

## BUILDING A GEOPARK FOR FOSTERING SOCIO-ECONOMIC DEVELOPMENT AND TO BURST CULTURAL PRIDE: THE NATURTEJO EUROPEAN GEOPARK (PORTUGAL)

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**Resumen:** El Geoparque Naturtejo fue el primer Geoparque de la Red Europea y Global de Geoparques que fue establecido en Portugal bajo el auspicio de UNESCO. El sólido desarrollo de un Geoparque debe ser construido por la interacción entre los científicos, las comunidades locales y los políticos, bajo un enfoque fractal para el desarrollo local: conocimiento, divulgación y promoción desde la escala local hasta la escala global, y viceversa. En los territorios olvidados por los planes nacionales o por los grandes grupos privados de turismo, un Geoparque, siendo un área de geodiversidad importante en interacción histórica con la cultura local, puede marcar la diferencia si sus fundamentos están profundamente arraigados en las acciones y aspiraciones del vecindario, los *stakeholders* y los tomadores de decisiones locales. La mejor forma de lograr la relevancia de las sinergias para el patrimonio geológico y el desarrollo socio-económico se hace a través de la integración en una red de Geoparques bajo los auspicios de la UNESCO. ¿Cómo construir un Geoparque con éxito y con una larga vida, y obtener el sello de la UNESCO? y, aun más importante, ¿cómo mantener el alto nivel de los estándares requeridos por la Red Global de Geoparques? La asociación entre las autoridades locales, los *stakeholders* y las asociaciones no gubernamentales (juventud, desarrollo, ambiental y cultural), así como un profundo conocimiento integral del territorio, son esenciales para la implementación efectiva de un Geoparque. La Geología es una fuente de innumerables historias y el geólogo creativo es el único que sabe como transformar una buena historia geológica en proyectos de geoturismo. El calendario anual de geoeventos, la interacción constante con los medios de comunicación locales, los programas educativos y el desarrollo de sendas geológicas, centros de interpretación y exomuseos (geositiros con interpretación local), van a reforzar materialmente el proyecto de cara a la opinión pública local y nacional. Se pretende que un Geoparque sea una forma exitosa de llevar de nuevo al Hombre hasta la Naturaleza de una vez por todas.

**Palabras clave:** Emprendedor, Geoparque Naturtejo, geoconservación, programas educativos, geoturismo.

**Abstract:** Naturtejo Geopark was the first European and Global Geopark, under the auspices of UNESCO, in Portugal. The solid development of a Geopark must be built by the interplay of scientists, local communities and politicians under a fractal approach to local development: knowledge, divulgation and promo-

tion from the local to the global scales and vice versa. In territories long forgotten by national economical plans or tourism private lobbies a Geopark, as a well limited area of important geodiversity in historical interaction with local culture, can really make the difference if Geopark foundations become deeply rooted in the actions and aspirations of locals, stakeholders and local decision makers. The best way to achieve relevance for geological heritage and develop socio-economic synergies is through the integration in a network of Geoparks under the auspices of UNESCO. How to build a successful and long living geopark and acquire the UNESCO label and, most important, how to keep the high-level standards required by Global Geoparks Network? The partnership among local authorities, stakeholders and NGO's (youth-, development-, environment- and culture-related) as well as deep holistic knowledge of territory are essential for effective implementation of a Global Geopark. Geology is a source of uncountable stories and the creative geoscientist is the only one that knows how to transform a good geological history into geotourism projects. The annual calendar of geo-events, constant interaction with local media, educational programmes and development of geotrails, interpretive centers and exomuseums (geosite-based interpretation) physically reinforce the project under the local to national public opinion. A Geopark might be a well succeeded way for bringing back Man to Nature once and for all.

**Key words:** Entrepreneurship, Naturtejo Geopark, geoconservation, educational programmes, geotourism.

## INTRODUCTION

### Naturtejo Geopark

Naturtejo is an intermunicipal major state-owned company, established in 2004, including also private companies, aiming to create conditions for the economic development relying upon tourism. Naturtejo, EIM, is the management organization of Geopark Naturtejo da Meseta Meridional – UNESCO European and Global Geopark. The municipalities forming Naturtejo Geopark, namely Castelo Branco, Idanha-a-Nova, Nisa, Oleiros, Proença-a-Nova and Vila Velha de Ródão, have a total area of 4617km<sup>2</sup>, ruled by a cultural heterogeneity based on historical and even ecological criteria, where Geology appears as an umbrella element (Neto de Carvalho, 2005a). A Geopark intends to be a territory for excellence in three main task forces: conservation, education and (geo)tourism (Fig. 1). Using 16 geomonuments (geological icons, Neto de Carvalho *et al.* 2006a) the outstanding landscape of the Geopark is intended to be explained immersing visitors into 600 million years of Earth History.

Man discovered this territory in the Centre of Portugal (Fig. 2) at least 150000-200000 years ago due to the importance of Tejo River habitat, living several important archaeological vestiges in its margins. In the 12<sup>th</sup> -13<sup>th</sup> centuries, Tejo River was a natural borderland along which the Templars built their castles and churches. Resulting from long and diversified geological and cultural histories the Geopark's heritage comprises more than 170 geosites identified in the ongoing Naturtejo Geopark Geosites Inventory; 1 Natural Monument (Portas de Ródão); 3 Natura 2000 Sites (Serra da Gardunha, Nisa/Laje de Prata and S. Mamede), internationally recognized Important Bird Areas, 2 Thermal Springs (Monfortinho and Fadagosa de Nisa), 1 Natural Park (Tejo Internacional), 2 Historical Villages (Monsanto and Idanha-a-Velha), 5 Schist's Villages (Figueira, Álvaro, Martim Branco, Foz do Cobre and Sarzedas), several fortified villages (such as Penha Garcia, Salvaterra do Extremo, Segura, Montalvão, Rosmaninhal, Nisa or Amieira do Tejo), more than 30 local to national-importance protected monuments, and several geosites already classified as Municipal Interest.

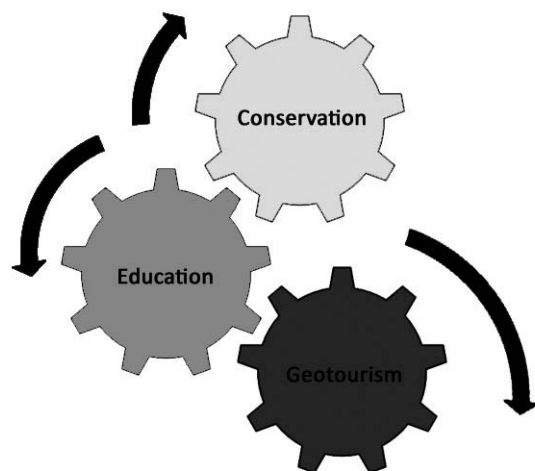


Figure1. Major task forces of a Geopark: protection, education and tourism.

products and definition of common strategies and EU funded projects (Zouros, 2004). EGN included 35 geoparks (September 2009) spread by 13 countries. In Portugal there are two European Geoparks – Naturtejo (2006) and Arouca (2009) Geoparks, and 2 ongoing and promising projects - Açores (Lima, 2007; Costa *et al.* 2008) and Porto Santo (Rodrigues, 1999; Silva & Gomes, 2003; Cachão & Dias, 2008; Cachão, 2009) Geoparks.

Global Geoparks Network (GGN), formally supported by UNESCO, has 64 Geoparks spread by 19 countries (September 2009). There are new projects from Japan, Vietnam, Indonesia, Korea, Venezuela, Mexico (N. Zouros & K. Vasileiadou, 2009, oral communication). According to Patzak & Eder (1998) it is predictable that in 2025 there will be 500 geoparks all over the world.

GGN intends to provide a cooperation and best practices platform between experts and actors on the geological heritage, under the auspices of UNESCO. GGN shall preserve geological heritage for future generations, educate and teach the broad public about issues in geological, landscapes and environmental matters, and provide research facilities for geosciences, ensuring sustainable development (Eder & Patzak, 2004).

## GEOLOGICAL HERITAGE: 600 MILLION YEARS OF HISTORY

The elements that have built Naturtejo Geopark's landscape are ubiquitous, although creators of diversity: wide areas flattened by Mesocenozoic polygenic evolution over a major Neoproterozoic basement (Beiras Group); numerous residual relieves, which *ex-libris* are the Ordovician quartzite ridges and the late-Variscan granite inselbergs; intramountain basins with alluvial to fluvial coarse sediments deposited during the paroxysms of the Alpine Orogeny; hydrographical nets deeply carved during the climate crisis of the Pleistocene and induced by important neotectonics, which broke the landscape into a succession of blocks (grabens and horsts) and motivates some of the thermal richness of the region.

Naturtejo Geopark was the first European Geopark in Portugal, integrating the European and Global Geoparks Networks, under the auspices of UNESCO, in 2006 and since then has been protecting geological heritage and promoting sustainable local development through Geotourism (Zouros, 2004).

## European and Global Geoparks Network

The European Geopark Network (EGN) is the continental network belonging to the Global Network of National Geoparks of UNESCO. The EGN aims are to protect the outstanding geodiversity of Europe, to promote geological heritage to general public and to support local economic development in geoparks (Zouros & McKeever, 2005). It stands in an active structure for sharing of information and experiences, proposal of new

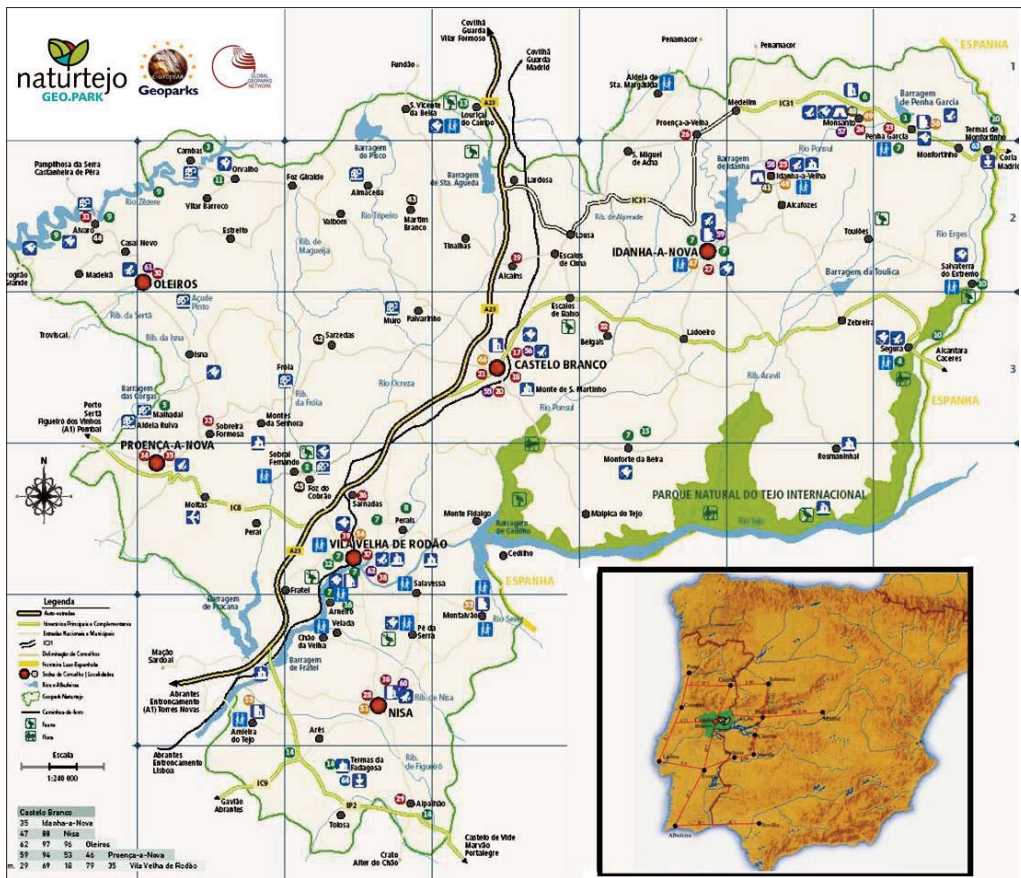


Figure 2. Geographic location of Naturtejo Geopark and tourism map showing the position of the main urban areas.

In Naturtejo Geopark the geological history is very well represented by geomonuments. This term, introduced by Galopim de Carvalho (1998) reports to geological occurrences, special geosites, places of geological interest with great and outstanding monumentality. There are 16 geomonuments that exhibit the geological history of the territory from the last 600 million years (Neto de Carvalho, 2005a,b; Neto de Carvalho & Martins, 2006). The geomonuments are: Penha Garcia Ichneological Park, Portas de Almourão Geomonument, Malhada Velha Epigenic Gorge, Segura Mines, Corgas Geomorphological Viewpoint, Inselberge of Monsanto-Moreirinha-Alegrios, Ponsul Fault, Vila Velha de Ródão Fossil Trees, Zêzere River Tectonic Meanders, Erges River Canyons, Fraga da Água d’Alta Waterfall, Portas do Ródão Natural Monument, Granite landforms of Gardunha, Arez-Apalhão Pedestal Rocks, Monforte da Beira Mining Complex, Conhal do Arneiro Roman Gold Mine (Fig. 3). Besides this geomonuments there are several geosites that are being used for tourist and educational programs.

A Geopark is an excellent territory for open air museums, also designated as Exomuseums. These ones are outcrops or landscapes with exceptional conditions that can be used as exhibition centres and outdoor



Figure 3. Some of the most important geosites found at the Naturtejo Geopark. a) Giant life signs of trilobites in the Ichnological Park of Penha Garcia (*Cruziana rugosa*); b) the impressive Monsanto granite inselberg; c) Arez-Alpalhão pedestal rock fields; d) Conhal do Arneiro huge Roman gold mine; e) lithological scarp of Água d'Alta waterfall; f) Portas de Almourão epigenic gorge: the complex land of Variscan tectonics; g) Portas de Ródão Natural Monument; h) Gardunha protected granite landforms (polygonal weathering).

geodidactic tools (Meléndez *et al.*, 2008). In Geology, most part of heritage elements needs their geological context to have meaning and value. Exomuseums can go further than museums because the object is in situ, the pieces of the “museum collection” are out doors, so it makes possible to observe phenomena in the real scale and natural conditions. It is necessary to create accessibilities and interpretative facilities to interpret the geological phenomena for the visitors and local communities. In Naturtejo Geopark the Penha Garcia Ichnological Park is the best example for a successful exomuseum but there are already other ongoing projects, such as Portas de Ródão Natural Monument, Monsanto Inselberge or the valley of Água d'Alta in Orvalho.

The great innovation of the Naturtejo Geopark project for its territory was the exploitation of the geological outstanding examples present all over the region, that although implicit, not always were valued, providing conservation measures, sustainable use and economic income for new ways of business. For example the attractive granite landforms from Gardunha or Monsanto have always been explained by the local people through legends and sacred rituals (Neto de Carvalho, 2004b), like also the similarities of Penha Garcia cruzianid trace fossils interpreted by the inhabitants as “painted snakes” (Neto de Carvalho, 2004a). But also mining activity since Iron Age (Monforte da Beira) and the Roman times (Conhal do Arneiro) were a reality in this region until the seventies of the 20<sup>th</sup> century (Neto de Carvalho *et al.* 2006b), being inventoried more than 150 mines in the Geopark. The geodiversity was essential in the establishment of villages and castles, traditional buildings, economic and traditional activities that typify Naturtejo Geopark. This is the reason why the involvement of the local communities is so important for the successes of this project: Geoparks are mostly “Geology with human’s face” (according to Mário Cachão, pers. commun.) and Geopark is being made by and for the people.

## GEOPARKS AND SCIENCE

A Geopark is the ongoing result of millions of years of Earth dynamics, centuries of territory management and scientific curiosity, fieldwork passion and tenacity for understanding nature. Naturtejo Geopark is not different from others in this perspective; it has own special history of fieldworkers which devoted their lives to research contributing deeply for the knowledge of natural and cultural heritages. These intrinsic values can sustain the present economical development of the territory based on geotourism (Neto de Carvalho *et al.*, 2008). So, scientific research in the context of the Geopark must be financial and logistically supported by their management bodies, employing scientists and/or fostering directly research projects by universities, labs, institutes or associations.

The mining resources of Naturtejo Geopark and the importance of the thermal springs from Termas de Monfortinho are long known since the publication by the Roman naturalist Pliny the Elder of his fundamental work *Naturalis Historia*. One of the first geological mapping works in Portugal was published in 1857 by Carlos Ribeiro, the first Portuguese field geologist and director of the Geological Survey, detailing the mining areas of S. Miguel de Acha and Segura. The first fossils were collected in 1874 by Nery Delgado, founder of Archeology and Geology in Portugal and still the most renowned Portuguese paleontologist. His most celebrated monographies *Estudo sobre os Bilobites e outros Fosseis das Quartzites da Base do Systema Silurico de Portugal* published in 1885 and 1888 respectively, and presenting several trace fossils from Penha Garcia and Vila Velha de Ródão, is one of the foundations for modern Ichnology. Orlando Ribeiro, the pioneer of modern geography in Portugal, worked in this territory (his "feud" as acclaimed by himself) for more than 30 years starting from 1937. He published 369 scientific papers and books concerning Physical and Human, Methodology and History of Geography, Ethnology and History, Geology and also published detailed geological maps from Castelo Branco and Nisa. He was also the founder of geotourism, in the wide sense of the concept, at the Naturtejo Geopark.

Adolf Seilacher, the most celebrated living paleontologist, Crafoord Award in 1992, contributed for more than 60 years to ecological and evolutionary paleobiology. Since 2000 he was the responsible for the internationalization of Penha Garcia fossil site through his exhibition Fossil Art travelling around the world (Seilacher, 2008), after a most important scientific paper of Goldring (1985).

Despite the curricula of pioneer researchers, there is still a lot to know about the geological heritage of Naturtejo Geopark. The geosites inventory has 170 sites of special interest but there are only three museums (from a total of 20) where the visitor finds information about geological heritage. Less than 50% of the territory is mapped at the scale 1:50000. Active research is running mainly in Portas de Ródão Natural Monument (e.g., Cunha *et al.* 2008) and at the Ichnological Park of Penha Garcia (e.g., Neto de Carvalho, 2006), geomonuments where tourism outdoor companies are operating more often and the visitor's number is increasing by thousands. New proposals for activities and business are appearing from the geosites where the field knowledge of the potentialities is more substantial and interpretation richer. Geoscientists can make people dream about past worlds and love it!

## GEOCONSERVATION

Geoconservation aims the use and the sustainable management of the geodiversity, otherwise there are no reasons that justify the geotourist potentialities of geosites.

Naturtejo Geopark do not belong to the National Network of Protected Areas, so to protect geosites would be necessary to use different, more or less objective, legislative tools such as the Cultural Heritage

or the Nature Conservation national laws. In Naturtejo Geopark there are geosites protected as Cultural Interest: 2 granite landforms in Castelo Velho (Serra da Gardunha) and the Ponsul Fluvial Gorge heritage (Penha Garcia) with Municipal Interest, and Foz do Enxarrique fossil site as national Public Interest. In application progress is Conhal do Arneiro Roman mine (Nisa) as Public Interest (also included in the Portas de Ródão Natural Monument) and the Fossil Trees in Vila Velha de Ródão (Neto de Carvalho, 2005d), as municipal interest. Portas de Ródão Natural Monument was recently declared (2009) and multi-institutional work is being devoted for protection of Portas de Almourão as a Regional Nature Park. With the last revision of the Law for the nature conservation (142/2008) geoparks are included as Areas with Conservation Designations of Supranational Importance, i.e., the Decision of the Executive Council of UNESCO (161 Ex/Decisions, 3.3.1), adopted in Paris in 2001, related with Geosites and Geoparks. However, they have not yet assigned any operational measures. Thus the protection of geosites will continue to be made separately through existing legal mechanisms. As paradigms for geoconservation in Naturtejo Geopark are the Ichneological Park of Penha Garcia, the Natural Monument of Portas de Ródão, the Portas de Almourão geomonument and Fraga de Água d'Alta geosite (Neto de Carvalho & Rodrigues, 2009).

Ichneological Park of Penha Garcia is the best and well known example of Geoconservation in Naturtejo Geopark (Neto de Carvalho, 2004a; Neto de Carvalho *et al.*, 2009). There is a vigilant form the municipality responsible not only for the security but also for the maintenance. It was established the Fossils Trail and the Climbing School and both comply with rules and standards of protection. On the other side, a lot of work with schools and tourists has been done, raising awareness for the Paleozoic topic. To save some sensitive specimens, some of the structures are being protected, other, most vulnerable, are not receiving visitors and others are being made replicas.

Portas de Ródão is a Natural Monument extending for 965 ha. Portas de Ródão was considered one of the most important Portuguese geomonuments, at the landscape level, by the pioneer geoconservationist Prof. Galopim de Carvalho (1998). The request for protection of Portas de Ródão started many years ago but only after the development of Naturtejo Geopark project municipalities reunited to work together for the cause of Portas de Ródão, since ancient times an *axis mundi* for these people. The application was coordinated successfully by Dr. Jorge Gouveia from the local Association for Studies of High Tejo NGO on behalf of the municipalities of Vila Velha de Ródão and Nisa, with the multidisciplinary scientific cooperation of the Naturtejo Geopark and several other regional and national institutions (natural parks, universities) and was finished in 2005. In these studies and besides Portas de Ródão geomorphosite itself, the inventory includes: 32 geosites of geological, geomorphological, palaeontological and geomining interest; 10 EU Habitats with 2 Priority Habitats (temporary Mediterranean ponds and fluvial forests of *Alnus glutinosa*), 119 species of birds (15 endangered), 20 of mammals (1 endangered), 10 of river fish (3 endangered), 10 of amphibians (1 endangered) and 12 of reptiles (1 endangered); 26 archeological to historical sites from Lower Paleolithic to modern times, and 13 legends.

Portas de Almourão geomonument was endangered by the building of a new big dam. The project to build it started during the forties with the idea of creating a dam 140 m high. Among other heritage is the outstanding geological heritage of Portas de Almourão, one of the most important geomonuments of the Naturtejo Geopark and responsible for the integration of the territory in the European Geoparks Network. Concerning biodiversity, the area is part of an internationally-recognized Important Bird Area (PT037). Only the people that live nearby, in the Foz do Cobrão schist village and Sobral Fernando, did not want the dam. The building of the dam goes against the ongoing development of nature tourism in these villages, disturbs deeply local ecosystems and local life, changes weather conditions for traditional use of land and the right to the landscape of their ancestors is condemned. The quality of the landscape built by thousands of

years of local culture and millions of years of Earth dynamics, during Variscan and Alpine orogenies, and Life evolution, were about to be submerged or severely injured. The Mayor of Vila Velha de Ródão presented recently the new decision of the Government to build a smaller dam 1,6 km upstream from the Portas de Almourão, not interfering with the fascinating cultural landscape surrounding the geomonument. The cause of this sudden change on the plans was assumed recently in the newspapers by the director of the National Electrical Company: in cause was the protection of Almourão geomonument included in the Naturtejo European Geopark! Nowadays the National Electricity Company is working with all local stakeholders to respect the demands of local people concerning their needs, as well as natural and cultural heritage protection. Quercus NGO - the national association for nature conservation - and Naturtejo Geopark, with the strong support of Association for Studies of High Tejo and University of Minho, started an application to protect Portas de Almourão as Regional Natural Park. There were already inventoried 29 geosites and the protecting area for geoconservation was defined. This work sums to the biodiversity inventory developed by Quercus, the archaeological inventory already done by the Association for Studies of High Tejo, and to the cultural inventory made some years ago by the Group of Friends of Foz do Córrego local association.

Before the Geopark first inventory to characterize geosites Fraga da Água d'Alta waterfalls were almost forgotten and invaded by the threatening *Acacia* neophyte. Naturtejo Geopark elevated this differentially-eroded lithological isocline scarp 50 m high divided by waterfalls in the Moradal quartzite ridge, to the condition of one of the 16 Geopark' geomonuments. Recently, researchers from the Institute for Nature Conservation visited the Água d'Alta deep valley and found a hidden treasure: in this mist environment protected from sunlight, in silica-rich soils one of the largest populations of *Prunus lusitanica lusitanica* still persists. The *Prunus* habitats are one of the most important from EU Habitat Directive (Code 5230). From the subspecies *lusitanica* less than 6000 trees exist in the world. Here researchers were marvelled to find more than 200 coexisting with *Viburnum tinus*, alders and the small fern *Omphalodes nitida*, an Iberian endemism (Armando Carvalho research team, 2009, *in letteris*). Altogether and *Arbutus unedo*, whose fruits are used in local production of jams and liquors, represent some of the last remains of the "Laurissilva" subtropical forest that during the Mio-Pliocene covered the SW of Europe and still persist mostly in some Macaronesian islands, like in the UNESCO Biosphere Reserve of La Gomera, in Canary Islands, or the Natural Park of Madeira Island. Geodiversity and Biodiversity of Fraga da Água d'Alta deserves now to be protected as Natural Monument.

Resulting from this work for protection of the geological heritage, two Geoconservation Awards were attributed to the Geopark' municipalities by ProGEO-Portugal and National Geographic-Portugal in 2004 and 2007 respectively to Idanha-a-Nova and the Natureza e Tejo association of municipalities, and the Environment National Award was attributed in 2009 to Vila Velha de Ródão and Nisa municipalities for protection of Portas de Ródão Natural Monument.

## EDUCATIONAL PROGRAMMES

A European and Global Geopark must promote the Education in Geosciences and Nature Protection (Zouros, 2004). In Naturtejo Geopark the Educational Programmes encourage and promote direct contact with the Nature, raise awareness for the protection and conservation of natural and cultural heritage, promote direct contact with geology in its real context, allow the use of scientific instruments associated with the field work, are a complement to education curricula of the Ministry of Education, help teachers in the



thematic area of Geosciences, generate significant learning, increase scientific literacy and contribute to the exercise of citizenship (Catana, 2008, 2009). Since the beginning of the Educational Programmes in Naturtejo Geopark, in 2007/2008, (until July 2009) there were 3435 students and 378 teachers participating in the proposed programmes (Catana, 2009).

Naturtejo Geopark created two different programs: "Geopark Goes to School", where the geoparks team operates several activities inside the classroom or around the school, and "School Meets the Geopark", where students and teachers come to the Geopark and visit geosites, museums, make walking trails, boat trips, visit science centers, guided by the geopark team (Fig. 4). The programmes are prepared according curricula programs of the Portuguese Ministry of Education and addressed to all education levels, from kindergarten till university. The monitors are qualified in Geosciences but the programs also seek Nature Conservation, History and Culture, in a holistic approach of the territory. Geological concepts can be very abstract like the geological time, or rock deformation, fossilization processes or tectonic plates. The Educational Programmes monitors use several tools, didactic materials, such as models of fossilized animals, reconstitutions of paleoenvironments and extinct animals, simplified geological maps, mold and cast fossils. These materials intend to generate meaningful learning. But the education is not only for the students. It is the basis for the Geotourism.

In October, 2008 Skål International, one the biggest tourism organizations in the world awarded Naturtejo Geopark Educational Programmes with the Ecotourism Award.



Figure 4. Educational Programmes "Meet Naturtejo Geopark". a) "Find geomonuments around your school" programme (Zêzere meanders painted by Oleiros Primary School); b) "School meets the Geopark" programme (Ichological Park of Penha Garcia); c) Learning how to use geologist tools in the Mosqueiro viewpoint (Orvalho); d) Boat trip in Portas de Ródão Natural Monument (celebration of thematic international days).

## GEOTOURISM

The Geological Heritage is one of the new values that can and must be exploited by tourism. It is very important to understand that Geotourism is much more than Geodiversity. It is important to cover also biodiversity, history and culture, with the main propose of local development (Fig. 5). The more high-quality offer diversity exists, the more rich and appealing the tourism destination is. When a geotourist visits a geosite he may also likes to visit a castle, an archaeological ruin, a traditional village or a wild animal and he also wants to buy handicraft, to taste the best local food and to rest in the most comfortable places, based on the traditional experience. This holistic approach not only enriches the offer but also diversifies it, making more pleasant to more people: a unique combination of experiences and emotions that differentiates Naturtejo Geopark from other tourism destinations, both in Portugal and the international tourism markets.

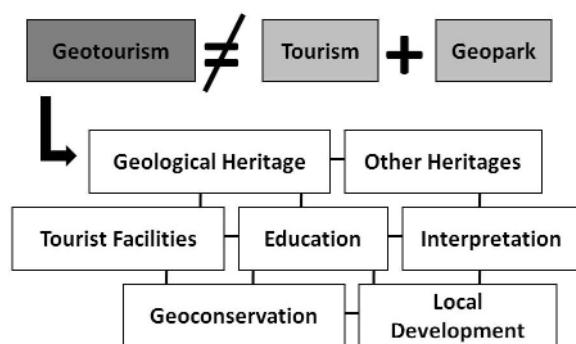


Figure 5. Geotourism-related elements for tourism diversification.

Park of Penha Garcia with the "Fossils Trail", where it is possible to swim nearby floating trilobites and orthoceratid cephalopods that once lived there, at the Granite Inselberg of Monsanto with the "Boulders Trail", or Portas de Ródão Natural Monument with "Geokayaking" and boat trips in Tejo River to see Rock Art, the Natural Monument and do birdwatching. At Conhal do Arneiro Roman Mine it is possible to walk through the "Conhal Trail", passing by the Roman mining tailings – the "conheiras", or at Portas de Vale Mourão Geomonument with the geomorphological and tectonic features nearby Foz do Cobreão, a Schist's Village with a high cultural heritage related with gold panning where visitors can revive golden ages and panning in Ocreza river margins.

It is also possible to visit fossil trees in Vila Velha de Ródão, trace fossils in the Exhibition "The world of trilobites of Sam Gon III" (future Paleozoic Museum) in Penha Garcia, the Stonemason Museum that shows the stone from the outcrop to the statue. In the museums, visitors can find accessible interpretation as in exomuseums, where it is possible to see the processes in real context. Several projects for visitation infrastructures and interpretation/signalling are on the way or being implemented. Interpretation is a fundamental tool to communicate Geology and it is made through publications, interpretative panels in geosites, viewpoints and specialized guides. It is extremely important raise communication capacity with simple message and clear images and texts (Fig. 5).

The sustainable local economy involves the creation of backup infrastructures, namely lodging, restaurants, cultural animation, outdoor activities and shops with the support for ISO certification of Naturtejo Geopark. For that, a good geotourism action plan with stakeholders from different sectors of society and funding systems are fundamental. Geoparks need a strong commitment of the local community through local administration, local associations and local companies. Local people can also be involved through Ethnogeology. The inhabitants can contribute with their empiric knowledge and explanations about natural processes and products. In Monsanto each granite boulder has a name and a legend; in Penha Garcia trace fossils are known as painted snakes and in Foz do Cobreão old miners help visitors to learn the ancient techniques of panning for gold. The "GeoRestaurant" "Petiscos e Granitos" presents Boulders Soup and the widest landscapes; the "GeoBakery" Casa do Forno has to offer Trilobite and Granulite cookies, Orogenic toasts, Earth Slices (plate tectonic pizzas) in the serenity of the Borderland. There are also outdoor activities, such as the "GeoCircuits" including boat trip to Portas de Ródão Natural Monument and "GeoKayak", with the company Incentivos Outdoor. Trilobite.Aventura suggests several outdoor activities in Penha Garcia Ichnological Park, such as the "TriloPaint", the local Paintball Championship.

One of the most popular activities in Naturtejo Geopark are the Pedestrian Trails, nature-friendly activities, made in natural or traditional paths. Among 439 km of signalized pedestrian trails cross all the Geopark, being 103 km with relevant geological interest - Geotourist Trails that can be explored in educational programs and geotourist routes. They are mainly dedicated to geological themes, such as fossils, mines or landforms (Rodrigues & Neto de Carvalho, 2009a).

It is possible to find several different experiences, such as at the Ichnological



Figure 6. Geotourist approaches in Naturtejo Geopark. a) Geokayaking in the Portas de Ródão Natural Monument (during the International Working Camp); b) Panning for Gold as tourist star-product for the Schist Village of Foz do Cobre; c) thematic visits in geotrails: the Fossils Trail in Penha Garcia; d) exploring geology with expert rangers: Naturtejo Geopark tourism package in the Boulders Trail with a group from Finland; e) University field trips in the Ordovician of Penha Garcia syncline; f) swimming with Ordovician sea animals, the first inhabitants (Pego pool, Penha Garcia).

## CONCLUSIONS

The Naturtejo Geopark, as long-term project in the scope of the UNESCO European and Global Geoparks networks, is very innovative because the geological features that have been always present in the region for the local people are being nowadays valued, protected and economically explored and sustainably exploited by local and newly-installed entrepreneurs. Small to Medium companies realize Naturtejo Geopark as new opportunity of investment, creating "Geoproducts" (Rodrigues & Neto de Carvalho, 2009b; Fig. 6).

Geotourism must be operated by several actors such as public and private entities, scientific institutions, local associations and non-governmental organizations (Rodrigues, 2009). The benefits for local communities are long-term, more sustainable and fruitful...and already in progress.

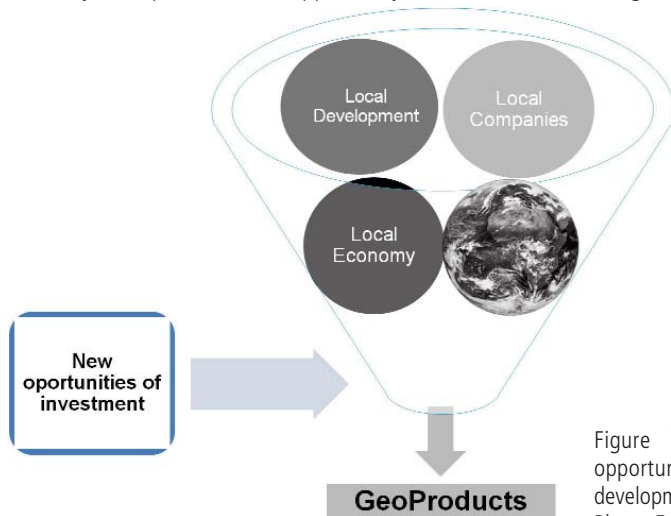


Figure 7. Geopark as a shaker for new opportunities of investment through the development of "geoproducts": local people and Planet Earth are the winners.

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