enhances the geographical characteristics of a place.

Tourism plays in Cape Verde a paramount role with huge social-economic impact. Till now, Cape Verde is seen mainly (almost exclusively) as a sea beach destination (bathing, fishing, diving). Public policies are being implemented in order to offer other touristic products, in particular those not affected by seasonality.

Geotourism is being developed, mainly focused on the development of a geopark in Fogo isl. huge caldera, but also trying to take advantage of their potentialities for Geomedecine, such as: Boavista isl. and Maio isl. carbonated sands, Boavista isl. geophagic clays, Sal isl. clayey salt marshes and St. Antão isl. volcanic muds.

A cooperative program established between Cape Verde University (UCV) and Aveiro University (UA, Portugal) is under way, aiming, on a first stage, to identify potentialities and, on a second stage, to develop products.

Concerning geotourism survey, the program comprises bibliographic information and *in situ* observations in order to select sites and their relevant information (1st stage) as well as to define tracks for pedestrian and/or bike tourist itineraries (2nd stage). For each studied island, present situation must be stated as well as potentialities and needs must be putted forward.

Concerning Medical Geology, the program comprises sampling performed on selected clay, carbonated sand and salt deposits on Boavista, Maio, Sal and St. Antão islands, followed by chemical and mineralogical characterization as well as assessment of other phys-

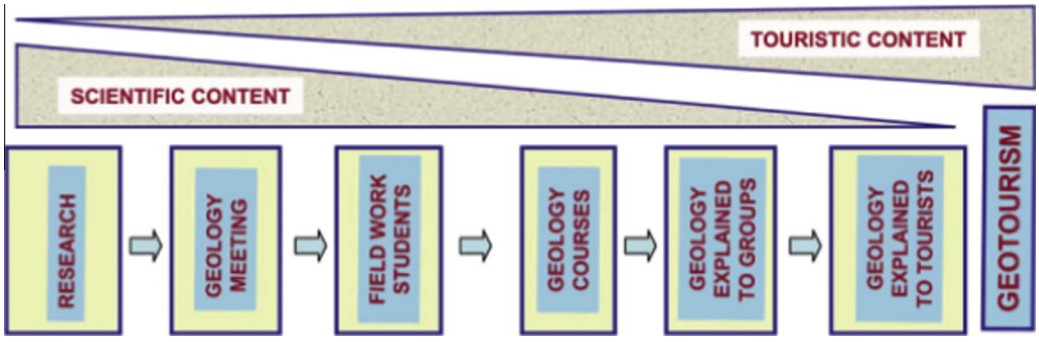

Fig. 2. Different activities generally performed by geologists in areas holding both scientific and heritage value and touristic potential, ordered according to the required scientific transfer of the activity (scientific content) and their touristic supply to the surrounding area (touristic content) (from Meléndez et al., 2011).

Please cite this article in press as: Rocha, F., Ferreira da Silva, E. Geotourism, Medical Geology and local development: Cape Verde case study. J. Afr. Earth Sci. (2014), http://dx.doi.org/10.1016/j.jafrearsci.2014.04.015