



# europaean GEO PARKS

network  
European Geoparks Magazine • Issue 7

2000 - 2010 European Geoparks  
10 Years of Innovation



This edition of the European Geoparks Network Magazine celebrates the first ten years of the Network's existence and the development and expansion of the Geoparks concept, both within Europe and other parts of the world. It provides an overview of the range of activities and achievements in education, regional development, research, tourism and geotourism. Other activities such as the European Geoparks Week, the VIII European Geoparks Conference, The International Intensive Course on Geoparks and new developments within individual geoparks are also highlighted. Two new members, Geopark Shetland, UK and Chelmos-Vouraikos Geopark, Greece provide articles which describe the attributes of their territories.

Activities within the European Geoparks Network (EGN) in 2009 include the highly successful "European Geoparks Week" which has become such a popular European-wide event that several geoparks have extended this festivity over two weeks to celebrate the day to day activities of geoparks and encourage participants to appreciate nature and the geoheritage within their territories.

The 8<sup>th</sup> European Geoparks Conference was hosted by the Naturtejo Geopark, Portugal from 14 -16 September 2009. The conference focussed on New Challenges With Geotourism and the conference proceedings are available online and as a publication. This successful conference was attended by over 200 participants representing 34 countries from almost all continents.

The International Intensive Course on Geoparks held in the Lesvos Petrified Forest Geopark, Greece is now a successful annual event which introduces participants to the nature, activities and management of geoparks.

The history of UNESCO's role in the development of the European Geoparks Network and the foundation of the Global Geoparks Network (GGN) are also in focus, and emphasize the strong relationship and continued cooperation between the members of this network and global partners in assisting UNESCO to extend the geoparks concept to all parts of the world.

The roles of European Geoparks in education, regional development, research, geotourism and geo-education are presented in four articles. They emphasize how geoparks can contribute to these major activities by sharing good practice and by cooperating with their local communities. They also demonstrate how these interrelated activities can contribute to regional development by increasing visitor numbers through the creation of enjoyable and memorable experiences in which information about a territory is communicated in a variety of ways such as geotrails, cycle routes, exhibitions, as well as active visitor service and guidance. Ongoing scientific research ensures that geoparks will continue to progress in their roles as active centres for providing holistic views of Earth history and for raising awareness of the need to protect and conserve the natural and cultural environment. The various approaches and tools for geo-education show, how Geoparks can create awareness, knowledge and fascination for our planet and for the necessity to protect our environment for future generations.

Three additional contributions focus on an interactive geoguide system (Reserve Geologique de Haute Provence) the needs of visually impaired children and students (Geopark Bohemian Paradise), and describes a new educational programme which introduces schoolchildren to the nature, causes and effects of earthquakes (Lesvos Petrified Forest Geopark).

The expansion of the European Geoparks Network and the increasing number of new applications provide clear evidence of the success of the geoparks concept. However, the exciting new opportunities created by continued growth also present the Network with a significant challenge in the coming years.

Tony Ramsay, Member of the Editorial Board



## European Geoparks Network Magazine

Issue No 7 / 2010

**Published by:**

Natural History Museum  
of the Lesvos Petrified Forest  
on behalf of the  
European Geoparks Network

**Executive editor:**

Nickolas Zouros

**Editorial board:**

Heinz Kollmann  
Tony Ramsay  
Jutta Weber  
Nickolas Zouros

**Contributors:**

Sylvie Giraud,  
Sita Hughson,  
Patrick J. Mc Keever,  
Heinz Kollmann,  
Margarete Patzak,  
Tony Ramsay,  
Tomas Ridkosil,  
Nikos Topouzidis,  
Jutta Weber,  
Nickolas Zouros

**Editing:** Tony Ramsay

**Publication manager:**

Antonis Georgiou

**Print:**

Epikinonia S.A

**Cover photo:**

Sobrarbe Geopark, Spain

**Copyright:** The magazine and all the contributions and illustrations contained therein are protected by copy-right. No part of this magazine may be copied or reproduced without the written approval of the publishers. This also includes commercial reproduction as an electronic data base and copying on cd rom. c 2010



**European**  
**Geoparks**  
**GEOPARKS**  
**calendar**

- **28 September - 5 October 2010**  
**Greece**

26<sup>th</sup> European Geoparks Meeting 2010  
 9<sup>th</sup> European Geoparks Conference  
 Lesvos Petrified Forest Geopark

- **2010 - Brazil**

1<sup>st</sup> Latin American Geoparks Meeting  
 Araripe Geopark

- **March 2011 - Wales**

27<sup>th</sup> European Geoparks Meeting 2011  
 Fforest Fawr Geopark

- **2011 China**

5<sup>th</sup> International symposium on  
 Development with in Geoparks

- **September 2011 - Norway**

28<sup>th</sup> European Geoparks Meeting 2011

10<sup>th</sup> European Geoparks Conference  
 Gea Norvegica Geopark

- **May 2012 - Japan**

5<sup>th</sup> International Conference on  
 Geoparks UNESCO  
 Unzen Geopark

**04** The European Geoparks Week 2009  
 The European Geoparks Fortnight  
 2009

**05** VIII European Geoparks Conference  
 Geoparks: New Challenges with  
 Geotourism

**08** 4<sup>th</sup> International Intensive Course  
 on Geoparks  
 Evaluating Earth Heritage  
 Management

**10** The UNESCO Global Geoparks  
 Network

**14** Education in European Geoparks

**18** Regional Development in European  
 Geoparks

**22** Research in European Geoparks

**26** European Geoparks: Destinations for  
 Tourism & Geotourism

**30** Using a Geo-Guide to discover the  
 Natural Geological Reserve of  
 Haute-Provence

**31** Bohemian Paradise Geopark  
 for sightless visitors

**32** Earthquake simulation & seismic  
 hazard protection

**33** Geopark Shetland

**34** Chelmos - Vouraikos Geopark

**35** European Geoparks Network  
 Charter

## The European Geoparks Week 2009

# The European Geoparks Fortnight 2009

In 2009 European Geoparks dedicated two weeks with numerous outstanding events designed to celebrate the day to day activities of geoparks and to encourage the appreciation of nature. 'European Geoparks Week', initiated

## European geo-heritage in all facets

in 2005, was gradually extended to include a fortnight of activities. Last year proved to be the most successful year so far, and the total number

of visitors to the various geoparks increased from 37,500 in 2008 to approximately 63,000 in 2009.

The activities offered by the participating geoparks did not focus on geology alone. Events combining geoheritage with natural history and other regionally specific traditions including sport, local food and music were extremely popular.

Themed events involving caves and underground activities were particularly well attended, as were a number of activities focussing on environmental education for children and students. However, the wide range of exhibi-

tions organized by individual geoparks attracted by far the highest number of visitors.

During Geoparks Fortnight, the 441 trans-European events included excursions, lectures, evening entertainment and exhibitions. Publicity for these events included 245 press releases, including radio and TV broadcasts, and the distribution of 143,275 flyers, brochures, and posters.

To sum up, it is clear that "Geoparks Fortnight" is fast becoming one of the most popular European-wide events for the promotion of nature and the environment.



Exhibition at Palazzo Gervina Visitor Center, Beigua Geopark, Italy



A Fossil workshop for children, Sierra Subbeticas Geopark, Spain

# VIII European Geoparks Conference

## G E O P A R K S

### New Challenges with Geotourism

Portugal 12<sup>th</sup> -18<sup>th</sup> September 2009



**Armindo Jacinto, chairman of Naturtejo Geopark presents the symbolic "Adufes" to the Arouca Geopark, Portugal and GeoMon, Geopark Wales which were welcomed as new members of the EGN**

The 8<sup>th</sup> European Geoparks Conference was hosted in the Centro Cultural Raiano of Idanha-a-Nova town in Naturtejo Geopark, Portugal. Idanha-a-Nova is a small agricultural town, noted for its elegant 18<sup>th</sup> and 19<sup>th</sup> Century palaces and manor houses, is a short drive away from the unique and pretty village of Monsanto consisting of a group of granite houses and a prominent castle. During the planning phase it was decided that since geoparks are pioneers and advocates for geotourism aiming to provide high quality destinations for geotourists, the 8<sup>th</sup> European Geoparks Conference should focus on New Challenges With Geotourism. The conference was attended by over 200 participants representing 34 countries from all continents except Africa. Delegates were welcomed

by the Regional Tourism body of the Centre Region, the National Commission for UNESCO and the Ministry for Foreign Affairs. Coverage of the conference was provided by the national media and Beira Tv. the regional web TV. The conference focussed on seven themes. Contributions to the session on Geoparks and Tourism covered a range of subjects, including educational programmes and tourism development, the

promotion of sustainable tourism, and the use of geotrails and water in geotourism. This session also considered the importance of creating memorable experiences for visitors to geoparks, and the need to encourage participation by adolescents and local people in the activities of their geopark. The use of Google software to create a virtual geopark demonstrated an innovative approach for providing disabled people with a geop-

**Margarete Patzak (UNESCO) contributing to the opening speeches of the 8<sup>th</sup> European Geoparks Conference.**



ark experience. The necessity for a carefully considered action plan in the development of a geopark was also highlighted. The session Geotourism and Local Development included talks on geotourism development within individual geoparks, the production of geoproducts and the development of interpretation facilities including audio guides. The need to involve communities in establishing geoparks and how local people can contribute as ambassadors for the global network of geoparks was also emphasized. Talks delivered in the session on Geoparks and Science covered a variety of subjects. These included geodiversity as a basis for geoconservation and geotourism, communicating the story of climate and man, and the application of scientific research in geoparks to encourage geotourism and for raising public awareness of the nature and causes of seismic activity. The presentation by the aspirant Azores geopark considered the role of volcanic and tectonic activity at the triple junction between the North



American, Eurasian and African plates in the creation of the geological heritage of this territory. The occurrence and importance of geosites and fossils as a scientific and educational resources and the role of geoparks in scientific education were also discussed in this session.

The session devoted to Geoconservation Best Practices and Wrong Ways focussed on strategies for geoconservation and sustainable development, the quantitative assessment of geotopes, the conservation of a territory's geological, mining and palaeontological heritage and the threat posed by quarrying uranium ore in Naturtejo Geopark. This session also highlighted the contribu-

tion of geoparks to geosciences and environmental education. A session dedicated to Marketing Strategies for a Strong EGN Brand emphasized the rigorous procedures involved in the EGN revalidation process for creating a strong brand for geoparks. The importance of community involvement in developing sustainable tourism products and the role of publications in marketing global geoparks was also discussed. In the session involving Man and Nature: Culture and Landscapes, contributions included talks concerned with communicating the relationships between man and nature, the relationships between cultural landscapes and livelihoods, oral "traditional" stories from the Araripe Basin Geopark, Brazil and the presentation of geological history through pictures, poems and performance. The cooperative project, Dialogues between Man and Earth, between two EGN Geoparks demonstrated how "ordinary" manufactured objects can be used in an exhibition to reveal the Man-Earth relationship. Presentations by prospective geoparks in the session New Geoparks and their Tutors are evidence of the success of the

**Armindo Jacinto, chairman of the Naturtejo Geopark, presents the symbolic "Adufes" musical instrument to Arouca Geopark, Portugal, and GeoMon, Geopark Wales which were welcomed as new members of the EGN**



The ice breaker out-of-doors dinner involved conference delegates in an interactive theatrical performance



geoparks movement which was initiated only ten years ago. Delegates from Portugal, Brazil, Estonia, Finland, Spain, Turkey and Venezuela presented papers showing how the respective geological heritage and tourism activities in their prospective geoparks fulfilled the necessary requirements for inclusion in the European and Global Geoparks networks. The trans-national Novohrad-Nograd Geopark initiative involving Hungary and Slovakia provided a superb example of countries cooperating for their mutual benefit. The keynote speakers Nikolaos Zouros and Patrick McKeever shared their knowledge about the EGN and activities within geoparks. Ross Dowling discussed the development, nature, challenges and future of geotourism and Jose Brilha presented an overview of the status of geoparks within the context of the geological heritage and geoconservation in Portugal. Margarete Patzak closed the conference with a presentation of UNESCO's perspective on geoparks. The inclusion of an article From the Geotourist's Point of View, written by sixteen years old Patricia Santos, describing a young person's response as a geotourist in Naturtejo Geopark

is a welcome addition to the approximately 90 articles contributed to the conference proceedings by specialists. The published proceedings of the 8<sup>th</sup> European Geoparks Conference New Challenges With Geotourism provide a benchmark for aspiring geoparks and other territories engaged in geotourism activities.

The out-of-doors opening dinner with panoramic views of the Ichnological Park of Penha Garcia made the participants feel welcome and gave them the opportunity to introduce themselves in convivial surroundings. On the second night delegates were entertained by the fascinating sounds of Luisa Amaro and the Adufe Women Players. At this

event Naturtejo Geopark presented the new geoparks GeoMon Geopark, Wales and Arouca Geopark, Portugal with personalized "Adufe" musical instruments which are the symbol of Idanha-a-Nova, the heart of Naturtejo Geopark. Two four-day conference excursions provided participants with the choice of either exploring the Portuguese Naturtejo and Arouca Geoparks or discovering the best monuments in the Naturtejo Geopark. Associated conference events included the 1<sup>st</sup> European Geoparks Fair which successfully presented many of the European Geoparks to over 20,000 visitors. The Nature Tourism Business meeting involved discussions between Portuguese and Spanish tour operators, the staff of Naturtejo Geopark and the Idanha-a-Nova Management School concerning the possibility of developing businesses with other geoparks. The around-the-clock Idanha Film and Internet Festival introduced the local people to geoparks and to environmentally related issues.



**Visitors learn about the Geological mining Park of Sardinia at the 1<sup>st</sup> European Geoparks Fair in Idanha-a-Nova**

# 9th European Geoparks Conference

1-5 October 2010 Lesvos, Greece

## GEO PARKS: Learning from the Past - Building a Sustainable Future

under the auspices of UNESCO



## Celebrating 10 Years of Innovation

[www.petrifiedforest.gr/lesvos2010](http://www.petrifiedforest.gr/lesvos2010)

## 4<sup>th</sup> International Intensive Course on Geoparks Evaluating Earth Heritage Management

1-6 October 2010 - Lesvos, Greece

The Geography Department of the University of the Aegean and the Natural History Museum of the Lesvos Petrified Forest invite you to participate in the intensive course on Evaluating Earth Heritage Management which will be held parallel to the 9th European Geoparks Conference and will involve a variety of lectures, workshops and fieldtrips.

This intensive course is co-organized by the Global Geoparks Network and the European Geoparks Network.

### Participants

Invited to participate in the course are:

- geopark staff members (with a university degree)
- post graduate students working on topics related with geoconservation, environmental education, geotourism, geopark management,
- geoscientists interested in geoparks

Participants have to submit application form, accompanied by a short CV and an abstract for their presentation.



### Information

#### Intensive Course on Geoparks 2010

Language: English

Participation: 20-30 participants

Patronage: UNESCO

Venue: University of the Aegean - Department of Geography, Mytilene

Natural History Museum of the Lesvos Petrified Forest

Scient. direction: As. Prof. Nickolas Zouros, University of the Aegean

Registration Fee: 250 €

Early Registration: 200 € (Before July 31)

The fee includes the 9th Geoparks Conference fee and lessons by international staff, the European Geoparks book, didactic material, course field trips and field trip meals.

Accommodation and Meals: 300 € (6 nights in a double room in a hotel and 2 meals daily).

### Contact

Lesvos Petrified Forest Geopark: [www.petrifiedforest.gr](http://www.petrifiedforest.gr)

Natural History Museum of the Lesvos Petrified Forest: [www.lesvosmuseum.gr](http://www.lesvosmuseum.gr)

Tel. Fax: +30 22510 47033

Email: [lesvos2010@hotmail.com](mailto:lesvos2010@hotmail.com)





**2000 - 2010**

**10 YEARS**

# European Geoparks Network



Thirty seven European Geoparks working together on the conservation and the appreciation of their geological heritage for sustainable territorial development, are pleased to welcome you.

We hope that you will enjoy a visit.

European Geoparks Network



# The UNESCO Global Geoparks Network



Today, at the start of the 21<sup>st</sup> century we can look back over a century that has seen enormous advances in our understanding of how our planet functions. While we might still be unable to predict exactly when an earthquake will happen or precisely when a volcano will erupt, we know why these phenomena occur. We know how and why mountain ranges are formed and we know how the very face of our planet changes over millions of years as the tectonic plates of the Earth's crust continue their relentless move over the surface of the planet. But it wasn't always like this. For centuries, people had no clear understanding of Earth processes. Nevertheless, people were in awe of their landscape and of the planet's natural phenomena and stories, myths and legends arose to help explain them. We, as geoscientists, now have explanations for all these phenomena. However, perhaps we

should ask ourselves how successful are we at sharing this knowledge with those with no formal geological training? Moreover, how good are we at preserving these phenomena and special landscapes for future generations. Many people today still ask the same questions our ancestors of long ago asked. Yet, all across our planets we have places where the amazing story of our planet can be told to the non-specialist without the need for the use of the esoteric language so often employed by geoscientists. Moreover these places should be conserved for the future. But it should not be our aim to conserve them in a sterile way where only the geoscientist can visit, it should be our aim to conserve in a way that the local communities can take ownership of these places and where they can feel that these places contribute positively to their everyday lives. Local communities across Europe, China and increasingly other parts of the world, are beginning to realise that their geological heritage can provide a source of sustainable economic benefit to their area. Rather than exploit this heritage in the non-renewable fashion of the past, there is an opportunity to manage it in a way that conserves it for the future through the development of geotourism. This form of sustainable economic development has the potential to directly impact on those rural areas

that have suffered from economic stagnation or demographic decline. But why should geoscientists be involved in such activities? In simple terms, we have to demonstrate to the wider public the relevance of geological science in the 21<sup>st</sup> Century. We have to rebuild the bridge between our knowledge of the Earth, it's history and it's landscape and the total dependence of modern society upon Earth's natural resources, a link that was known to generations past.

## The Geopark Concept

In June 2000 representatives of four European territories, which had separately been promoting geological conservation and sustainable development, came together in Greece to discuss their common socio-economic problems (stagnant economic development, high unemployment, rural depopulation and the ageing of the remaining population) and how to

**A European Geopark Information corner at the visitor's centre of the Subbeticas European and Global Geopark, Spain**

**Geoparks have become popular tourist destinations in China.**

**A crowded view point at the top of Mount Huangshan Global Geopark**



Geoparks organize activities to enhance public awareness on geodynamic processes and natural hazards. In Lesvos geo park educational activity on volcanoes includes on line connection with erupting Eyjafjallajokull in Iceland



address these problems through the protection of geological heritage and the promotion of geological tourism. The result was the signing of a convention declaring the creation of the European Geoparks Network. The purpose of this new designation was to provide a network within which to share information and expertise, and to define common tools for addressing these issues.

In November 2000, the four members of the new network, Reserve Geologique de Haute-Provence (France), Lesvos Petrified Forest (Greece), Maestrazgo Cultural Park (Spain), and Vulkaneifel (Germany) invited interested regions and organisations from across Europe to join them in learning more about geoparks and to apply for membership of the new network. From its formal beginnings in June 2000, the European Geoparks Network grew rapidly and successfully. One of the key early successes for the European Geoparks Network was the signing of an official agreement of collaboration with UNESCO (the then Division of Earth Sciences) in April 2001 which placed the new network under the auspices of UNESCO, thereby confirming the network's important contributions to conservation and sustainable development issues in Europe. Since then, UNESCO has played an

important role in the development of the European Geoparks Network and has used the European model as the one to follow as they rolled out their Global Geoparks Network<sup>1</sup>.

### The Global Geoparks Network

At a meeting in the UNESCO headquarters in Paris in February 2004 representatives from the scientific board of the International Geoscience Programme, the International Geographical Union and the International Union of Geological Sciences along with international experts on geological heritage, conservation and promotion agreed to the establishment of a "Global Network of National Geoparks (GGN) under the auspices of UNESCO." This decision was endorsed by the 1<sup>st</sup> International Geoparks Conference, Beijing, China, 2004. Three goals were established for the new global network, i.e. conserving a healthy environment, education about Earth Sciences to the wider public and fostering sustainable local economic development. Currently (May 2010) the GGN comprises 66 members in 19 nations including 37 in Europe, 22 in China, 3 in Japan and one each in Australia, Brazil, Iran and Malaysia.

But what actually is a Geopark? As specified in the operational guidelines, a

Geopark is not just a collection of geological sites, but is a territory with a particular geological heritage of international significance and with a sustainable territorial development strategy<sup>2</sup>. It must have clearly defined boundaries and a sufficient area to allow for true territorial economic development, primarily through tourism. Geological sites must be of international importance in terms of their scientific quality, rarity, aesthetic appeal and education value. Sites cannot only be related to geology but also to archaeology, ecology, history and culture. All these sites in the geopark must be linked in a network and constitute thematic parks with routes, trails and rock sections that can benefit from protection and management measures. Typical activities in a Global Geopark include the development of walking and cycling trails, the training of local people to act as guides, education courses, provision of information signage and the development of modern museums and visitor centres. The ultimate aim of a Global Geopark is to bring enhanced employment opportunities for the people

**A group on a geological walking route within the Reserve Geologique de Haute-Provence European Geopark visiting the in-site remains of a fossilised ichthyosaur**



who live there. These opportunities are now being realised right across the expanding network but they are being created in association with the conservation of the geological heritage of the geoparks. But this conservation is not of the restrictive type. Geoparks use a holistic approach to conservation where all aspects of a geopark's natural and cultural heritage are valued, conserved and promoted under the geopark label. Geoconservation is implicitly expressed within the operational guidelines of the Global Geoparks Network through the strong statement that no destruction or sale of the geological value of a Global Geopark may be tolerated, except for scientific or educational purposes. Furthermore, a Geopark has to develop and enhance methods and tools for the preservation and conservation of geological heritage, as well as to support and develop scientific research related to the various disciplines of the Earth Sciences. Education and training on the natural and geological environment comes as a direct consequence of conservation

**An example of geoconservation from the Lesvos Petrified Forest European Geopark**



strategies and aims to promote knowledge and value of geological heritage, outlining the concept of geodiversity in the territory. Sustainable development is considered as an essential practice for economic development in the territory and for the strengthening of the management structure and, therefore, for the Geopark itself. Geological heritage is evaluated and considered from the inhabitants' perspective, presence and needs. The contribution of the Geopark is thus seen through the enhancement and promotion of a certain image related to the geological heritage and the development of tourism with related actions. This should have a direct impact on the territory influencing its inhabitants' living conditions and environment, lead

to a revalidation of the values of the territory's heritage and enforce active participation in the territory's cultural revitalization as a whole. Finally, and crucially, a Global Geopark has to work within the network for its further expansion and cohesion, collaborate with other geoparks and local enterprises for the achievement of its objectives, create and promote new by-products linked with geological and cultural heritage in the spirit of complementarity with the other Global Geoparks Network members. In practise this is mostly achieved through regional networks such as the European Geoparks Network or the Asia-Pacific Geoparks and Geoheritage Network (which was founded in November 2007).

**Information center with the traditional Chinese architecture at Mount Huangshan Global Geopark in China**

### **The European Geoparks Network: Regional Cooperation**

As mentioned above, the Global Geoparks Network operates primarily through regional cooperation. Such regional cooperation is best exemplified by the European Geoparks Network which has been operating for ten years. One of the stated aims of the European Geoparks Network is to exchange ideas and expertise on promoting geological awareness and sustainable devel-



**Young students, local people and authorities celebrate Arouca Geopark membership in the European Geoparks Network, with a happening at the central square of Arouca Municipality in Portugal, liberating balloons with message to the European citizens, in May 2009**

opment. It is with this aim in mind that the members meet twice a year. The first meeting is open to everyone, members and non-members alike. The second meeting, the annual meeting, is only open to members of the network. These meetings promote the use of common tools such as the website ([www.europeangeoparks.org](http://www.europeangeoparks.org)), magazines, displays, events but also encourage members to develop exchanges or projects between smaller groups of geoparks. Once a year all members participate in European Geoparks Week. This is a series of coordinated events (e.g. guided walks, talks, activities for children) which occur during the same week in all European Geoparks. This annual event is aimed at increasing public awareness about Earth science

**Young dancers at Langawi Global Geopark, Malaysia, celebrating the International Geopark Fair**



issues in general and about building awareness of the European Geoparks Network and our great shared geological heritage. Not only are members of the public in one geopark informed about activities occurring there but they are also made aware of the fact that they are part of a much wider series of pan-European events. Transnational networking and sharing of knowledge will lead to new concepts, outputs and results for further integration on spatial planning, transnational environmental problems and development issues. The creation of quality standards for geoparks services and products is one of the key aims of the network. As part of this, an evaluation process has been established that will try to measure the level of quality in infrastructure, services and sustainable management in each member of the network. The process will be repeated every four years to ensure that the level of quality remains of the highest order. An evaluation dossier has been drawn up and the evaluation process occurs in two parts. Firstly, the geopark subject to the evaluation completes a self-evaluation. This is followed by a visit and an evaluation by an independent referee. A geopark which fails to reach a certain quality level

in the evaluation process will lose its membership of the network. To date this has happened to three former members.

The network continues to expand, drawing in new expertise and knowledge from all parts of Europe. Many new membership applications are pending and members from across the network are assisting these territories in their membership bids to ensure the overall high quality of services the network insists on is maintained. The network is still young and the coming years will continue to be one of great challenge. With the global partners in the Global Geoparks Network, the members will continue to assist UNESCO in bringing the geopark concept to all parts of the world, especially to the developing world where sustainable tourism, such as that developed within geoparks, could lead to job creation in local rural communities for the benefit within these communities.

*P. J. Mc Keever<sup>1</sup>  
 N. Zouros<sup>2</sup>, M. Patzak<sup>3</sup>*

**References**

Eder, F.W., 2004, The Global UNESCO Network of Geoparks, in Zhao, X., Jiang, J., Dong, S., Li., & Zhao, T., eds, Proceedings of the First International Conference on Geoparks: Beijing, Geological Publishing House, pp1-3.  
 Frey, M-L., Martini, G. & Zouros, N., 2001, European Geopark Charter, in Frey, M-L., ed., European Geoparks Magazine. Issue 1 (2001), 28.  
 Martini, G. & Zouros, N., 2001, European Geoparks: Geological Heritage & European Identity - Cooperation for a Common Future, in Frey, M-L., ed., European Geoparks Magazine. Issue 1 (2001), 4.  
 Zouros, N. & Martini, G., 2003, Introduction to the European Geoparks Network, in Zouros, N., Martini, G., & Frey, M-L., eds, Proceedings of the 2nd European Geoparks Network Meeting: Lesvos, Natural History Museum of the Lesvos Petrified Forest, pp. 17-21.

1. Geological Survey of N. Ireland, Colby House, Stranmillis Court, Belfast, BT9 5BF, Ireland  
 2. Department of Geography, Aegean University, Mytilene, GR-81100, Hellas  
 3. UNESCO, Division of Ecological and Earth Sciences, 1 Rue Miollis, 75732 Paris Cedex 15, France

# Education in European Geoparks

Understanding that the Earth, between its origin 4.5 billion years ago and the present day, has been changing constantly can be both fascinating and exciting especially for people who are relatively unfamiliar with the geosciences. The positions of continents, ocean basins and mountain ranges, the composition of the atmosphere, the global climate and the nature of life on Earth have all changed through time. Only physical processes such as erosion, sediment transport and deposition by water, wind and ice and the crystallisation of minerals from molten rocks or salt saturated waters have always remained constant. Slow lateral (side-ways) movements of the plates which make up the Earth's hard outer shell trigger catastrophic earthquakes which are sometimes associated with devastating tidal waves (tsunami). Plate boundaries are also the sites of volcanic activity. News reports of catastrophes arising from volcanic

eruptions, earthquakes and associated tsunami show clearly that plate motions are forces over which we have no control. Thus understanding these changes and processes, the nature of landscapes, the causes of global climate change and our place and responsibility in the dynamic and holistic system which we call Earth is a great educational resource. Through their communication skills, European Geoparks contribute to informal and formal education by sharing their accumulated scientific, historical and cultural knowledge, and ethical values with visitors of all ages. In the broadest sense, geoparks are centres for informal education providing tourists with informative and enjoyable experiences which enhance their appreciation of geological history, the evolution of landscapes and the relationship between geological resources, landscapes, and cultural development. They also create an understanding of the need to manage and protect the environment and preserve the natural and geological heritage for future generations. Geoparks also serve as outdoor laboratories for formal, traditional education and research in which the main target groups are schoolchildren and university students<sup>1</sup>. Introducing education about the environment and geology into the school curricula and offering training pro-



grammes for teachers can enhance the transferable skills of individuals and thus contribute directly and/or indirectly to their social and economic prospects.

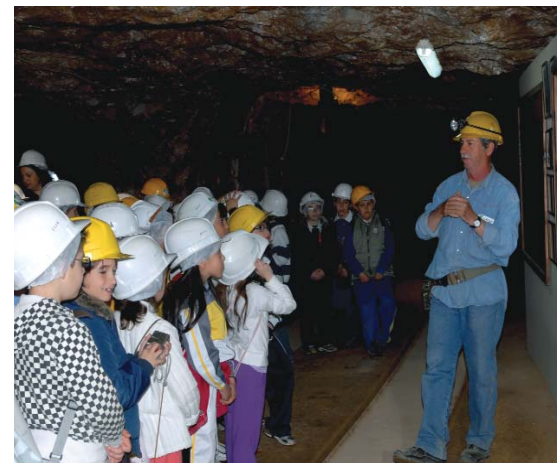
The informal communication of knowledge is an activity common to all geoparks. Exhibitions in information centres and local museums usually tell the story of the Earth's history and chronicle the geoparks' geology, natural history, archaeology and culture through panels, visual images and specimens which visitors can touch. These facilities are sometimes accompanied by books and leaflets. Terra. Vita Geopark, Germany<sup>2</sup>, for example, reconciles the interests of tourists and scientists by using the concept of stage design for exhibitions in its Information Centre. This Geopark is also investigating the potential for using the high-tech

**Fig. 2. Henllys Vale with its limekilns and the Henllys Vale Colliery chimney is one of the destinations in Fforest Fawr Geopark, Wales, for schoolchildren and visitors who wish to learn about the Geopark's industrial and cultural history**

**Fig. 1. Visitors to the Museum of Geology in the city of Apt, Luberon Geopark, France, are introduced to life in an Oligocene landscape between 34 and 23 million years ago**



**Fig. 3. Schoolchildren on a fieldtrip to the Porto Flavia Tunnel in the Geological Mining Park of Sardinia, Italy**





**Fig. 4.** Schoolchildren enjoy a geology fieldtrip in Hateg Country Dinosaurs Geopark, Romania (Photo - Dan Palcu)

treasure hunting game geocaching as a new approach to encourage visitors to learn about the landscape<sup>3</sup>. The exhibition area in the headquarters of Luberon Geopark, France<sup>4</sup>, enables visitors to appreciate its landscape and geological history and to understand the necessity for conserving the Earth's heritage preserved in rocks, fossils and minerals. Exhibitions in the Museum of Geology in the city of Apt combine fossil specimens with pictures of the landscapes animals and plants for different geological time intervals (Fig. 1). By emphasizing and communicating the fascination their unique geological, natural and cultural heritage, sometimes through adventure and fun, geoparks attract people of all ages creating an interest in enhancing their knowledge and appreciation of the evolution of a territory and a feeling for their place within the vast space-time continuum of nature's beautiful and mysterious system. Delivering this information also caters for geotourism, a new form of special interest tourism<sup>5</sup>. It includes the design of websites and the production of leaflets, guide books and panels interpreting geosites and the landscape in which the geology and other features are inter-

preted in language that is understandable to non-specialists so that all visitors can enhance their knowledge through onsite experiences. Visitors to geoparks can also get a sense of the significance of geosites within a wider context by following geotrails and reading easily understandable geological maps in accompanying guides, e.g. the walkers' guide to the North West Highlands Geopark, Scotland<sup>6</sup>. Sobrarbe Geopark, Spain, provides clues along cycle trails which allow visitors to reconstruct the geopark's geological history<sup>7</sup>. Visitors to geoparks, however, cannot fail to be fascinated to learn that they are standing in landscapes which may have in the past, as revealed by their geology, been situated in different latitudes, climates and environments or exposed to high temperatures, pressures and deformational forces several kilometres below the surface. That some territories were, at some stage/stages in their geological history, subject to catastrophic events such as earthquakes and volcanic eruptions are also subjects which can captivate visitors' imaginations. Developing an awareness of how the geology, landscape, natural history and occurrence or non-occurrence of mineral resources has shaped the lives and culture of the people who live in geoparks introduces a social element into the appreciation of these territories. In the field of formal education, geoparks provide ideal destinations for school and university courses requiring experiences in field work. All geoparks deliver programmes for schools. In Fforest Fawr Geopark, Wales, for example local schoolchildren are introduced to

the industrial archaeology, and aspects of cultural history which are related to the former exploitation of mineral resources within the Geopark (Fig. 2). Schoolchildren in the Geological Mining Park of Sardenia enjoy exciting fieldtrips when they visit the Porto Flavio Tunnel, an engineering masterpiece associated with mineral exploitation within the Geopark (Fig. 3). Geoparks are also providers of materials and services to schools and school teachers. Hateg Country Dinosaurs Geopark Romania has developed field activities as part of the school curriculum (Fig. 4). Papuk Geopark, Croatia organises a childrens workshop entitled "What is so special about volcanoes?". This involves an outdoor simulation of a volcano and includes a short lecture (Fig. 5). Geoparks can also serve as vocational training centres providing guidance in a variety of disciplines. European Geopark Bergstrasse Odenwald, Germany organises Ranger-schools for primary school children (Fig. 6). The impressive and professional presentation to the public of this Geopark by its young Rangers at the Geoparks Fair in Osnabruck during the 3rd International UNESCO Geoparks

**Fig. 5.** Schoolchildren participating in a workshop "What is so special about volcanoes?" in Papuk Geopark, Croatia





**Fig. 7. A schoolboy from Swabian Alb Geopark, Germany learns about fossils and fossil preparation techniques in a room specially designed for use by children**

Conference (2008) is an example of what can be achieved when geoparks work with children.

In the field of higher education for example, Cardiff University decided to use Fforest Fawr Geopark, Wales, to train Environmental Geoscience students in geological mapping and analysing water quality in streams. The Geopark Swabian Alb<sup>8</sup>, Germany, developed a programme in which high school pupils chose and designed panels for two geosites. This is an example where pupils acquired transferable skills through research, the collection and selection of data, interacting

**Fig. 6. Children at the Bergstrasse Odenwald Ranger-school learn how to create a map of the landscape. This creative and exciting experience is part of the Ranger activities for primary schools in European Geopark Bergstrasse Odenwald, Germany**



**Fig. 8. Schoolchildren polish pebbles from a nearby stream in the GeoWorkshop in Eisenwurzen Geoparks, Austria**

with staff from the University of Tübingen and engaging with communities, property owners and authorities involved in conservation within the geopark. This Geopark also provides children with an opportunity to learn about fossils by using fossil preparation techniques in a specially designed room in the Meteor Crater Museum in Steinheim (Fig. 7). The GeoBox project developed by Eisenwurzen Geopark, Austria<sup>9</sup> provided schoolchildren with a programme of research concerned with the erosion, transport and deposition of river gravels which introduced them to the discipline of project design necessary for the creation of an exhibition. Eisenwurzen Geopark also delivers GeoWorkshops in which fossils and rocks, collected under supervision from nearby outcrops, are identified. Schoolchildren can cut and polish pebbles from a stream in close proximity to create personal souvenirs of their visit to the Geopark (Fig. 8). In Portugal, the concepts of geosites and geological heritage are embedded in the school curriculum and modules on geoconservation are delivered in the undergraduate degree courses of several universities<sup>10</sup>. Consequently the staffs of Naturtejo and Arouca Geoparks provide classroom

activities and organize field-trips for schools<sup>11</sup>. In the photograph (Fig. 9) schoolchildren examine one of the exceptionally well preserved trace fossils in the internationally important Vale do Ponsul fossil site in the Ichnological Park of Penha Garcia, Naturtejo Geopark, Portugal. The significance of the water cycle in groundwater transport and extraction provides geoparks with an attractive multidisciplinary topic for environmental education<sup>12, 13</sup>. In Arouca Geopark, Portugal more than 300 children from kindergarten and primary schools participated in the educational game "Around Water" (Fig. 10). The game was devised by Geopark staff to raise awareness among teachers and children of the need for water conservation both within the geopark and globally.

**Fig. 9. Schoolchildren on a fieldtrip to the Naturtejo Geopark, Portugal, examine trace fossils exposed on bedding planes exposed along the Fossils Trail in the Ichnological Park of Penha Garcia**







**Fig. 10.** Schoolchildren participating in the "Around the Water" game in Arouca Geopark, Portugal

Designing and disseminating geo-educational tools are also important geopark activities. For example the 'Geokids' programme in the Geopark Bergstrasse-Odenwald, Germany, is an interactive programme for children aged 8 to 12 which provides teachers with information for project weeks, one-day hiking tours and out-door projects<sup>14</sup>. A Geopark rock-box in combination with geological posters and simple experiments, e.g. demonstrating volcanic eruptions and sediment transport, provides children with a wide range of experiences about how the Earth works and how the landscape in which they live developed. The North Pennines AONB (Area of Outstanding Natural Beauty) Geopark, England, has, through its Rockworks project, generated lesson plans, worksheets and 20 'rock boxes' enabling local schoolteachers to use the region's geology and landscape in delivering components of England's National Curriculum<sup>15</sup>. The Vocational Training Centre at the Natural History Museum of the Lesvos Petrified Forest, Greece, provides training for young unemployed adults in the techniques of excavating and preserving fossils, visitor management and the promotion of geoparks<sup>16</sup>. European Geoparks are con-

stantly challenged to increase visitor numbers by providing enjoyable, stimulating and memorable experiences. Captivating visitors by providing new insights into a territory through delivering information in readily

understandable forms as well as satisfying the educational aspirations of students of all ages can contribute significantly to this aim. Cooperation between European Geoparks through the sharing of good practice in providing informal education for tourists and developing active and exciting formal education programmes can significantly change peoples' perception of a territory and potentially contribute to its economic and cultural growth.

*Tony Ramsay<sup>1</sup>  
Jutta Weber<sup>2</sup>  
Heinz Kollmann<sup>3</sup>  
Nikolaos Zouros<sup>4</sup>*

#### References

1. Zouros, N. and McKeever P.J. 2009. European Geoparks Network and Geotourism. In Neto de Carvalho, C., and Rodrigues, J. Eds. New Challenges with Geotourism. Proceedings of the VIII European Geoparks Conference, Idanha-a-Nova, 14-16 September (2009), Portugal, pp.19 - 23.
2. Escher, H. and Kluttig, T. 2007. A new information centre for the Terra. Vita geopark. E G N Magazine, Issue 4, p.21.
3. Escher, H. 2009. Geopark Luberon in Apt. Geocaching. A new way to encourage people to learn about the landscape. E G N Magazine, Issue 6, p.25.
4. Balme, C. 2008. Geopark Luberon in Apt. New Exhibition Area at the Maison du Park. E G N Magazine, Issue 5, p.18.
5. Dowling, R. K. 2009. The growth of global geotourism. In Neto de Carvalho, C., and Rodrigues, J. Eds. New Challenges with Geotourism. Proceedings of the VIII European Geoparks Conference, Idanha-a-Nova, 14-16 September (2009), Portugal, pp.24-30.
6. British Geological Survey. 2004. Exploring the Landscape of Assynt. A walkers guide and map showing the rocks and landscape of Assynt and Inverpolly. Map at 1:50,000 scale. (Keyworth, Nottingham: British Geological Survey).
7. Poch, J. 2009. Geologic itineraries by mountain bike in Sobrarbe Geopark. E G N Magazine, Issue 6, p.22.
8. Speidel, W. and Kramer, G. 2007. Geopark Swabian Alb. Pupils adopt a geosite. E G N Magazine, Issue 4, p.17.
9. Kollmann, H. and Weiskopf, K. G. 2008. Geobox: A geological exhibition by children for children. E G N Magazine, Issue 5, p.16.
10. Brilha, J. 2009. Geological Heritage and Geoconservation in Portugal. In Neto de Carvalho, C., and Rodrigues, J. Eds. New Challenges with Geotourism. Proceedings of the VIII European Geoparks Conference, Idanha-a-Nova, 14-16 September (2009), Portugal, pp.31-35.
11. Catana, M. M. and Rocha, D. 2009. Geological Heritage and Geoconservation in Portugal. In Neto de Carvalho, C., and Rodrigues, J. Eds. New Challenges with Geotourism. Proceedings of the VIII European Geoparks Conference, Idanha-a-Nova, 14-16 September (2009), Portugal, pp.31-35.
12. Fasoulas, C. 2005. Introducing the invisible water routes of karstic systems. An educational project of Psiloritis Geopark. E G N Magazine, Issue 3, p.17.
13. Ramsay, T., Bradbury, J. and Channing, A. 2008. Water: From ground to bottle in the Fforest Fawr Geopark. E G N Magazine, Issue 5, p.22.
14. Weber, J. 2005. "Geokids" and "Geoworlds" Geoeducational tools suitable from regional to global levels in the Geopark Bergstrasse-Odenwald. E G N Magazine, Issue 3, 18.
15. Woodley-Stuart, C. and Pickett, E. 2007. "Rockworks" in the North Pennines AONB European Geopark. E G N Magazine, Issue 4, p.12.
16. Valiakos, I. and Vasiladou, K. 2008. Vocational training in Geoparks: Collaboration between Lesvos Petrified Forest and Bergstrasse Odenwald. E G N Magazine, Issue 5, p.11.

1. School of Earth and Ocean Sciences, Main Building, Cardiff University, CF10 3YE, UK.
2. Geo-Naturpark Bergstrasse-Odenwald, Global - European - National Geopark Nibelungenstrabe 41 64653 Lorsch, Germany.
3. Nature Park Eisenwurzen, Markt 35, P.C.A.-8933. St. Gallen, Austria.
4. Department of Geography, University of the Aegean, University Hill, Mytilene, GR-81100, Hellas

# Regional Development in European Geoparks

Regional development encourages economically disadvantaged communities to improve their economic, social, cultural and environmental well being by realising the full potential of a region's resources and its inhabitants. Wealth creation through the expansion of sustainable economic development enhances the quality of life and is therefore considered as a prerequisite for regional development. With the exception of the urban English Riviera Geopark, European Geoparks are located in rural areas experiencing slow economic development, high levels of unemployment and population decline. By definition a European Geopark is a territory which combines the protection and promotion of the geological heritage with sustainable local

**Fig. 1. Local products for sale in the Geoparks Corner Lesvos Petrified Forest Geopark, Greece**



**Fig. 2. A "Rangers Adventure Day" at the "Odenwaldquelle" a mineral water company in the Geopark Bergstrasse Odenwald, Germany**

development<sup>1</sup>. The European Geoparks Network was established in 2000 and subsequently grew to include 34 geoparks in 13 European countries by 2009. The development strategy, which

initially focused on the geological/geomorphological heritage and on sustainable geological tourism (geotourism), has expanded to include and promote the natural and cultural heritage of these territo-

**Fig 3. The Geo-restaurant "Petiscos & Granitos" in Naturtejo Geopark, Portugal**





**Fig. 5. The Brecon Beacons Food Festival, October 2009 where farmers from Fforest Fawr Geopark, Wales, sold local produce**

ries in order to encourage the realization of their economic potential. At the local level sustainable employment may be achieved by supporting and developing small and medium sized businesses, for instance those involved in tourism, gastronomy and the production and sale of local products. The development of outdoor educational activities and facilities for outdoor sports, the utilisation of

cultural assets and the initiation of programmes for the protection of the environment can also generate new and sustainable jobs. The establishment of information centres, museums and exhibitions generates temporary employment for designers and provides permanent employment for local people.

Local development is also stimulated by activities aimed at creating new

geopark souvenirs and handicrafts, the promotion of local quality products through local festivals and in promotional corners in Geopark information centres (Fig. 1). Some Geoparks, e. g. Adamello-Brenta, Italy, Subbeticas and Cabo de Gata, Spain, have developed advanced promotional campaigns through the establishment of a "Park Quality Label". Lesvos Petrified Forest Geopark, Greece, organizes an annual agrotourism festival with the participation of 60 local producers and women's agrotourism cooperatives. Naturtejo Geopark, Portugal, provides 23 private local partners with technical assistance involving marketing strategies, quality enhancement, product innovation and networking. The Geo-restaurant "Petiscos & Granitos" is an example of one of this Geopark's successful partnerships (Fig. 2.). Naturtejo Geopark, Portugal, provides 23 private local partners with technical assistance involving marketing strategies, quality enhancement, product innovation



**Fig. 6. A visit to an inland saltworks in the Subbeticas Geopark, Spain, where Triassic salt is exploited**



**Fig. 4. A partner of Gea Norvegica Geopark, Norway, sells "Fen Volcano Soup" to a visitor at a festival in the city of Skien**

and networking. The Georestaurant "Petiscos & Granitos" is an example of one of this Geopark's successful partnerships (Fig. 3). Gea Norvegica Geopark, Norway, has inspired the creation of a recipe for 'Fen Volcano Soup' which is served at local festivals (Fig. 4). The annual Brecon Beacons Food Festival provides farmers from Fforest Fawr Geopark, Wales, with an opportunity to sell their products at a popular event within the Geopark (Fig. 5). Subbeticas Geopark, Spain, collaborates with local enterprises, such as a saltworks, which exploits Triassic salt deposits. Their aim is to create new EGN/GGN branded products (Fig. 6). Training programmes involving an International Intensive Course on Geoparks<sup>2</sup> and vocational training in geoparks have also been initiated<sup>3</sup>. The Lesvos Petrified Forest Geopark is running a Vocational training centre to train young unemployed people as rangers and conservators. The Geopark Bergstrasse-Odenwald, Germany, offers vocational training and engages local stake-

**Fig. 8. The regional train "Ulmer Spatz" at its stop at Munsingen Railway Station. Munsingen Railway Station is part of the "Swabian Alb Railway" and one of 14 information centres in the Geopark Swabian Alb, Germany**



**Fig. 7. Families enjoy a day out in the Water Adventure Park of Sankt Gallen, Nature Park Styrian Eisenwurzen, Austria**

holders as ambassadors for the European and Global Geoparks Networks. The "Geopark-on-Site" initiative provides visitors with attractive tours in which scientific information is linked with local knowledge and support for the local economy by visits to restaurants, farms and handicraft shops<sup>4</sup>. The 'Landmarks Project' in the Geopark Harz Braunschweiger Land Ostfalen, Germany, benefits from a network of members who share the promotion of facilities and events, as well as adver-

tising and marketing their geopark through information sites<sup>5</sup>. Geoparks have also successfully promoted sustainable tourism through developing cycling trails<sup>6</sup>. The creation of a Landscape Model in the Water Adventure Park in the Nature Park Styrian Eisenwurzen, Austria, is an example of a geopark using its technical expertise to enhance the facilities within a pre-existing local attraction (Fig. 7). The Landscape Model promotes an understanding of the water cycle through

**Fig. 9. Young people build a new path opening access for all to the landscape in the North West Highlands Geopark, Scotland**



play<sup>7</sup>. The Madonie Geopark, Italy, has strengthened its cultural identity by publishing a study on the Preservation and commerce of snow in central-western Sicily (1500- 1900) by Luigi Romana<sup>8</sup>.

The promotion of access to geoparks is also an important component of sustainable development. The establishment of an Information Centre at Munsingen Railway Station by the Geopark Swabian Alb, Germany, encourages visitors to use rail links to the Geopark (Fig 8). The North West Highlands Geopark, Scotland, has an "Opening Access for All" programme which provides young people in the Geopark with work and training in path creation and dry-stone walling (Fig 9). In Papuk Geopark, Croatia, an educational trail, the "Counts Trail", has had a significant influence on the development of tourism (Fig 10).

The European Geoparks Network shares experiences in regional development and aims to strengthen cooperation between geoparks by creating and implementing common strategies for developing geotourism, educational and cultural activities. During European Geoparks Week, geoparks celebrate their geodiversity and promote public awareness of trans-European geoparks and the need to protect the natural heritage<sup>9</sup>.

Applying for funding to support regional development through transnational cooperation between European Geoparks or through geopark-specific projects is therefore an important component of a



geopark's activities. European Geoparks have, with the support of European Union initiatives for transnational cooperation between rural areas in Europe, such as INTERREG and LEADER, promoted aspects of regional development within their territories. Development within individual European Geoparks can also be achieved through regional or government funding, e.g. the English Riviera Geopark which in 2009 received substantial support from the UK Government Seachange funding programme<sup>10</sup>. By developing their territories through working in partnership with major local groups, European Geoparks fulfil many of the aims of regional development programmes. Geoparks are about the people who live in them and their interaction with visitors to their territories. The success of regional development programmes within geoparks ultimately depends on the active involvement of the local population leading to their sense of ownership and empowerment in influencing future developments

**Fig. 10. The Minister of Environmental Protection, Physical Planning and Construction officially opens an educational trail (Counts trail) in the Park Forest Jankovac, Papuk Geopark, Croatia.**

within their region.

*Tony Ramsay  
 Jutta Weber  
 Heinz Kollmann  
 Nikolaos Zouros*

#### References

1. Zouros, N. and McKeever P.J. 2009. European Geoparks: Tools for Earth heritage, protection and sustainable local development. *European Geoparks*, pp.15 -31.
2. Zouros, N. 2008. International Intensive Course on Geoparks. *E G N Magazine*, Issue 5, p. 9.
3. Valiakos, I. and Vasiliadou, K. 2008 Vocational training in Geoparks: Collaboration between Lesvos Petrified Forest and Bergstrasse Odenwald. *E G N Magazine*, Issue 5, p.11.
4. Eckhardt, C. 2009. Geoparks-on-Site, local ambassadors for a global network residents' commitment in geopark development. In Neto de Carvalho, C., and Rodrigues, J. Eds. *New Challenges with Geotourism. Proceedings of the VIII European Geoparks Conference, Idanha-a- Nova, 14-16 September (2009), Portugal.* p. 98.
5. George, K. and Zellmer. H. 2007. The 'Landmarks Project' in the Geopark Harz Braunschweiger Land Ostfalen. *E G N Magazine*, Issue 4, p.11.
6. Pickett, E. 2008. 'Wheels to the Wild' in the North Pennines AONB. *E G N Magazine*, Issue 5, p.17.
7. Eisenwurz great geology in liliput size. *E G N Magazine*, Issue 6, p.28.
8. Li Puma, P.2008. Snow trenches & snow preservers of the past. *E G N Magazine*, Issue 5, p.14.
9. Schuller, A. 2009. European Geoparks Week 2008. Europe celebrates its geodiversity. *E G N Magazine*, Issue 6, p.8.
10. Border, M. 2009. Major investment in English Riviera. *E G N Magazine*, Issue 6, p.15.

# Research in European Geoparks

All European Geoparks are, by definition, characterised by a particular geological heritage and can include sites which may be of archaeological, ecological, historical or cultural importance<sup>1</sup>. The geological heritage has usually been uncovered through pioneering scientific research involving regional mapping and is described either in published geological maps and memoirs of geological surveys or in articles written for scientific journals. Discoveries based on specific aspects of a geopark's geological history have contributed significantly to the development of the science of geology and include sites of particular scientific importance (geosites), a prerequisite for any geopark. Some of these sites are internationally significant and are visited regularly by academic and industrial geologists and by groups of school children and university students studying courses in the Earth sciences. Information derived from published geological research is expressed in non-scientific language and used in the design of walking and cycle routes,

exhibitions in information centres, for geo-educational activities and in the production of educational material. General geological descriptions are used in information centres and publications to relate the history of the Earth, including the history of life and the succession of past climates and environments. Scientific research, however, is an ongoing process which will inevitably lead to new advancements in our understanding of the Earth's history.

Knockan Crag in the North West Highlands, Geopark, Scotland, is an example of an internationally famous site where two geologists, Benjamin Peach and John Horne<sup>2</sup>, discovered the process of thrust faulting whereby older 1000-850 million year old Precambrian rocks were pushed over younger Cambrian and Ordovician rocks ranging from 540 to less than 500 million years in age (Fig 1). Their research resolved the bitter debate among 19th Century British geologists concerning the sequence of rock types at this site. It also paved the way for our understanding of how layers of squeezed rocks can break and slide over each other when continents collide to form mountain ranges. At the Knockan Crag Visitors Centre tourists discover Scotland's turbulent geological history and learn about the rocks and landscape of Knockan Crag through poetry, sculpture and interactive demonstrations. In more ancient times the Petrified Forest of Levos, Geopark,

now designated as a Greek National Monument<sup>3</sup>, inspired the philosopher Theophrastus (371-c 287 BC) to write in a lost manuscript about "those which become petrified". Now we know that his observation might have referred to the petrified tree trunks and root systems in growth position which provide an insight into the ecology of a sub-tropical forest in the eastern Mediterranean region some 20 million years ago<sup>4</sup>. Theophrastus was born in Eressos village in the Geopark. He was Aristotle's pupil and successor and his book on rocks is considered as the foundation for the study of minerals and rocks. Theophrastus also wrote about plants and is considered by some as the father of botany.

Salt deposits in the Italian Madonie Nature Park and Rocca Di Cerere Geopark are evidence of the drying of the Mediterranean Sea when, for reasons which are still unclear, the gateway through the Strait of Gibraltar between North Africa and Spain closed between 5.96 and 5.33 million years ago<sup>5, 6</sup>, the so called Messinian Salinity Crisis.

A number of geoparks contain rock sequences which serve as internationally agreed reference sections for boundaries on the geological time scale. In the 19th Century geologists constructed a geological column in which rock layers (strata) are arranged in sequential order. Standard names corresponding to rock units

**Fig. 1. A young 80 year old geologist, Walter from the USA finally realized his dream of visiting the exposure of the famous Moine Thrust at Knockan National Nature Reserve, North West Highlands Geopark, Scotland, and straddle 500 million years between his fingers**



within the geological column have been developed for time divisions within the geological time scale. The type sections (stratotypes) for some of these internationally agreed time divisions such as periods, series and stages occur in European Geoparks. The Silurian Period (444 - 416 million years ago) and Llandovery Series (444 - 428 million years ago) were named for a local town on the northern margin of Fforest Fawr Geopark, Wales, and for the Celtic Silures Tribe who lived in the area<sup>7</sup>. The Anisian Stage (245 - 237 million years ago) within the Triassic Period (251 - 200 million years ago) is named after the Latin name Anisus, for the river Enns which flows through the village of Grossreifling, the type locality in Eisenwurzen Geopark, Austria<sup>8</sup>. The Pliensbachian Stage (192 to 184 million years ago), within the Jurassic Period (200 - 145 million years ago) is named for Pliensbach a small hamlet in the Geopark Swabian Alb, Germany<sup>9</sup>. The village of Barreme in the Reserve Geologique de Haute Provence, France gives its name to the Barremian Stage (130 -125 million years ago), while the Aptian Stage (125 -112 million years ago) is named for the town of Apt in the Luberon

Geopark, France<sup>10</sup>. The Barremian and Aptian stages occur within the Cretaceous Period (145 -65 million years ago). Some geoparks contain the world's so called "type localities" where particular rock types were first described others possess world renowned fossil sites. Pilot's Cove in Geo Mon Geopark, Wales, is the type locality for a rock known as melange<sup>11</sup> which forms at collision zones where ocean plates slide beneath continental crust, in a process called subduction, creating a rock consisting of jumbled blocks of ocean sediments, ocean floor lavas and continental crustal rocks of varying shapes and sizes ( Fig. 2 ). The Tonale Pass in the Adamello Brenta Geopark, Italy, gives its name to the rock Tonalite<sup>12</sup>, a type of granite which crystallized below the Earth's surface from a hot liquid melt which intruded cold, continental crustal rocks. The Vale do Ponsul fossil site in the Ichnological Park of Penha Garcia, Naturtejo Geopark, Portugal is known internationally for exceptionally well preserved trace fossils<sup>13</sup>. The German Geoparks Swabian Alb and Bergstrasse Odenwald are renowned for their world renowned fossil sites. In the Swabian Alb Geopark the Lower Jurassic Posidonia Oil Shales (185 - 175 million years ago) is exposed at the world famous Holzmaden and Dotternhausen<sup>14</sup> sites. Here well preserved fossils of ammonites and sea lilies are recorded. The Upper Jurassic (155 - 151 million years ago) Lithographic Limestone at Nusplingen<sup>14</sup> is famous for well preserved fossils of land plants, ammonites, insects, angel sharks and marine croco-

diles. Messel Pit in Bergstrasse Odenwald Geopark, Germany, however, is by far the most famous fossil site amongst the European Geoparks and is designated as a UNESCO World Heritage Site. Its unique record of plant remains, complete skeletons of fossil mammals, birds, crocodiles, frogs, fish and insects, provides valuable information concerning the climate and important stages in the evolution of mammals approximately 47 million years ago<sup>15</sup>. Recently published results of new research projects in European Geoparks create an opportunity for updating existing knowledge and for introducing visitors to new and exciting concepts. In 2008 geologists from the Universities of Aberdeen and Oxford reinvestigated and reinterpreted a group of layered rocks in the North West Highlands Geopark, Scotland, as material which was ejected from a 1.2 billion year old meteorite crater estimated at 10 kilometres in diameter<sup>16</sup>. The mass extinction at the Cretaceous /Tertiary boundary 65 million years ago has been attributed to a meteorite impact<sup>17</sup>. Now, as a result of detailed research undertaken in Eisenwurzen Geopark, Austria, this view has been challenged and this event involving the

**Fig. 2. Pilot's Cove, Geo Mon Geopark, Wales, is the world type site for melange, a rock containing a huge mixture of pebbles, boulders and pieces of rock, in places a hundred metres or so across. The melange originated in a collision zone where ocean crust slid beneath continental crust**



**Fig. 3. Scientists from the Croatian Geological Survey analyse core samples of dolomite and limestone rocks in order to discover the nature of a subsurface sequences of rock layers**



extinction of 60% of species, including the dinosaurs, is attributed to changes in the atmosphere induced by volcanic activity<sup>18</sup>. The Petrified Forest of Lesvos, Greece, uses information from active faults within the geopark to inform the public of the nature of seismic hazards and how careful planning may reduce the risks to life and the economy<sup>19</sup>. The necessity for constructing



**Fig. 4. Drilling sediment cores from lake deposits in one of the high mountain lakes in Sobrarbe Geopark, Spain. The cores record environmental and climatic changes at high altitudes**

**Fig. 6. Lime terraces precipitated by alkaline streams derived from quarry waste in the Black Mountain, Fforest Fawr Geopark, Wales. The colours of the terraces are due, in part, to thin bacterial layers**



"life-safe" buildings in earthquake zones has been highlighted by the scale of destruction and high numbers of casualties caused by the recent earthquake in the city of Port au Prince, Haiti. The recent discovery of the oldest fossilized feather in Europe (late Kimmeridgian, 155 -151 million years ago) from the Lithographic Limestone of Nusplingen in the Geopark Swabian Alb, Germany, could play a significant role in our understanding of the evolution of feath-

ers<sup>20</sup>. Drilling holes into rocks and sediments and extracting core samples from beneath the surface is an essential component of geological exploration and research. The photograph (Fig. 3) shows scientists from the Croatian Geological Survey examining cores samples from a subsurface sequence rock layers (limestones and dolomites). Cores of lake deposits in the high altitude lakes of Sobrarbe Geopark, Spain, are currently being investigated to determine the history of changes in the climate and environment (Fig. 4). Recent investigations at the Kraus Cave, Eisenwurzen Geopark, Austria, revealed astonishing results showing how the limestone walls were dissolved and sculpted by sulphuric acid derived from thermal water (Fig. 5). In Fforest Fawr Geopark, Wales, the influence of physical, chemical and biological processes in the precipitation of lime deposits (tufa) from highly alkaline seepages (pH 13.5) from quarry waste (Fig. 6) is currently being investigated at Cardiff University. The filled lake basin at Traeth Mawr preserves a complete Lateglacial and Holocene sedimentary sequence. The approximately 12,000 years of climate history shows how the landscape and vegetation changed in response to a succession of warm and cold intervals<sup>21</sup>.

The range of research activities in geoparks does not only involve professional scientists and is not just confined to geological research. The archaeological, natural and cultural heritages of geoparks are also subjects for research. Luberon Geopark, France, engages teams of young people in excavation techniques



designed to reveal the nature of the relationships between fossils and the rocks in which they occur (Fig. 7). Arouca Geopark Association, Portugal, supports a research programme involving "Scientific Work during Holidays". Bergstrasse Odenwald Geopark, Germany, organized a scientific excavation project for school children in cooperation with the Historical Mining Association Odenwald (Fig. 8). In Adamello-Brenta Nature Park, Italy, workers associated with the Glaciological Committee of the Alpine Society of Trentino collaborate with the Park to produce surveys, maps and measurements of its glaciers. The photograph (Fig. 9) shows the recording of measurements for mass balance studies, i.e the ice budget, of the Adamello Glacier, the longest glacier of the Italian Alps. In Madonie Geopark, Italy, recent excavations carried out by the University of the city of L'Aquila, has uncovered the remains of a Roman settlement of the 1<sup>st</sup>-3<sup>rd</sup> Century AD, which was probably associated with the nearby

**Fig. 5. The walls of Kraus cave, Eisenwurzen Geopark, Austria, have been sculpted by sulphuric acid derived from thermal water**

**Fig. 7. Scientific excavation revealing information about ancient environments by studying the relationship between fossils and rocks at a site in Luberon Geopark, France**







**Fig. 8. A school working group engaged in a scientific excavation in Bergstrasse Odenwald Geopark, Germany, concerned with the history of mining**

salt mine (Fig. 10). A joint research project by the Universities of Durham and Sheffield at Kents Cavern in the English Riviera Geopark, England, is making discoveries which will dramatically improve our understanding of life at this important site between 10,000 and 50,000 years ago.

It is clear that all geoparks share a legacy of scientific knowledge which was gathered in the 19<sup>th</sup> and 20<sup>th</sup> Centuries. This overview shows that geoparks with their special geological heritage and their wide range of activities stimulate the pursuit of new research and can create research projects involving communities and young people. These projects, particularly excavations, introduce the participants to the excitement involved in making new discoveries and to the curiosity and enthusiasm which are essential components of all scientific research. The results of new scientific research will ensure that geoparks will continue to fulfill their role as active centres for providing a holistic view involving Earth history, the natural and cultural envi-

**Fig. 10. Recent archaeological investigations in the Madonie Geopark, Italy by the University of the city of L'Aquila, recently destroyed by an earthquake, revealed a 20 metres long colonnaded portico from a 1st-3rd Century AD Roman settlement**



**Fig. 9. Recording measurements for mass balance studies of the Adamello Glacier, Adamello - Brenta Nature Park, Italy**

ronment and raise awareness of man's responsibility to conserve and protect the environment.

*Tony Ramsay  
Jutta Weber  
Heinz Kollmann  
Nikolaos Zouros*

#### References

1. Zouros, N. and McKeever P.J. 2009. European Geoparks Network and Geotourism. In Neto de Carvalho, C., and Rodrigues, J. Eds. New Challenges with Geotourism. Proceedings of the VIII European Geoparks Conference, Idanha-a- Nova, 14-16 September (2009), Portugal, pp.19 - 23.
2. Peach, B.N., Horne, J., Gunn, W., Clough, C.T. and Hinxman, L.W. 2007. Geological Structure of the North-west highlands of Scotland. Memoirs of the Geological Survey, Scotland. His Majesty's Stationary Office Glasgow.
3. Zouros, N. 2009. European Geoparks: The Petrified Forest of Lesvos. European Geoparks, 40-43.
4. Velitzelos, E. and Zouros, N. The Petrified Forest of Lesvos. Topio Publications.
5. Li Puma, P. and Modica, R. 2009. Madonie Nature Park. Involving just over 200 million years of Nature. European Geoparks, 64 - 67. Natural History Museum of the Lesvos Petrified Forest, 163 pages.
6. Amato, G. and Ingrasciotta, M. V. 2009. Rocca Di Cerere Geopark. Gypsum, Sulphur and Myths. European Geoparks, 68-71.
7. Ramsay, T. 2007. Fforest Fawr Geopark the first European Geopark in Wales. E G N Magazine, Issue 4, 26.
8. Kollmann, H. A. and Mitterback, R. 2005. The Eisenwurzen a geopark in progress. E G N Magazine, Issue 3, p. 12.
9. Hegele, A. 2009. Swabian ammonites, type-localities and volcanoes. E G N Magazine, Issue 6, 26.
10. Balme, C. 2009. Luberon Geopark. Exceptional fossilization, unusual landscapes, exploitation of mineral resources: a territorial project revolving around geology. European Geoparks, pp 89-91.
11. Wood, M. 2009. Geo Mon Geopark. E G N Magazine, Issue 6, 32.
12. Ferrari, C. 2009. Adamello- Brenta Nature Park. E G N Magazine, Issue 6, 29.
13. De Carvalho, C. N. 2008. Ichnological Park of Penha Garcia Naturtejo Geopark Portugal. E G N Magazine, Issue 5, p. 30.
14. Heizmann, E. P. J. 2009. The Geopark Swabian Alb. European Geoparks, pp 96-99.
15. M-L. Frey. 2009. Messel Pit-World Heritage Site. A Unique scientific and magic location in European Geopark Bergstrasse Odenwald. European Geoparks, 81.
16. Saywell, F. and Mackenzie, F. Meteorite strikes North West Highlands Geopark. E G N Magazine, Issue 6, 27.
17. Alvarez, L.W., Alvarez, E., Asaro, F., Michel, H.V. 1080. Extraterrestrial causes for the Cretaceous-tertiary extinction. Science, 208, 1095.
18. Grachev, A. F. (Editor) 2009. The K/T Boundary of Gams (Eastern alps, Austria) and the nature of terminal cretaceous mass Extinction. Abhandlungen der Geologischen Bundesanstalt, 63.199 pages.
19. Zouros, N., Palvides, S., Soulakellis, N., Chatzipetros, A., Vaseleiadou, K., Valiakos, I. and Bentana, K. 2009. Using Active faults for raising public awareness and sensitisation on seismic hazard: A case study from Lesvos Geopark, NE Aegian Sea, Greece. Proceedings of the VIII European Geoparks Conference, Idanha-a- Nova, 14-16 September (2009), Portugal, pages 148-153.
20. Schweigert, G., Tischlinger, H. and Dietl, G. 2010 (in press): The oldest fossil feather from Europe. - Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen.
21. Walker, M.C. 2007. Traeth Mawr: pollen stratigraphy and glacial chronology. In Carr, S J. et al., Quaternary of the Brecon Beacons Field Guide. Quaternary Research Association pp 146-150.

# European Geoparks: Destinations for Tourism & Geotourism

**Fig. 1. Deep gorges such as the Wasserloch Gorge, Naturpark Styrian Eisenwurzen, Austria, are among the main attractions of the region. They give a stupendous insight into geological processes and contain 250 million years of the Earth's history**

In a Note produced for its Roundtable Discussion on "Regional Policy and Tourism", the Organization for Economic Co-operation and Development (OECD)<sup>1</sup> highlighted the obvious link between tourism and regional development. Tourism is identified as one of the world's major service and growth industries. However, the growth of tourism policies at national, regional and local levels as drivers for economic development and job creation present challenges, both for the present and future, which include:

- Supporting tourism as an instrument for territorial development with strategies designed for the sustainable conservation of an area's heritage.
- Creating new forms of marketing linked to quality standards which meet the requirements of a global market.
- Encouraging the emergence of new, less developed regions as competitive tourist destinations and revitalizing existing tourism areas experiencing a slow down in growth.
- Establishing cooperation between regions
- Raising awareness of the social impacts associated with the growth of tourism

Since this document was produced by the OECD in 1999, i. e. one year before the initiation of the European Geoparks Network, it is interesting to consider how the European Geoparks Network (EGN) has risen to the challenges outlined above.

European Geoparks are members of a Network which actively promotes tourism as a driver for economic development and job creation. Since 'A European Geopark is a territory which includes a particular geological her-

itage and a sustainable territorial development strategy'<sup>2</sup> geotourism and geoconservation are major components of the development strategies in all geoparks. Many geoparks were established either within existing Nature Parks (e.g. Parco Del Beigua Geopark, Italy)<sup>3</sup>, National Parks (e.g. Fforest Fawr Geopark, Wales)<sup>4</sup> or Areas of Outstanding Natural Beauty (e.g. The North Pennines AONB, England)<sup>5</sup>, and were already subject to measures designed to protect their natural and cultural heritage. Geoparks are therefore territories with a strong regional identity, derived from their natural and cultural characteristics. Earth history, nature and landscape combined

**Fig. 2. A guided excursion in the Oppedette Canyon, Luberon Geopark, France**





**Fig. 3. Sgwd Gwladus, one of the many spectacular waterfalls in the Waterfalls Area of Fforest Fawr Geopark, Wales, is a popular destination for families**

**Fig. 4. An international group of geologists taste the carrots grown in the rich soil of the marine clay in the Lagendalen Valley, Gea Norvegica Geopark, Norway**



advanced holistic experiences of nature combining leisure, enjoyment and adventure with the acquisition of information and knowledge. Since its inception in 2000, the EGN emphasized the growth and promotion of geotourism as a means of contributing to the sustainable development of geopark territories. This new form of special interest tourism is now regarded as a fast emerging global phenomenon with an educational function<sup>6</sup>. All geoparks use special features within their landscapes to attract visitors. The deep gorges and canyons in the Naturpark Styrian Eisenwurzen, Austria (Fig. 1) and in Luberon Geopark, France (Fig. 2) as well as the waterfalls of Fforest Fawr Geopark, Wales, (Fig. 3) are spectacular natural attractions. Exploring the gorges and waterfalls provides visitors with an adventure together with insights into the effects of the erosive power of water on rocks. In Adamello-Brenta Nature Park, Italy (see photograph on cover page) guided excursions introduce visitors to the influence of glacial processes in a breathtaking landscape. Visitors to Gea Norvegica Geopark, Norway, can combine experiences of the landscape and geology with the taste of locally grown vegetables (Fig. 4). Presentations of traditional dances, music and story telling are an essential component of European Geoparks Week in Hateg Country Dinosaurs Geopark, Romania (Fig. 5). Panning for gold and the

chance to 'strike-it-rich' is one of the many exciting activities offered by Naturtejo Geopark, Portugal (Fig 6). In 2010 Greenway Ferries, a partner of English Riviera Global Geopark, England, will develop Geopark Kayak tours in which trained guides will lead tours along the coastline providing incredible and exciting opportunities to get close to the spectacular geology and coastal wildlife (Fig. 7). Naturpark Styrian Eisenwurzen offers a combination of science and excitement when specially trained guides introduce visitors with the aid of waterproof guide books to GeoRafting. In some geoparks, caves and old mine workings provide visitors with opportunities for exciting adventures when exploring the underground world. Visitors to Geo and Nature Park Terra Vita, Germany, can join a guided tour of an abandoned iron ore mine near the village of Kleinenbremen (Fig. 8). Here former miners demonstrate the techniques used in the past for mining the dark reddish iron ore found at this

**Fig. 5. Presentations of traditional dances, music and story telling, in Santamaria Orlea School, Hateg Country Dinosaurs Park, Romania, during the European Geoparks Week, 2009. (Photo Dan Palcu)**



site. Caves are a major attraction in Subbeticas Geopark, Spain. More than 800 recorded abysses and caverns provide experts as well as beginners with an insight into a world of subterranean labyrinths (Fig. 9). Newly emerging destinations for geotourism, e. g. The Northwest Highlands Geopark, Scotland<sup>7</sup>, Gea Norvegica Geopark, Norway<sup>8</sup>, and the Nature Park Styrian Eiswurzen, Austria, are located in geologically significant areas which already served as outdoor teaching laboratories for schools and universities. Residential fieldtrips to these and similarly remote areas can contribute significantly to their economies. Geoparks within established tourist destinations have added geotourism to their portfolios in order to appeal to a special interest market and thereby increase the number of visitors to their territories. The Geological and Mining Geopark of Sardinia, Italy, with its unrivalled mining history extending from 6000 BC to the 20<sup>th</sup>

Century<sup>9</sup>, and the unique Petrified Forest of Lesvos, Greece, are exceptions which have always been primarily destinations for geotourists. The Petrified Forest is also an example of a geopark which has been marketed successfully to tourists who visit the island of Lesvos for reasons other than geotourism.

History and/or a combination of history and science is an important part of a geopark's cultural heritage and provides an additional attraction to visitors. The poet Sappho was allegedly born in the village of Eressos in the Petrified Forest Geopark on the island of Lesvos between 630 and 612 BC. Her lyric poetry, written from the perspective of the individual dealt with the big themes of death, love and the gods. Sappho, a now iconic figure, was credited in the ancient world as being the first poet to speak directly about love and to describe eros as a "bittersweet experience"<sup>10</sup>. Importantly this liberated woman's poetry also served an educational



function for young women.

The exploitation of mineral resources in Fforest Fawr Geopark, anthracite, ironstone, limestone and silica sand, the raw materials used for iron smelting, contributed significantly to the development of South Wales as a major player in the Industrial Revolution. In the early 19th Century David Thomas and George Crane successfully adapted the hot blast furnace process to burn anthracite at the Ynysgedwyn Iron Works, Ystradgynlais, a village on the edge of the Geopark,<sup>11</sup>. Eventually David Thomas emigrated to Pennsylvania and founded the American iron and anthracite mining industries. Now the weathered and overgrown

**Fig. 7. A Geopark Kayak tour along the coast of the English Riviera Geopark, England**

**Fig. 6. Geotourists pan for gold in the Naturtejo Geopark, Portugal**



**Fig. 8. Former miners explain the techniques for mining iron ore in the Geo and Nature Park Terra Vita, Germany**



**Fig. 9. A visit to the Marmoles Cave. One of the main tourist attractions in Subbeticas Geopark, Spain**

limekilns, coal and silica mines, quarries and tram-roads are a testament to over 200 years of industrial activity which played a significant role in the culture and economic development of the region.

The emphasis on cooperation between the EGN's 34 members from 13 countries represents a significant departure from the frequent isolationism accompanying competitiveness within the tourist industry. In contrast to other tourist destinations, geoparks share common backgrounds and experiences and advertise each other's natural and cultural characteristics and activities. Thus, when visitors travel to a geopark for the first time and leave with a memorable experience, they are more likely to develop an interest in visiting others.

The network serves as a forum in which territories can address and develop solutions to shared socio-economic problems and form partnerships to apply for funding. For example, The INTERREG III C project, European Geoparks: A Tool for Geotourism Development in Europe which was approved in 2003, involved a partnership of 9 geoparks<sup>12</sup>. The EGN - Website, the EGN Magazine and advertising other European Geoparks

in their Information Centres (Geopark Corners) are further examples of co-operation designed to promote geotourism.

The growth of geotourism, in addition to other forms of tourism activities, can contribute to the creation of new jobs and, by improving the regional economy, benefit the people who live in geoparks. The involvement of local communities is an important factor in developing new ways for creating sustainable benefit through geotourism. For instance, Messel Pit, a World Heritage Site in Bergstrasse Odenwald Geopark, Germany, was saved from being used for waste disposal through the enthusiastic participation of the local community of Messel<sup>13</sup>. Now this is a well managed and popular geotourism destination of international significance.

By promoting geotourism, the EGN combines territorial development and the emergence of a special interest market with the sustainable preservation of the geological heritage, thus creating interest, awareness and a special regard for the uniqueness of our environment. The EGN achieves and maintains the high quality standards, designed to

meet the requirements of a global tourism market, through its rigorous evaluation procedure for all new applicants and its 4-yearly revalidation process for continued membership within the network<sup>14</sup>. At the end of the day, however, the strength of the Network will always depend on the cooperation of local communities in the foundation and development of each geopark.

*Tony Ramsay  
Jutta Weber  
Heinz Kollmann  
Nikolaos Zouros*

#### References

1. ROUNDTABLE: "REGIONAL POLICY AND TOURISM" Key policy issues for discussion. [www.oecd.org/dataoecd/10/32/1902552.pdf](http://www.oecd.org/dataoecd/10/32/1902552.pdf)
2. European Geoparks Network Charter. E G N Magazine, Issue 5.
3. Burlando, M. 2005. Beigua Geopark. E G N Magazine, Issue 3, p.29.
4. Ramsay, T. 2007. Fforest Fawr Geopark. E G N Magazine, Issue 4, p.26.
5. Pickett, E. and Woodley-Stewart, C. 2005. The North Pennines AONB Area of Outstanding Natural beauty. E G N Magazine, Issue 2, p.26.p. 29.
6. Dowling, R. K. 2009. The growth of global geotourism. In Neto de Carvalho, C., and Rodrigues, J. Eds. New Challenges with Geotourism. Proceedings of the VIII European Geoparks Conference, Idanha-a-Nova, 14-16 September (2009), Portugal, pp.24-30.
7. Krabbendam, M. 2009. The North West Highlands Geopark: Three billion years of Earth's history in a dramatic landscape. European Geoparks, pp.92-93.
8. Dahlgren, S. 2007. Gea Norvegica Geopark. E G N Magazine, Issue 4, p. 27.
9. Otelli, L. 2008. The Geological and mining Park of Sardinia. E G N Magazine, Issue 5, p.28.
10. Hughes, B. 2005. Helen of Troy. Jonathon Cape London. 458 pp.
11. Ley, L. 2005. The Iron Cradle. Glamorgan press, Neath, 173 pp.
12. Zouros, N. and McKeever P.J. 2009. European Geoparks: Tools for Earth heritage, protection and sustainable local development. European Geoparks, pp.15 -31.
13. M-L. Frey. 2009. Messel Pit-World heritage site. A Unique scientific and magic location in European Geopark Bergstrasse Odenwald. European Geoparks, pp.81.
14. Zouros, N. and McKeever P.J. 2009. European Geoparks Network and Geotourism. In Neto de Carvalho, C., and Rodrigues, J. Eds. New Challenges with Geotourism. Proceedings of the VIII European Geoparks Conference, Idanha-a-Nova, 14-16 September (2009), Portugal, p.19 - 23.

# Using a Geo-Guide to discover the Natural Geological Reserve of Haute-Provence

In 2009, the Natural Geological Reserve of Haute-Provence installed an interactive geo-guide system so tourists would be able to visit the natural and cultural heritage of the area using GPS. This innovative tool is relatively new to France. It is currently the largest visually guided system in the country boasting almost 1.5 GB of "onboard" files for 5 audio-guided tours focusing on a range of themes (tourism, geology and culture) available in 6 languages.

This project is based on state-of-the-art technologies that can be used to best promote and develop the cultural possibilities offered by the Natural Geological Reserve of Haute-Provence and the Digne region. The project also aims to meet the expectations of its tourists/ customers looking for more independence and mobility. It is supported by strong partnerships drawing on the complementary interests of both public and private organizations (over 50 partners)

including the town of Digne-les-Bains, the Digne Region, the museums, tourist professionals, Digne craftsmen, and service providers. The pooling of information and writing of the comments for the audio guide was a crucial, yet complex, step in the project. This involved working together with the local people on various different themes (heritage, culture, geology and nature).

The Geo-guide provides 5 self-guided tours in the Digne region. Two self-guided GPS car tours cover about forty different sites of special interest scattered across the geological reserve. You can discover alpine landscapes in a pristine environment, such as the wild beauty of the Bes Gorges, geological sites, dense forests opening onto prairies and the villages along the Bleone River. Otherwise, you can amble your way through the Provençal heritage, discovering sumptuous scenery shaped by man, including lavender fields, olive groves, and charming picturesque villages.

Three self-guided cultural tours on foot are available in Digne-les-Bains. The Museum Meander Tour looks at the history of the Earth and the evolution of flora and fauna in the area. The Gassendi Museum Tour includes a variety of subjects such as science, history and fine arts; the Philosophical Walkabout is an invitation to turn back the clocks.

The Geo-guide includes

audio commentary, video footage, music and pictures. It also provides a panoramic description of the fauna and flora in the Digne region, including landscape readings, tourist information, and presentation videos of the self-guided tours.

Tours for the general public are available in six languages: French, English, German, Italian, Spanish and Dutch. There are also two special versions available which include a children's version for the Museum Meander and an adapted version for French sign language users at the Gassendi Museum. A total of 70 devices are available from three different collection points at the Museum Meander, the Tourist Office and the Gassendi Museum. Visitors are asked to pay a small fee to rent the equipment. Visitors must return the equipment to the place from where they borrowed it. This project requires a new organisation and available staff to welcome visitors (explanation on how to use the equipment, with manual and automatic functions, the touch screen, etc.). The GPTO Station software is used to update the data and manage both the tour itinerary and content. This project was implemented as part of a 'Rural Centre of Excellence' programme financed by the State, the Provence-Alpes-Cote-d'Azur Region and the Department of the Alpes de Haute-Provence.

*Sylvie Giraud*



# Bohemian Paradise Geopark for sightless visitors



**Un sighted students feel the nature and experience the thermal conductivity of amethyst (quartz) crystals**

The phone rings and Marek Hladik introduces himself with words: "Good afternoon, we would like to know something about Bohemian Paradise Geopark." One of our normal daily calls. I respond "OK, when will you show up and what would you like to know?" Marek specifies: "We are a group of sightless children from Prague." At that moment it is clear that the information can be transmitted only with the help of four senses. I am always excited to meet with sightless and purblind children. The so called "Tyflotouristic group" brings together people from Bohemia and Moravia to arrange programmes, weekend activities and camps for visually impaired

**A student uses Braille to investigate a geology exhibition designed for sightless people**



children and students. More than twenty children and students from high schools and universities come to the Geopark with their leaders. Some have a clouded vision of their surroundings, others are unable or only partially able to distinguish shapes.. However, there is much which they can sense about the world around them without being able to see.. One does not need to feel sorry for the sightless. Their disability makes their lives more complicated but they have learnt how to live with it. A sightless person is able to do most things and participate in many activities. Therefore this person is equal among others and her/his ability to recognize using the senses of touch or sound is, for example, many times greater than that of a "normally sighted person". Therefore it is a challenge to try and enable a sightless person to experience a "real picture". Visually disabled people frequently display characteristics that can be missing in the sighted. For example the ability to enjoy the moment, combined with a sense of humor and tolerance. Jana and Tomas help me to to devote ourselves to our guests' needs. There are many possibilities to introduce mineralogy, paleontology and geology to sightless visitors to the Geopark. I explain that the basic structural unit of the Earth/s crust are minerals which occur as crystals and which differ from amorphous substances in their

shapes and their thermal conductivity. We circulate a specimen of amethyst crystals and a piece of obsidian, an amorphous volcanic glass among the children. The crystal in their hands is cooling and the obsidian, quite the reverse, feels as if it is warming Minerals also have distinctive odours. This phenomenon was used by Swedish geologists in the 19th. Century who used trained dogs in the search for ores.. The sightless are very perceptive. Any creative activity provides them with an intense experience. One group uses different beads to create beautiful necklaces, bracelets and rings. The second group studies an exhibition which is equipped with Braille. The children and students leave after a few hours enriched by new experiences and with souvenirs, i. e. the jewelry, which they have created. The leaders acknowledge that we are well prepared for such visits. The biggest reward for me, in addition to this acknowledgement, is the words of children: "The geology is so interesting!"

*Tomas Ridkosil*

**Un sighted students experience touching rocks**



# Earthquake simulation & seismic hazard protection

The tragic pictures from the devastating earthquake that struck Haiti on January 12, remind us of the need to be prepared to confront natural disasters. In order to inform its visitors about the nature of earthquakes The Natural History Museum of the Lesvos Petrified Forest organized an exhibition on "Seismic hazards in North eastern Aegean" the exhibi-

## Learn everything about the earthquakes in the Lesvos Petrified Forest Geopark!

tion is accompanied by an original educational programme which has been designed by the Lesvos Petrified Forest Geopark and runs in the Natural History Museum in Sigri.

The programme has been enthusiastically welcomed by the schools of Lesvos, and also by other Greek areas who visit the Natural History Museum on the island of Lesvos. The theme of the programme is a burning issue in Greece and many other countries where towns and villages are locat-

ed along tectonic plate boundaries. Specifically, the programme concerns the nature of earthquakes and seismic hazards.

The 2-hour programme, which is designed to address the basic and secondary educational levels, includes a presentation on the causes of earthquakes, the ways in which seismic waves travel through the Earth and the catastrophic effects they might have. Subsequently, the children visit the Museum's exhibition hall where, with the aid of interactive models, they can visualise the movements of the Earth's plates and their links with the occurrence of earthquakes. A real seismometer records the waves that the children produce on the ground while walking, while screens show the records of the seismographs in Sigri and the University of Thessaloniki in real time. A poster exhibition provides further information on the connection between mythological characters and natural phenomena. It also provides information on historical earthquakes in the islands of the northeast Aegean, the links between large faults in these islands and the most recent tectonic activity in the Aegean area and other catastrophic natural phenomena linked with the earthquakes. The children have a great opportunity to see a real fault in the back-yard of the museum and understand how the rocks deform, fracture and move along the fault plane. The highlight of the programme, without any doubt, is the seismic table installed in the Museum. The installa-

tion can simulate the seismic movement of some of the most destructive earthquakes during recent years. Children can sit at their desks and experience the tremors felt by the people of Athens Greece, on the 5th September 1999, of Kozani Greece, on 13th May 1995, Kobe, Japan, on the 17th January 1995, or of Gujarat, India, on the 26th of January 2001. This activity aims to familiarize the children with the correct procedures that need to be followed during and immediately after an earthquake. The programme enables them to learn and practice these procedures in a perfectly safe environment. This new educational programme of the Lesvos Petrified Forest Geopark has proved a huge success. More than 900 children have already participated and about 500 have already booked to take part. The great value of this programme in an area with very intense seismic activity such as the NE Aegean is obvious. Greece is situated at the front of the Eurasian Plate on a collision zone i.e. a convergent plate margin where the Eurasian and African plates collide.. Greece is therefore one of the most seismically active countries in Europe. Earthquakes are frequent and every-day events in some areas. The programme aims to the familiarize children with earthquakes and their natural consequences. Knowledge is the most successful weapon against the catastrophic effects of earthquakes.

*Nikolaos Zouros*

**The seismic table in the Natural History Museum of the Lesvos Petrified Forest**







**Eshaness cliffs - 'Shetland's volcano', the first of Geopark Shetland's self-guide trails, explores this high energy coastline. Copyright Davy Cooper**

With rocks of every era, from the Precambrian to the Carboniferous, Shetland's geology spans almost 3 billion years and is more geologically diverse than any similarly sized area in Europe. Where else can you walk on ancient oceanic crust, explore an extinct volcano and stroll across shifting sands in the space of a day?

Shetland consists of a group of over 100 islands, 15 of which are inhabited. The islands extend 110km from north to south with Fair Isle lying a further 35km to the south. The total land area is 1468km<sup>2</sup>, but the tortuous coastline, over 1500km in length, means that no point is more than 5km from the sea. In 2009 Shetland became the first complete island group to join the European Geoparks Network.

Over the past 700 million years Shetland has travelled from a location close to the South Pole across the Equator to its current latitude of 60° north. On this journey it has experienced oceans opening and closing, mountains forming and eroding, tropical seas, volcanoes, deserts, ice ages and ancient rivers. Evidence of these earth-shaking events, changing environments and a number of unique geological features, can be found throughout the

# Geopark Shetland

isles. Geopark Shetland is bringing to life the fascinating stories behind Shetland's geology and geographical location, as well as demonstrating how these features have influenced every aspect of living in the islands, from the landscape and biodiversity to the settlement patterns and economy.

A number of projects have been carried out to date including geological walls, geo-art exhibits and information panels throughout the islands. 'Shetland's Volcano', the first in a series of self-guide trails, explores one of the highest energy coastlines in the world - Eshaness. Once a supervolcano, this coastline now represents 'the best section through the flank of a volcano in the British Isles'. A second self-guide trail will journey to the bottom of an ancient ocean and reveal the massive forces at play when England and Scotland united 400 million years ago. This trail crosses the Shetland Ophiolite Complex, which has been described as 'the most compact, best exposed, complete and accessible in the world'. Other projects include a geology garden designed to bring to life the desert and lake environment of Shetland's Devonian Period through the fossilised remains of animals, plants and even raindrops. Shetland's geology is an impressive resource for learning, which is promoted by Geopark Shetland for educational use at every level. Current projects include the development of geology based teaching units for local schools.

Geopark Shetland is

managed by Shetland Amenity Trust. The Trust is supported by the multi-agency Geopark Shetland Working Group. This group includes representatives of organisations committed to the long-term future of Geopark Shetland, such as Shetland Islands Council, Scottish Natural Heritage, community groups, tourism operators and geology advisors.

Community ownership and support is also generated by working with local communities to develop Geopark projects. Geopark Shetland has held popular events to promote Shetland's geology within the island community, including guided walks, public talks and family activity days. More activities are planned for 2010 in celebration of EGN week, the Scottish Geology Festival and Shetland Schools Environment Week. Shetland is a vibrant cultural hub, which is becoming a strong player in the modern tourist market. With EGN membership, its geology has received the same recognition as its birdlife, biodiversity, archaeology and cultural heritage. Joining the EGN has further strengthened Shetland's tourism product and we look forward to welcoming more visitors, including other EGN members, soon.

Sita Hughson

WELCOME  
european  
**GEOPARKS**

**Giant's Leg, Bressay - The Old Red Sandstone of Shetland's Devonian period has been carved by the sea to create this stunning landmark. Copyright Jonathan Wills**



**Climbing in Shetland - Little known until recently, this addition to the range of outdoor pursuits enjoyed in Shetland is rapidly growing in popularity. Copyright Andy Long**



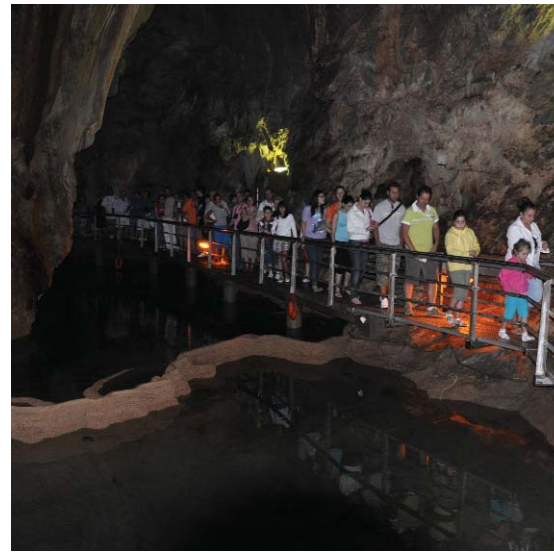
# Chelmos - Vouraikos Geopark

Chelmos - Vouraikos Geopark is located in North Peloponnese (Greece). It has an area of 5654 Km<sup>2</sup>, with 62 settlements and towns and a population of about 27,125 inhabitants. The Geopark is administrated by the Chelmos - Vouraikos Management Body whose aim is to man-

tains a rack railway, i.e. a railway designed for use on steep slopes with a rack between the rails which engages a gear on the locomotive. The line was opened in 1896 and is used by a train called Odontotos. Here the rocks consist of conglomerates with limestones. The rough slopes create important environments for birdlife within the gorge.

The 2 km long Cave of the Lakes, close to the village Kastria was created in the limestones of Chelmos Mountain, by an underground river some 1,5 million years ago. Nowadays the river cascades over a series of steps forming thirteen permanent sinter pools which occupy one third of the cave. The cave is located at an elevation of 827 metres in the drainage basin of the Aroanios river and owes its origin to chemical and mechanical erosion along tectonically controlled fissures. The permanently flowing Aroanios Springs in the Feneos basin are the source of the Aroanios River. The water reaches the springs through a series of sinkholes in the limestone. Next to the springs is an old watermill and the European E4 trail crosses this site.

The Ladonas River is suitable for canoeing- kayaking and rafting. This this gently flowing river is ideal for beginners and children also offers opportunities for trekking, swimming and fishing. The areas around the river are used by fans of climbing, biking and hunting as wild boar are known to come to parts of the river. Visitors to the area range from private individuals to



**A party views an underground lake during a visit to the Cave of the Lakes**

groups wishing to experience to alternative tourism. The geosite Tsvilou Lake at an altitude of 800 m was formed by a landslide in 1912 which blocked Krathis river valley. The Doxa Lake is a small artificial lake with the small church of St. Fanourios situated in its middle. The monastery of St. Georgios on the southern shores of the lake has a "secret school" and provides a magnificent view of the lake.

Geopark activities include the annually organised descent of Vouraikos Gorge. The participation of walkers from all over Europe in this activity reflects the interest in the natural beauty and geology at this site. The Kleitoria Environmental Educational Center organizes variety of environmental education activities. Its eucalyptus trees and gardens create some amazing combinations of colors in spring.

The area of Chelmos-Vouraikos successfully combines geology (geosites and geodiversity) and out door activities with the interests of the visitors.

*Nikos Topouzidis*



**The Vouraikos Gorge in the Chelmos Vouraikos Geopark**

age and protect the region's natural environment, archaeology and geology. The Geopark consists of a mountainous and semi-mountainous terrain with an average altitude of about 1,391 m. The geological structure and the region's rock types together with the rainfall, snowfall, and erosion by water contribute significantly to the nature of the landscape, Important geosites in the Chelmos - Vouraikos Geopark include the Vouraikos Gorge, con-

**Rafting on the gently flowing Ladonas River**





## European Geoparks Network Charter Against trading in geological objects

The European Geoparks charter was officially accepted on June 5, 2000 in Lesvos, Greece and was signed by the four founder members of the European Geoparks Network.

Every territory wishing to submit candidature to become a European Geopark is obligated to accept this charter and will sign it at the moment of the official nomination.

1. A European Geopark is a territory which includes a particular geological heritage and a sustainable territorial development strategy supported by a European programme to promote development. It must have clearly defined boundaries and sufficient surface area for true territorial economic development. A European Geopark must comprise a certain number of geological sites of particular importance in terms of their scientific quality, rarity, aesthetic appeal or educational value. The majority of sites present on the territory of a European Geopark must be part of the geological heritage, but their interest may also be archaeological, ecological, historical or cultural.

2. The sites in European Geopark must be linked in a network and benefit from protection and management measures. The European Geopark must be managed by a clearly defined structure able to enforce protection, enhancement and sustainable development policies within its territory. **No loss or destruction, directly or via sale, of the geological values of a European Geopark may be tolerated. In this respect European Geoparks are managed within the framework established by the Global Geoparks Network Charter (see below).**

3. A European Geopark has an active role in the economic development of its territory through enhancement of a general image linked to the geological heritage and the development of Geotourism. A European Geopark has direct impact on the territory by influencing its inhabitants' living conditions and environment. The objective is to enable the inhabitants to re-appropriate the values of the territory's heritage and actively participate in the territory's cultural revitalization as a whole.

4. A European Geopark develops, experiments and enhances methods for preserving the geological heritage.

5. A European Geopark has also to support education on the environment, training and development of scientific research in the various disciplines of the Earth Sciences, enhancement of the natural environment and sustainable development policies.

6. A European Geopark must work within the European Geopark Network to further the network's construction and cohesion. It must work with local enterprises to promote and support the creation of new by-products linked with the geological heritage in a spirit of complementarity with the other European Geoparks Network members.



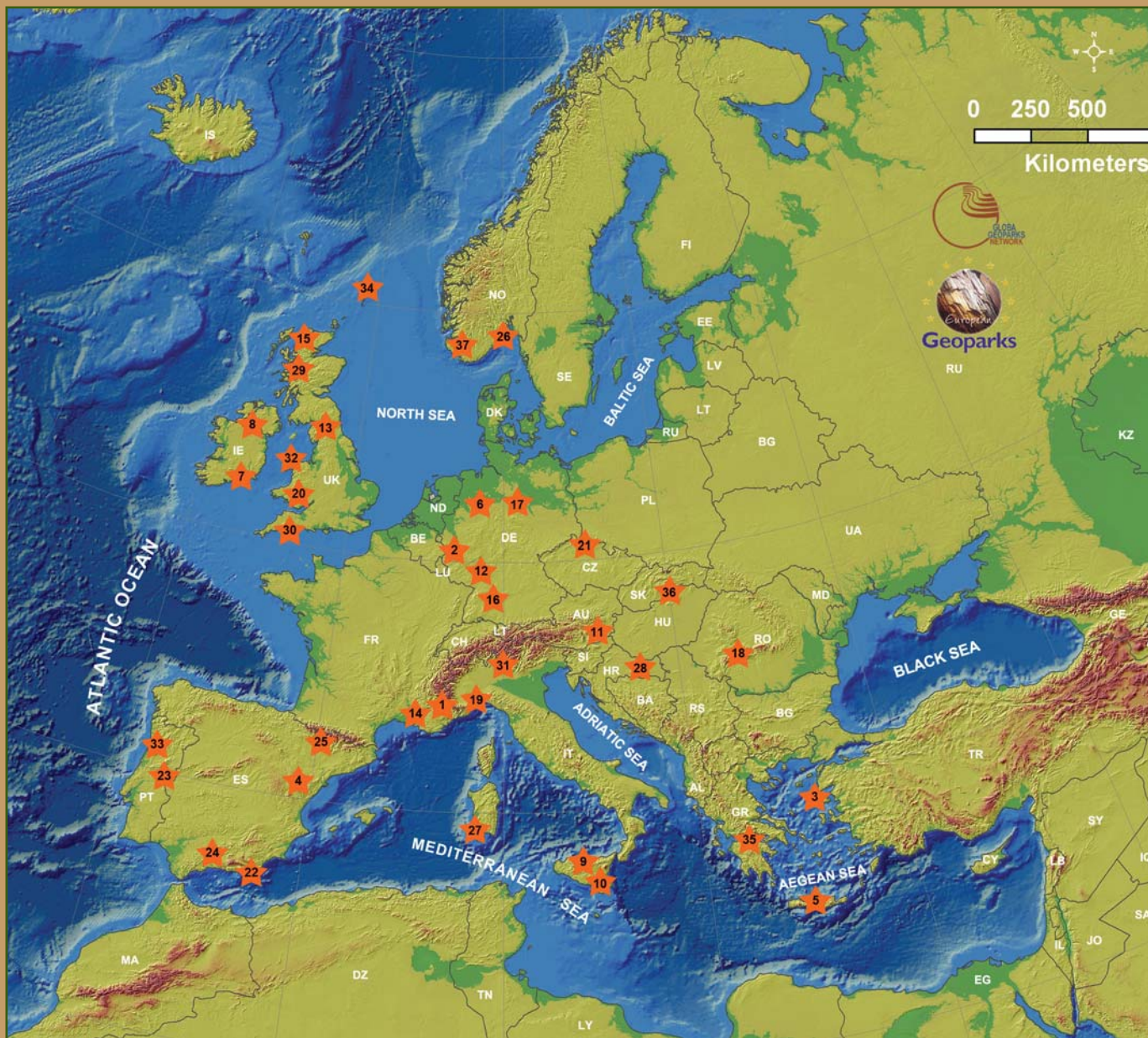
## Global Geoparks Network Charter

A Geopark must respect local and national laws relating to the protection of geological heritage. In order to be seen to be impartial in its management of the geological heritage, its managing body must not participate directly in the sale of geological objects\* within the Geopark (no matter from where they are) and should actively discourage unsustainable trade in geological materials as a whole, including shortsighted selling of Earth heritage, minerals and fossils. Where clearly justified as a responsible activity and as part of delivering the most effective and sustainable means of site management, it may permit sustainable collecting of geological materials for scientific and educational purposes from naturally renewable sites within the Geopark. Trade of geological materials based on such a system may be tolerated in exceptional circumstances, provided it is clearly and publicly explained, justified and monitored as the best option for the Geopark in relation to local circumstances. Such circumstances will be subject to debate and approval by the GGN / EGN on a case by case basis.

\*By geological objects the charter is specifically referring to specimens of rock, minerals and fossils of a type that are commonly sold in so-called "rock-shops." It does not refer to material for normal industrial and household use which is sourced by quarrying and/or mining and which will be subject to regulation under national and/or international legislation.

# The European Geoparks Network today...

The Network consists of 37 Geoparks in 15 European countries (April 2010)



1. Reserve Geologique de Haute - Provence	FRANCE	20. Forest Fawr Geopark	WALES, UK
2. Vulkaneifel European Geopark	GERMANY	21. Bohemian Paradise Geopark	CZECH REPUBLIC
3. Petrified Forest of Lesvos	GREECE	22. Cabo de Gata - Nijar Natural Park	ANDALUCIA, SPAIN
4. Maestrazgo Cultural Park	ARAGON, SPAIN	23. Naturtejo Geopark	PORTUGAL
5. Psiloritis Natural Park	GREECE	24. Sierras Subbeticas Natural Park	ANDALUCIA, SPAIN
6. Terra.Vita Naturpark	GERMANY	25. Sobrarbe Geopark	ARAGON, SPAIN
7. Copper Coast Geopark	IRELAND	26. Gea Norvegica Geopark	NORWAY
8. Marble Arch Caves European Geopark	NORTHERN IRELAND & IRELAND	27. Geological, Mining Park of Sardinia	ITALY
9. Madonie Geopark	ITALY	28. Papuk Geopark	CROATIA
10. Rocca di Cerere Geopark	ITALY	29. Lochaber Geopark	SCOTLAND, UK
11. Naturpark Steirische Eisenwurzen	AUSTRIA	30. English Riviera Geopark	ENGLAND, UK
12. Naturpark Bergstrasse Odenwald	GERMANY	31. Adamello - Brenta Nature Park	ITALY
13. North Pennines AONB	ENGLAND, UK	32. Geo Mon	WALES, UK
14. Park Naturel Regional du Luberon	FRANCE	33. Arouca Geopark	PORTUGAL
15. North West Highlands	SCOTLAND, UK	34. Shetlands	SCOTLAND - UK
16. Geopark Swabian Albs	GERMANY	35. Chelmos Vouraikos	GREECE
17. Geopark Harz Braunschweiger Land Ostfalen	GERMANY	36. Novohrad - Nograd Geopark	HUNGARY & SLOVAKIA
18. Hateg Country Dinosaurs Geopark	ROMANIA	37. Magma Geopark	NORWAY
19. Beigua Geopark	ITALY		