

european GEOPARKS



network
European Geoparks Magazine • Issue 4

**Geoparks:
popular places
for geo-adventures
and education**

**From a dream
to a strong chain of partners!**

UNESCO Global Network of Geoparks,
European Geoparks Network & World Heritage Sites



The secrets of the land and its beauty; anything that one may discover and enjoy, seeking the geological history of a land; all those that were born as the Earth was taking its present form... These are just a few of what a Geopark appoints; a few of what are object of a sector that is constantly evolving, offering multiple services, contributing towards the development of geotourism.

Throughout the last years, parallel to the evolution of technology and orientation towards a specific lifestyle, man needed to look back to Earth and seek there, through the past, through the future. Geoparks are carriers that appoint the geological monuments of each location, offering visitors the opportunity to admire these breathtaking monuments of nature and to participate in numerous creative and pleasant activities through which they best learn the exact nature and creation of these geotopes.

The founding of the European Geoparks Network and its fast development, confirms all of the above. The coordination of actions and the cooperation among the most important European Geoparks contributes towards the further development of Geotourism, the evolving of new initiatives, the exploitation of European Union programmes, the exchange of knowledge and expertise and the common action in neuralgic for the Geoparks sectors.

31 European Geoparks from 12 countries are currently joining in the Network, while many other territories with reach geological heritage have expressed their will to join the Network. So, many more will have the chance of experience knowledge and joy in their contact with Earth.



European Geoparks Network Magazine

Issue No 4 / 2007

Published by:

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

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This issue is co-financed by the European Agricultural Guidance and Guarantee Fund - Guidance Section (EAGGF-G)





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Geoparks

An ideal destination for alternative tourism and educational activities in rural areas in EUROPE

The community initiative Leader+ supports the collaboration between 7 Geoparks, members of the European Geoparks Network, on earth heritage protection and local development. The Geoparks that participate in the programme are members of the Global Geoparks Network established by UNESCO. Their participation in the Global Network confirms the uniqueness and importance of the geological heritage that they represent, which should be globally recognised.

The European Geoparks Network was founded in 2000 by four LEADER II zones with the support of the LEADER IIC initiative. It was built in collaboration with UNESCO-Division of Earth Sciences. By 2006, 30 Geoparks, representing 10 different EU countries, joined EGN. Main goal of the Network is the sustainable development in rural areas through the promotion of geological heritage in each geopark territory. Partners are involved in common actions and in developing strategies to promote alternative tourism by evolving new development policies, new products and new methods, experimenting on those issues and

working on preserving geological heritage.

The main aim of the Leader+ collaboration is to promote Geoparks as ideal destinations for educational and outdoor leisure activities. The project focuses on young European citizens, aiming at the protection and promotion of a common European geological heritage as a key-point for sustainable territorial development.

The target group of this project includes students, educational activities will be conducted in each Geopark. The student ages will range from school classes to universities and the educational material will correspond to the needs of each group. The management of this collaboration is overseen by a project management group (PMG) with representatives of all partners, which works with the responsibility of the lead partner. The PMG will meet twice a year, in order to discuss future plans and actions of the partners. Each Project Management meeting will be organized and hosted by one member of this project.

In the frame of the project, studies will be conducted on the development of alternative tourism and educational activities in rural areas in EUROPE. Advice missions to new Geoparks may be necessary to provide advice and suggestions in order to improve their status and fulfill the international quality standards. Special councilors from the member territories will study the candidatures of new members; therefore it's often the necessity of travel to the candidate for advice and suggestions. The present situation and level of



the tourist services will be examined and compared among the European Geoparks in the frame of a "tourist offer study". This study will evaluate the existing services and propose improvements. Valuable tools for the development of alternative tourism will be the promotion of common tourism packages and the organization of events promoting alternative tourism. Furthermore new technologies such as tele - selling via the internet will be used for better access in the product market.

Educational activities for university and school classes will sensitize the new generation.

Educational tools: Museum kits, students' exercise books, teachers' information leaflets and books

Informational material:

Special field guides for all ages will be created; maps and information leaflets will be printed.

Promotional tools that will be used are:

- Website: Updating and upgrading Geoparks website
- E.G. information point: Specially created points with promotion panels will be placed in the main information center of each Geopark.
- Leaflets and posters: Leaflets informing visitors about tourist programs, educational programs and offered geotouristic activities. Leaflets about the EGN will be published in four different EU Languages.
- Multimedia Presentation in CD-ROM: Information material concerning European Geoparks will be presented in a CD-ROM promoting the global image of the network.



European Parliament Commissioners visit the Lesvos Petrified Forest

A Delegation of the Commission of Education and Culture of the European Parliament (EP) visited the Natural History Museum of the Lesvos Petrified Forest and the Lesvos Petrified Forest Geopark, on Friday May 4th, 2007

The Delegation included the following members of the EP:

1. Maria BADIA i CUTCHET (Spain)
2. Giovanni BERLINGUER (Italy)
3. Lissy GRONER (Germany)
4. Marianne MIKKO (Estonia)
5. Ljudmila NOVAK (Slovenia)
6. Doris Gisela PACK (Germany)
7. Zdzislaw Zbigniew PODKANSKI (Poland)
8. Nikos SIFOUNAKIS (Hellas)

President of the Commission and EP officials, All of the above form the Commission of Education and Culture.

The main objective of the visit was to examine the role of thematic Museums in local development and to explore their activities, problems and achievements.

The EP delegation was welcomed by the Mayor of Eressos-Antissa Municipality Mr. S. Kardaras and the Director of the Museum and Lesvos Geopark Dr. N. Zouros.

The delegation was informed about the main features of the Lesvos Petrified Forest Geopark and the role of the Museum in the coordination of activities dealing with research, conservation, protection and promotion of the Lesvos Petrified Forest. These activities include cultural and scientific events (exhibi-

tions, concerts, theatre plays, dance performances, book presentations and conferences) as well as dealing with aspects of geotourism development and education. The role of the Museum in local development was extensively discussed.

The delegation was then given a guided tour of the Museum's permanent and temporary exhibitions. They visited the Petrified Forest and the Aegean Evolution exhibition rooms where they had the opportunity to see the impressive fossil discoveries from excavations in the Lesvos Petrified Forest and the new exhibits dealing with volcanic activity in the Aegean.

They also visited the temporary exhibition on the Art of the fossilised wood from the Bohemian Paradise Geopark and the temporary exhibition "Birds of the Petrified Forest protected area". The EP Delegation also visited the Museum's Educational Centre where 25 young unemployed men and women participated in a seminar on "Fossil conservation techniques", in

order to obtain the necessary qualifications to work for the Museum and the Geopark.

N. Zouros used the opportunity to present the European Geoparks Network and the Global Geoparks Network to the EP delegation. The presentation covered the structure, operation, meetings and evaluation procedures as well as the main achievements in trans-regional cooperation and geotourism development. He emphasized the role of Geoparks for the sustainable development in rural areas through the development of geo-tourism, eco-tourism, educational and cultural tourism. The Commissioners asked several questions on the European Geoparks Network and the importance of the thematic Museums, Info-centres and on-site interpretation equipment for their operation.

The EP Commissioners and officials were also informed about the organisation of the 3rd IGeoC and Geoparks Exhibition in Terra-Vita Geopark next year and were invited to attend.



The visiting members of the European Parliament in the Natural History Museum of Lesvos Petrified Forest

The 2nd Global Geoparks Conference From a dream to a strong chain of partners!

The 2nd Global Geoparks Conference was held in Belfast in September 2006. The conference was successful and had a high number of participants. The meeting provided delegates with the opportunity to discuss and assimilate new ideas which they could use to develop their own territories. However, aspirations are not fulfilled at conferences. It is essential that we consider the origins of our European Geoparks Network in order to define how we progress in the future. The origin of European Geoparks Network began in 1998. Discussions were initiated between the Reserve Géologique de Haute Provence, Gerolstein and Volcaneifel by G. Martini to explore the potential for collaboration in an innovative



project designed to create a European Geoparks Network. The Greek Lesvos Petrified Forest and the Spanish Cultural Park of Maestrazgo also participated in this process. This new and exciting concept, namely the creation

of a European Geoparks Network, was based on the view that the "in situ memory of landscape which every inhabitant of a region has" can be used to secure the future through the development of "geo and economic / tourism". The success of the project is a tribute to the creativity, patience, strength and enthusiasm of members within a growing network to work together with a common aim. This is clearly reflected by the continued growth of the EGN and GGN and the success of the Belfast conference. The conference demonstrated the need for communication between politicians, tourist providers, economic consultants and geoscientists. It was a pleasure to discuss ideas and share practical experiences with colleagues from participating geoparks and to consider the diverse views expressed on the future development of the Geopark concept raised in oral presentations and in workshop discussions. Many of us benefited by discussing, in a wider forum,



Representatives of the new members of the Global Geoparks Network at the official ceremony for their nomination

UNESCO Global Network of Geoparks, European Geoparks Network & World Heritage Sites

the ideas concerning geological heritage arising from the management strategies of Geoparks and of existing World Heritage Sites, and from current and proposed collaborations between Geoparks. It became clear from the meeting that we still have a long way to go in progressing our common future on planet Earth under the aegis of "geosciences and landscape for the future of human society" to "meet the needs of future generations" both for a stable society and for sustainable economic development.

It was a privilege to participate in the "Geoparks Celebration" in Belfast. Landscape and geosciences are not boring, dirty and dead! This was shown during the celebration in which the UNESCO certificate was presented to new members of the UNESCO Global Geoparks Network. The meetings and discussions between diverse nations who have already worked together, and new members will lead to future progress and to the creation of new projects. They are a cause for celebration.

The partners within the Network form links within a growing chain in which members contribute to the strength and development of the Geopark concept and, simultaneously, serve the needs of future generations within different areas of the world. Each partner is an equally important link within the chain. Let us pull together so that we all benefit through our creativity, progress collaborative efforts and above all in our support for each other.

M.-L. Frey



Celebrating Earth Heritage.
Sustaining Local Communities

Belfast Conference Declaration

320 participants attended the Geoparks 2006 Conference coming from 40 countries and 6 continents. After 3 days of discussions, positive exchange of experiences and ideas on Geopark development worldwide we want to emphasise the needs for the future development of the Global Geoparks Network (GGN):

1. Reaffirm the Geopark concept which refers to a holistic approach to the identity of the territory including earth heritage and all other aspects of natural and cultural heritage both tangible and intangible.
2. Reaffirm the continuing integration of earth heritage protection and promotion for the sustainable development of local communities under the Geopark label.
3. In response to the expansion of the GGN, to emphasise the responsibility of all Geopark participants to create a new kind of territory for the 21st Century in terms of concept, management and equipment.
4. Strengthen the cooperation and understanding among Geopark members creating new possibilities of partnerships and synergies especially by actively contributing to international and regional conferences, thematic workshops, courses etc.
5. Based on the results of this conference to develop a new coherent strategy for the operation and expansion of the GGN worldwide, especially encouraging the formation of Regional Geopark Networks using the European Geoparks Network as a model.
6. Commit to work with World Heritage Sites in order to explore areas of mutual cooperation and to have coherence in the GGN strategy.
7. GGN members commit to assist aspiring Geoparks to develop their own territory producing an appropriate model that reflects their own unique set of conditions.
8. Explore new areas of mutual cooperation between the GGN and other International organisations as and when appropriate.
9. Work together to promote the heritage of our planet provided by the unique opportunity of the International Year of Planet Earth (IYPE).

Belfast, 21st September 2006

Geoparks and Higher Education

A Field Lab for Sustainable Tourism



Last June, a group of international students visited the Lesvos Petrified Forest to complete an assignment for their Strategic Environmental Development (SED) course. This course is a component of the Master of Science Degree in Environmental Management and Policy programme at the International Institute for Industrial Environmental Economics (IIIEE) at Lund University, Sweden. In the SED programme students work with real-life case studies, in this case the Lesvos Petrified Forest (LPF), to develop and test new ideas, methods and tools in order to support sustainable human activities.

After examining tourism in the geopark, its affects on the protected area, the geopark's relations with the local community of Sigrí and sustainable tourism practices, the students developed a number of fresh ideas for the geopark in their reports. Their suggestions included methods for improving efficiency in energy consumption in the museum, increasing support for employees, financial development of the geopark, and promotion of eco-tourism and environmental conservation. The stu-

dents also suggested that the LPF made use of the European Charter (created in 1995 by the EUROPARC Federation), which offers a framework for managing the development of tourism. Moreover, the students felt that the establishment of a stakeholder forum would assist the geopark and the local community of Sigrí to work more closely in partnership to protect their park's resources. Each partner would benefit from one another's expertise and experience. They also suggest that the community of Sigrí could benefit from eco-tourism and should develop activities such as wind-surfing, fishing and bird watching in order to take advantage of the 40,000 annual visitors to the geopark.

The Lesvos Petrified Forest Geopark, like all the geoparks in the EGN and the GGN, is an ideal location for those interested in sustainable tourism practices. The visiting graduate students were able to learn from and contribute to the efforts of staff at the geopark in reconciling the need to preserve its environmental and cultural assets with the need to develop tourism.

Nikolas Zouros

Instruments for Recording data and Improving Planning in the Parco Culturale Rocca di Cerere

The Geosites Maps

A field study with the aim of documenting the many geosites distributed in the vast territory of the park has been conducted in the Geopark "Parco Culturale Rocca di Cerere", since last Spring. The study, which proceeds from the file cards developed for the classification of the geosites within the "Geosites Project", has improved the classification and methods of investigation required for proficient planning. This process has resulted in the extension of the knowledge base to include the relationship between the geology, the landscape and the natural and cultural

and heritage within the Geopark. Consequently the working group now produces holistic records which better define the complexity of each site. We anticipate that the increase in scientific knowledge resulting from this approach will provide new research opportunities for interested Universities and, more importantly, will lead to improved procedures in the protection of the listed geosites. The next stage in this process will be to develop a strategy for rigorous conservation measures that are commensurate with the aims and demands of geotourism.

The research project has used an

original database programme based on the freedom of research typical of LINUX which is compatible with systems which differ from Microsoft. The choice of programme allows the database to be translated into every possible language by simply processing file fields. Geopark "Parco Culturale Rocca di Cerere", together with the "Centro di Educazione Ambientale Alexander Von Humboldt", organisation responsible for the research, will make this programme available to other Geoparks via the internet.

M.V. Ingrassiotta, R. Umbriaco, A.M. Barberi, A. Cristaldi, F. Sgro, G.M. Amato

Geoparks and UNESCO

The role of UNESCO

UNESCO has developed two cooperating programme frameworks to deal with geological heritage - the World Heritage Convention, and the Global Network of National Geoparks (GGN) which is one of the most recent initiatives being promoted by UNESCO in the field of Earth sciences.

The Global Network of National Geoparks provides a landscape approach for the conservation of geological heritage, education and sustainable development. The initiative of UNESCO to support national Geoparks responded to the wish expressed by the geoscientific community within numerous member states. UNESCO has, since 2001, through its Global Network of National Geoparks, assisted national initiatives by providing a framework to develop models of best practice and set standards. In cooperation with its international partners UNESCO is committed to support ad hoc efforts related to geological heritage upon request by its member states where appropriate. At present 48 national Geoparks are members of the Global Network. The interaction between socio-economic development and conservation of the natural environment adds a new dimension to the international vision for conservation. It recognises, as a central principle, the relationship between people and geology and the ability of a site to serve as a focus for economic development. The increasing number of established Geoparks around the world shows the growing global



awareness of the necessity of working together in this particular field.

UNESCO is also heavily involved in maintaining the high standards of the Global Geoparks Network. It recognizes an emerging need either for training and tutoring or twinning to ensure the efficient flow of knowledge between Geoparks. It is important to stress that UNESCO's idea is not to create a long list of global Geoparks. The Organization is more interested in the intellectual development of the Geopark concept and in developing a strong authentic network than in achieving an unsustainable number of members within a global network. Networking among Geoparks is an important component of the Global Network of National Geoparks. Guidelines for and information on National Geoparks seeking UNESCO's assistance are available on the UNESCO website:

<http://www.unesco.org/science/earth/geoparks.shtml>

Margarete PATZAK, Geoparks
Secretariat, Division of Ecological
and Earth Sciences, UNESCO

Patrick McKEEVER,
Geological Survey
of Northern Ireland

What is a Geopark?

A Geopark is a geographical area where geological heritage sites are part of a holistic concept involving conservation, education and sustainable development. Non-geological themes are an integrated part of a Geopark, especially when their relation to landscape and geology can be demonstrated to visitors. For this reason, it is also necessary to include sites of ecological, archaeological, historical or cultural value. In many societies, natural, cultural and social history are inextricably linked and thus cannot be separated.

Geoparks that are part of the Network:

1. preserve their geological heritage for present and future generations;
2. educate and teach the broad public about issues in geological sciences and their relation with environmental matters;
3. ensure sustainable socio-economic and cultural development;
4. foster multi-cultural cooperation for heritage and conservation and the maintenance of geological and cultural diversity, using participatory schemes and co-partnerships;
5. stimulate research when appropriate;
6. contribute actively to the life of the Network through joint initiatives (e.g. communication, publications, exchange of information, twinning, participation in meetings).

Educational and interpretation facilities

for the enhancement of the geological heritage in Beigua European and Global Geopark

From its establishment in (1996) the Beigua regional nature Park has developed educational projects to inform younger generations about their territory and its environmental resources. This has been achieved through links with schools and others involved in the educational system. On becoming a European Geopark in 2005 the Beigua territory has paid increasing attention to the conservation and enhancement of the natural heritage, supported by interpretation facilities and educational activities.

The educational and interpretation facilities network in Beigua Geopark

The educational and interpretation facilities of the Beigua Geopark operate within the National and the Regional Educational Network and provide a resource for developing new projects and promoting work and educational experiences. Visitor and Information Centres provide exhibitions promoting the Geopark and its activities in protecting the geological heritage as a resource for local sustainable development. The educational and



Geological trail and geotourism activity

interpretation facilities network includes:

The Educational Centre, located near the headquarters of the Geopark, in Arenzano, provides information about the Geopark. It houses a "Geopark Corner", equipped with several computers, free web-connection, guide leaflets and various material concerning the EGN and GGN.

The "Villa Bagnara" Visitor Centre contains a "Geopark Corner" and information boards with internet links to all sites of major geological interest in the Beigua's territory.

The Ornithological and Educational Centre, located in Vacca, above Arenzano, has a small geological laboratory, with learning kits which explain the geological and geomorphological processes within the surrounding area.

The "Bruno Bacoccoli" Information Centre, sited in Prariondo (Cogoleto), introduces the rocks of the Geopark through interpretation panels and samples of rocks and crystals. An outdoor "stone garden" shows different patterns of rocks belonging to the ophiolitic area in Beigua Geopark.



Geopark corner in Beigua Geopark headquarters - Villa Bagnara Visitor Centre - "Stone garden" at the Info Point in Prariondo

The Alpicella Museum (Varazze) hosts a permanent archaeological exhibition, and an exhibition dedicated to geology in the Geopark. In Sassello ("Palazzo Gervino"), the site of the local tourist bureau managed by the Beigua Geopark, we are establishing a Visitor Centre totally dedicated to the Geopark.

The "Nature trails" complete the picture. Created in several sites of the Geopark, they are thematic trails, equipped with interpretation panels and materials, which inform the visitors about the geology and landscape.

Recent activities to enhance geoconservation

The Geopark uses different educational activities to promote the Earth heritage. In the past two years Geopark staff involved many classes from schools in the area in a project called "Discovering Beigua Geopark - Adopt a geosite". This was aimed at improving the pupils knowledge of the main geological, geomorphological, mineralogical and palaeontological characteristics of Beigua Geopark.

The Geopark staff organised training courses for the school teachers in the projects concerning the preservation and the enhancement of the geological heritage.

The Beigua Geopark supported two exhibitions in the spring of 2006. The first exhibition (Civic Museum of Natural History, Genoa) presented the history of dinosaurs discovered in the Rés?rve G?ologique de Haute Provence Geopark. The second, a collection of pictures and fossil samples from Santa Giustina (in Stella Municipality), demonstrated the tropical habitat of the Oligocene epoch.

The Geopark also provides a number of monthly geotouristic activities and guided visits, along the geological trails of the Beigua territory.

Maurizio Burlando

The "Landmarks Project"

in the Geopark Harz.
Braunschweiger Land. Ostfalen

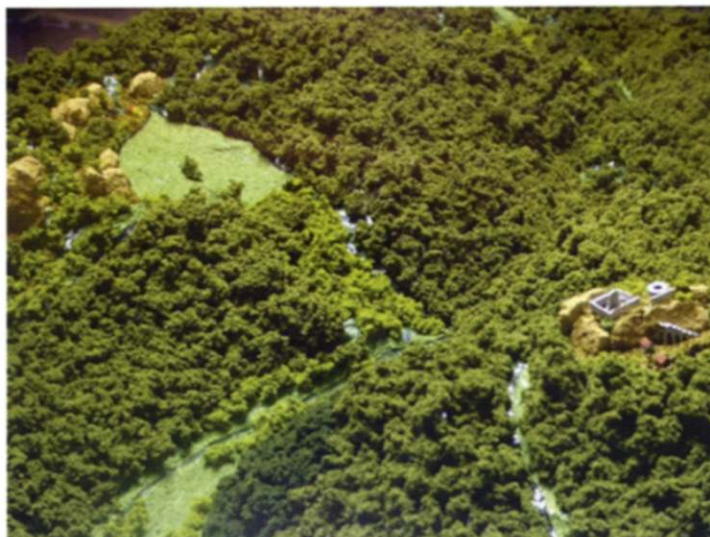
A Numerous individuals and institutions have addressed the topics of geology and mining within the geopark area for a considerable length of time. The Harz Mountains, in particular, already contained a number of geosites, show-caves, show-mines, geo-museums together with other potential network partners. Given this situation, we undertook the task of building a network within which partners shared in the promotion of the various facilities and events within the geopark. Members of this network operate within the framework of a professional association which is responsible for promoting and marketing the geopark through information sites.

In an open workshop held during September 2002, initial ideas for projects were developed for the geopark area of the Harz Mountains. The complete project was implemented in several stages between 2002 and the beginning of 2006. Each of the 17 landmarks is defined either by one famous mountain, tower or castle etc, thus establishing a visual connection to 17 related geo-routes. Each geo-route would normally involve a weekend-tour. We published leaflets for each landmark with facts and explanations pertaining to the geology, mining and the nature and cultural development of the landscape. Geo-guides consisting of trained personnel are provided for the whole area.

Half a million leaflets have already been distributed and recently, the 2nd and 3rd editions of certain of the leaflets were printed. The leaflets can be downloaded by anyone by visiting the website www.harzregion.de.

The landmark-project is the first stage in an area-wide development linking the existing geological sights with other tourist highlights.

K. George and H. Zellmer



"Rockworks"

in the North Pennines AONB European Geopark

Rockworks' is the North Pennines Area of Outstanding Natural Beauty Partnership's four-year €840,000 geodiversity project. Rockworks aims to make the most of the area's geological heritage through interpretation, education and conservation, and to use it to support sustainable development. It is mainly funded by the Heritage Lottery Fund, Natural England and LEADER+. Recent highlights amongst a much wider programme include:

Success for Rock Detectives!

Now into its second year, Rock Detectives is our children's geology club for 6 to 12 year olds. There are three clubs across the North Pennines, hosted by three of our partner organisations: Harehope Quarry Project, East Cumbria Countryside Project and Fawside. Membership is £1 and after that all events are free. Members get a free T-shirt and a bag for storing their Rock Detectives kit.

Events in 2007 include mine tours, crafts and games, museum visits and discovering fossils in Harehope Quarry Project's new 'Georium'. The AONB Partnership bought this after seeing it in action at the Reserve Géologique de Haut Provence European

Geopark.

Geodiversity Officer Elizabeth Pickett said, "We weren't sure what kind of interest Rock Detectives would generate, but with almost 200 members it has surpassed our expectations!"

Celebrating European Geoparks Week with Northern Rocks

Northern Rocks - the North Pennines Festival of Geology and Landscape, runs over two weeks every May and June, in celebration of European Geoparks Week. The festival is packed with events and activities to help local people and visitors discover the geological heritage of the North Pennines.

There's an exciting range of things to do. This year there were 45 events, including guided walks, talks, exhibitions, geological holidays, children's events, rock climbing, mine tours and a dry stone walling workshop.

School of Rocks

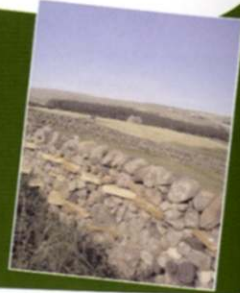
We have recently produced new materials to help teachers use the geology and landscape of the North Pennines to deliver the National Curriculum. Though geology is rarely taught as a single subject, it is possible to use geology and landscape to teach many parts of the curriculum, from ages 5 to 16.

The AONB Partnership Staff Unit contracted Durham University and Harehope Quarry Project to produce the new pack. They have worked with us to create a fantastic resource of lesson plans, worksheets and 20 'rock boxes' with superb samples of local rocks, minerals and replica fossils.

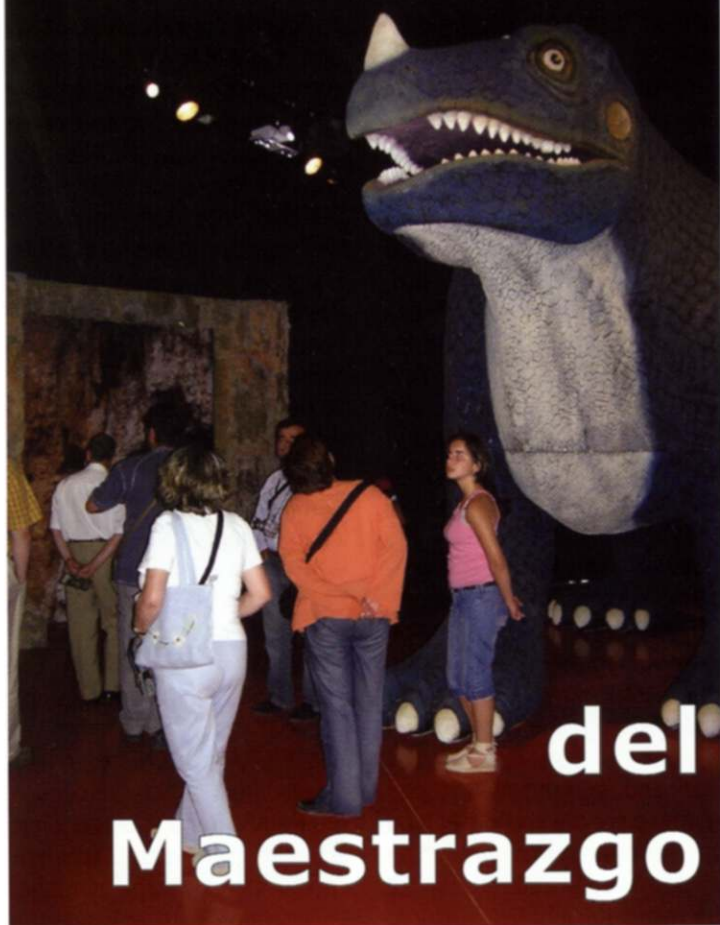
Wheels to the Wild Launched

In May 2007 we launched 'Wheels to the Wild', our geological cycle trail. The guide contains directions for a three-day main route and three day-rides, and interpretation of the geology and landscape along the way. It includes an accommodation guide and a leaflet highlighting other cycling opportunities in the North Pennines. We have improved cycling infrastructure around the route, with new facilities in accommodation and attractions. "Cycling and geotourism are important elements in developing sustainable tourism within the AONB," said Chris Woodley-Stewart, North Pennines AONB Officer and Geopark Manager. "People visiting the area to explore the landscape by bike help to support accommodation providers and other service-related businesses."

*Chris Woodley-Stewart
Elizabeth Pickett*



Parque Cultural



del Maestrazgo

The Cultural Park of Maestrazgo has consolidated its new management structure supported by the Aragon Government (regional government and by the Technical Commission - Scientific Committee. The Scientific Committee is composed of members with expertise in the management and protection of the geological and paleontological heritage. Luis Alcala represents the Fundacion Conjunto Paleontologico de Teruel - Dinopolis. Jose Luis Simon the Facultad de Geologicas of the Universidad de Zaragoza; Jose Antonio Andres the technical staff of the Direccion General de Patrimonio Cultural del Gobierno de Aragon; Victor Guiu is the manager of the Parque Cultural and Jorge Abril is member of the Geopark technical staff and of the Asociacion para el Desarrollo del Maestrazgo. In a short-term future, the Committee will extend

its staff with a tourist associationism representative and a representative of the Departamento de Medio Ambiente of the Gobierno de Aragon.

The Gobierno de Aragon has recognised two Natural Monuments within the Parque Cultural; the Grutas de cristal and de Batcabras in Molinos and the Natural de la Fonseca in the village of Castellote. The two councils will manage the protection and defence of the monuments. The Geopark will keep working to promote other sites to be included in the Natural Monuments list, such as rganos de Montoro and Parque Geologico de Aliaga.

As members of the Committee, the Dinopolis staff have been engaged in important management work to include the Icnitas del Parque Cultural in the Heritage of Mankind of the Iberian Peninsula. The important site of Cerradicas stands out as

one of the strongest candidates.

Training in the Geopark

The Parque Cultural del Maestrazgo has a training program involving several courses each year to train associations, guides and tourist firms to promote the heritage of our region. There are several courses. For example the successful summer courses in geology and paleontology and local projects management developed with the Universidad de Zaragoza, and supported by Asociacion para el desarrollo del Maestrazgo."

Maestrazgo and the Media

The Geopark works actively with specialized tourist magazines e.g. Cultural y Turismo de Naturaleza, and the regional magazine "VerdeTeruel". It frequently takes part in the most important regional media events, and works with the local and regional press.

New Visitors Centers

New visitor centres established in 2005 included: Dinopolis in the Geopark of Maestrazgo, Parque Geologico de Aliaga included a Geological Hall and was supported by Parque Cultural and other institutions such as Comarca de Cuencas Mineras. The Centro de la Miner?a, one of the most interesting sites in the Parque Geol?gico was restored in 2005. An important centre devoted to Orden del Temple was opened in Castellote and the Visitors of Nature Centre in Villarluengo was restored. New visitor centres were also established in the geopark in the summer and autumn of 2006.

Computerization and Organization of the Parque Cultural Library

After more than 15 years working for the rural development of the region, the Parque Cultural, with the support of the Instituto Aragonos de Empleo, has been able to organize the library and its archive to include important regional culture finds and a specialized section about the European Union.

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World Heritage Site Messel Pit and European Geopark Bergstrasse-Odenwald:

UNESCO World Heritage Sites (WHS) are generally not associated with geoparks. In South-Hesse however, the UNESCO-WHS, the Messel Pit, occurs within the European Geopark Bergstrasse-Odenwald. From 2003, the year of implementation, the WHS "Grube Messel gGmbH" revived its plan to construct a visitor centre in partnership with its shareholders the State of Hesse, the local community of Messel and the

Messel Pit and the participation between the WHS and Geopark Bergstrasse-Odenwald in regional and trans-national projects within the European Geoparks Network. Cooperation between the WHS and the Geopark also involved the creation of a special program during the EGN week 2006. This coincided with WHS day in Germany, the first Sunday in June, in which the German-wide WHS promoted the UNESCO concept. In 2006, the Messel Pit celebrated its 10th anniversary as a WHS and a special one week event program, centred on the Messel pit, was developed with a wide range of activities for children and adults. More than 500 visitors enjoyed the increase in number of short trips, at the week-end, into the WHS Messel Pit and a special action day with the Geopark Rangers. The week's events catered for all interests. Scientific lectures were delivered at Frankfurt/Main, Darmstadt and Messel. Performances by the "Rainforest Puppet Theatre" and book reading sessions appealed to children. Entertainment involving square dancing clubs encouraged people to stay, relax and enjoy the regional food. The combination of information, enjoyment and discoveries demonstrated the linkage between culture, landscape and

geology in our modern society. One highlight of the week's events involved an arts competition for young people from 6 to 19 years age, with a new prize for the winner: the FIORA EOCENE Prize donated by the Welterbe Grube Messel gGmbH. The prize was presented by Dr. Patrick McKeever, Vice-Coordinator of the EGN, Gerd Mangel, Chairman of the Welterbe Grube Messel gGmbH, Reinhard Diehl, Manager of the Geopark Bergstrasse-Odenwald, and Dr. Marie-Luise Frey, Manager of the WHS Messel Pit. The children from the kindergarten of Messel won a special prize for their sculpture: "a crocodile from the Messel pit" made from natural materials.

The FIORA EOCENE is a new development which initiates a program of socio-economic activities combining Earth science with landscape heritage. Its intention is to enhance the relationship between man and the Earth and to provide an example of the benefits of long term socio-economic development. The key to our future success is the constructive collaboration between Geoparks and WHS territories with respect to continuous joint actions and public relations activities.

*Dr. Marie-Luise Frey
& Dr. Jutta Weber*

A new socially focussed collaboration

"Senckenbergische Naturforschende Gesellschaft", Collaborating partners in this venture include the "Hessisches Landesmuseum Darmstadt" Geopark Bergstrasse-Odenwald, the Fossil Museum of Messel, and the University of Jena as well as regional stakeholders. The first phase of implementing this plan has already produced two successful outcomes: the installation of a provisional information centre besides the



Geoparks: popular places for geo-adventures and education

Geoparks are areas with a unique combination of Earth history, natural history and culture. They are dedicated to providing new ways of enjoying nature, discovering the landscape and generating and/or strengthening an interest in the history and in the future of our planet.

between the rock record, Earth history and landscape can be observed (Photo-1).

Creating rock art, mosaics and sculptures, with the Geopark rangers simultaneously combines enjoyment with insights into Earth history and the nature of geological processes. (Photo-2)

Creating fossils by using natural

and questionnaires can be downloaded from the Geopark homepage.

(Photo-4)

Natural cycles can be demonstrated and experienced during long term projects, e.g. growing potatoes from planting to harvest with different tasks on site and in the classroom. The example quoted ends with the



Enjoying nature in a very special way and learning how the Earth has changed over millions of years has the potential to create a huge informative playground. The Geopark Bergstrasse-Odenwald offers a wide range of programmes in geo-education and geo-adventure for children as well as for adults. Discovering the stories which are hidden in the rocks is a favourite game during field trips when the connection

materials or plaster provides a very special opportunity to combine fossil preparation with information concerning the nature of life at different stages of Earth history. (Photo-3) 'Geokids on tour' produced by the Hessian TV channel shows rock detectives, accompanied by a Geopark ranger, who are given special tasks during their discoveries of geotopes. Information on how to become a rock detective, location maps

fun of roasting potatoes in an autumn bonfire. (Photo-5) With their balanced combination of adventure, enjoyment and information, the Geopark's educational programmes are considered as particularly suitable tools for engaging with the general public. Additionally, these programmes create awareness of the function and potential of the Geopark Bergstrasse-Odenwald.

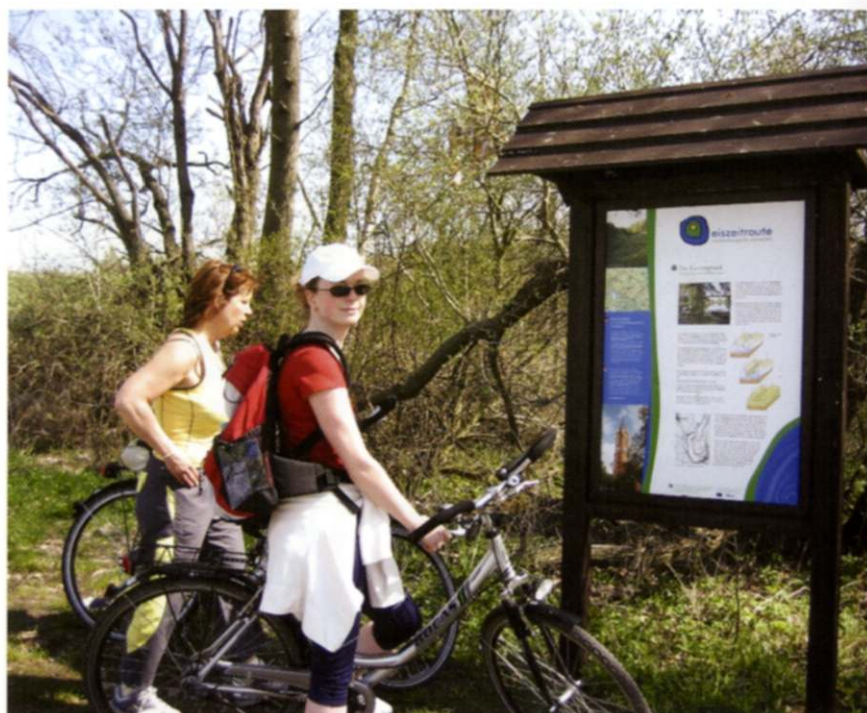
Dr. Jutta Weber



The Ice Age by bicycle

Traces of the last Ice Age can be found everywhere in the landscape of the Geopark Mecklenburg. The broad fields, numerous lakes, chains of hills, moor-lands, springs and the large number of huge erratic blocks provide the perfect terrain for physically active tourists and local people. Across the whole of Europe cycling is a growing holiday activity. For this reason the idea of an Ice Age Route was included in the INTERREG-Project "High Quality Tourism 2". The Regional Planning Board of Mecklenburg Lake District took part in this project together with partners from Sweden, Latvia and Poland. The main aim of the "Ice Age Route Mecklenburg Lake District" was to connect geologically interesting sites and sites that were attractive to tourists through a high quality bicycle route. Developing the route involved cooperation between specialists from different disciplines such as tourism, geology, design and education.

Opened in spring 2005, the Ice Age Route now connects the Activity Centres of the Geopark. The 666 km length of the Ice Age Route is sub-divided into nine smaller routes. This allows tourists to either spend a two week holiday cycling in the Mecklenburg Lake District or to engage in weekend tours and day-trips. Tourist information packages have been prepared which combine relaxation and



A Route through the Ice Age Landscape of Geopark Mecklenburg

activity.

The Ice Age Route is easy to follow, as it is continuously signposted with a specially designed logo that shows the regional colours: blue, green and yellow. They stand for lakes, forests and the wide fields of rape for which the Mecklenburg Lake District is famous. Another category of signposting is provided by geo-information boards. So far 40 of these boards are positioned along the Ice Age Route. They combine information and explanation with illustrations to show how the present day landscape was created by geological processes.

Information relating to the cycle route is provided by the Geopark Information Centre as well as by the regional tourist information centres. The detailed Ice Age Route map is useful for orientation within the

Mecklenburg Lake District and a route brochure provides general information concerning the route, single tracks, the landscape, sightseeing trips, and geology. Further information concerning, for instance, guided tours is also available on the Internet (www.eiszeitroute.com). Why not come and cycle The Ice Age Route and take a run down the end moraines?



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Geopark Swabian Alb

Pupils adopt a geosite

The Swabian Alb, a region in southern Germany, has a geological record ranging from the Mesozoic to the Quaternary and is noted for its karst scenery which is associated with Jurassic limestones. Due to its rich natural and cultural heritage the region has a long tradition of geotourism and other geo-activities. A major challenge within the geopark is to combine existing activities. One area of focus is concentrated on developing educational programs in geology. The educational project NAT -operated by the Robert-Bosch-foundation provides an example of an integrated program which was undertaken by a high school in Langenau in cooperation with the University of Tübingen. The project was concerned with the development, by pupils, of geosites during interdisciplinary lessons. The interdisciplinary and holistic approach required by this project introduced the class to different learning disciplines.

A working group of high school pupils at different stages in their education made excursions to choose a geosite. The challenge for the working group was, to make the geosite accessible to the public and to explain the site through the interpretation of the landscape. The first stage of the project involved an exploration of the geosite combined with a literature search. This provided the basis for developing a working plan which included the characteristics of the geosite. During this stage decisions were made concerning the content of interpretive panels and making the site accessible. Following completion of these stages the pupils had to present and discuss their plans with the communities concerned, property



1. Rammingen Sandpit before the initiation of the geosite project.



2. Pupils clearing the vegetation at the Rammingen Sandpit.



3. Installation of an information panel at the Rammingen Sandpit.



4. Rammingen Sandpit after completion of the geosite project.

owners and authorities involved with nature protection and the protection of natural and cultural heritage. Data collection and data storage for the geosite based on fieldwork, site description and the measurement and collection of materials including water analyses provided the pupils with new learning experiences. The next stage, preparing the geosite, involved clearing vegetation, excavation and the removal of debris. The illustrations show the stages in the development of the Rammingen Sandpit geosite. Figure 1 shows the sandpit in its original overgrown state and Figure 2 shows the pupils clearing the site of vegetation.

The holistic approach to the project also included designing panels, proof reading text and positioning the panels in the landscape. Figure 3 shows the pupils installing an information panel and Figure 4 shows the Rammingen Sandpit at the end of the project.

To date two projects, one at the former sandpit near Rammingen (Tertiary Upper Marine Molasse) and the other at the karstic spring Grimmensee near Langenau, were completed by the high school in Langenau. A third project, a trail through the caves in the Lonetal, where the oldest evidence of sculptures have been recorded, was presented to the public during the national day of the geosite in September 2006.

The geosite program combines education with the promotion of geoinformation to the public and thus strongly supports the aims of the geopark.

Walburg Speidel
and Elmar P.J. Heizmann

Co-author and pictures:
Günther Kramer

The Geopark Way

Abberley and Malvern Hills European Geopark

The Abberley and Malvern Hills European Geopark are firmly committed to the promotion of its internationally important geological heritage for tourists to encourage regional economical development within its territory. However, it is recognised that the European Geoparks designation is not enough to motivate tourists to come to the area and visit those key sites within the geopark which are currently disconnected from the larger visitor attractions such as the Malvern Hills Area of Outstanding Natural Beauty (AONB). Over 1.25 million people visit the Malvern Hills per year. Visitors are attracted by the impressive Iron Age hill forts, the famous Malvern springs and the stunning landscapes, but often fail to visit other lesser known geologically important and scenically attractive landscapes within the Geopark. In order to redress this issue, the Geopark Partnership has launched a new geotourism initiative called the Geopark Way. The Geopark Way is a long distance walking and cycling trail which follows existing footpaths and heritage trails. The trail cuts through the heart of the territory and allows visitors to travel across 700 million years of Earth history. Visitors will be



The Malvern Hills ridge. Increased visitor pressure has resulted in footpath erosion in some of the more popular localities

introduced to Quaternary ice age landscapes and impressive river valleys, Permian desert sandstones, Silurian limestones and Precambrian igneous rocks. The trail will be accompanied by a guide book which will be packed full of advice and information to enable visitors to get the most out of their visit to the Geopark. The final route of the trail will be influenced by the local communities who live within the Geopark. This is facilitated through a Community Liaison Project which enables local residents to take ownership of their Geopark, making the European Geopark designation work for their communities by increasing tourism in

their local areas. The Geopark Way project will be completed in early 2008 but in the meantime visitors can discover our rich geological heritage by following one of the many Geology and Landscape trails within the Geopark. Some of these trails can be downloaded from our website, whilst others may be purchased from visitor information centres. More information can be found on the Abberley and Malvern Hills Geopark Website www.geopark.org.uk and Herefordshire and Worcestershire Earth Heritage Trust <http://www.earthheritagetrust.org/>

Rona Davis and Cheryl Jones



The German Volcano Route

A route for tourists connecting the outstanding volcanic landforms of the Eifel area

The volcanic landforms which were created by Quaternary volcanic activity during the last 700.000 years are the dominant features in Vulkaneifel European Geopark. More than 200 sites of geological and geomorphological as well as of touristic interest are equipped and marked with information panels. All these sites are accessible along waymarked geological routes and pathways which have been established by the partner municipalities during the last 20 years. The sign-posting along each route or pathway uses, primarily, scientific insights to present the theme of the trail. Sites of varying degrees of remoteness were also included for the sake of scientific completeness rather than for their value as destinations for tourists. With the new project "German Volcano Route" sites throughout the whole geopark were selected for connection along a car-route. The main criterion for selecting these sites is that they are of aesthetic appeal and enable the visitor to experience and understand the landscape. Furthermore these sites must be readily accessible.

To fulfill the minimum requirement for a "German" volcano route the project includes a sec-



Draft information-panel for the "German Volcano route": trilingual, outline map, information-element for children

Deutsche
Vulkanstraße



Standardized
road sign

ond volcanic field (East Eifel Volcanic Field) which is 45 Kilometers east of the Vulkaneifel European Geopark. Of the 39 sites along the "German Volcano Route" 25 are located in the Vulkaneifel Geopark and highlight the diversity of volcanic landforms and features.

Until it is opened to the public, during the European Geopark Week 2007, the "German

Volcano Route" will be equipped with standardized signposting for an itinerary which extends for 280 kilometers with newly designed information-panels at the sites. In Vulkaneifel Geopark these information panels will be part of a more comprehensive visitor guidance system which will be completed in the coming years and will include regional and local signage.

Andreas Schuller

Mosenberg
Volcano near
Manderscheid;
tagged as on one
of "Germany's
outstanding
geotops"
and No. 37 along
the new German
Volcano route



Vulkaneifel
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Mitata of Psiloritis

An Introduction of their History, Construction Details and Semiotics

The word mitata stems from the Latin metatum, which means military lodging. During Byzantine times the word mitato meant the obligation of citizens to provide lodging and food for travelling government employees. Today its meaning relates to a shepherd's residence. A typical mitata contains a fireplace for cheese making, a hole at the top of the building providing ventilation and an outlet for the smoke from the fire (the emblem of Psiloritis Natural Park), a door and one or more stone cupboards built into the wall for storing food and/or tools. Outdoor furniture consists of a stone table and two stone chairs. When the mitato is double, the shepherd dwells in the "xokoumos" while the main building is retained for cheese making. The stockyard is next to the xokoumos and the complex is completed by a building for storing and maturing the cheese.

Architects consider mitata as vaulted houses which originated from truncated domed huts. Archaeologists have noted the similarity between the construction of mitata and circular Minoan tombs. The mitata however are smaller than the Minoan tombs and are constructed above ground from local rock, unlike the tombs which are partly underground and constructed from a variety of rocks and mortar. Structurally a mitata consists of a curved, almost circular inner wall (diameter = 3.5 - 5.5 m) and an outer wall which is either curved (diameter = 4.5 - 6.5 m) or rectangular. The buildings range in height from 2.5 to 3.5 m and consist of a series of stone rings in which the thickness of the individual stones decrease from the base and the arrangement of the

stones is designed to keep out the rain. This method of construction ensures the transmission of a diminishing load to the supporting rings.

The use of natural or only partially dressed stones capable of bearing compression forces is known as the "ekforiko" system of construction

In terms of semiotics the lack of any particular method in the way the building is constructed denotes an opposition to hierarchy. The collaborators -users of a mitato- work together as a team. They sleep together and warm themselves at the same hearth. The equality in the use of space as well as the circular form of the ground plan expresses and symbolises the monastic way of life which appears to have had a long history in the Psiloritis region.

The oldest date, engraved in a mitato in the Nida plateau is "1841" which indicates either the year of its construction, repair or reconstruction. This mitato is situated in Astriotiko and belongs to Papamichalis Skoulas. The youngest date, 2000, records the year of its construction. This building is owned by to Demetrios Skoulas, who together with Vassilis Skoulas, worked as a stone craftsman on the maintenance of mitata in the Anogia region. This project, which received European Funding in the late 1980's, was related to the Declaration of Mitata by the Archaeological Service of Greece which designated mitata as protected monuments in recognition of their historical and cultural value. This declaration however does not actually protect them as there is no detailed list recording their geographical distribution.

Dr Z.D. Skoula

A new information centre for the TERRA.vita geopark

A museum for nature and the environment, which failed to include a modern exhibition on earth history - and a Geopark that needed a new information centre: This was the situation in Osnabrück, the capital of TERRA.vita, north western Germany, in 2005. The main problem for the museum was to find a financial source to create the new exhibition, while the geopark needed the space and expertise to install a modern information centre which focussed on geopark issues. So an obvious decision was made: To cooperate and install an exhibition which combines the geological heritage of the region with information concerning the geoparks main sites of interest. The geopark's commitment: To raise funds and contribute to the concept of the exhibition, while the museum is responsible for the production and scientific content of the exhibition.

But how can the interests of tourism and science be reconciled in the same exhibition?

All the existing exhibitions in Osnabrück's museum use the concept of a stage-design. A natural scene is constructed for the visitor to enter and find out more about it. The museum's exhibits include the cultivated landscape, forest and town ecology. Using the principle of a

stage-design aspects of earth history will be explained using scenes showing, for example, sand-or clay-pits and quarries. By entering the exhibition through a "time-tunnel", the visitor will travel through the geological periods starting in the Carboniferous. This period will be represented by a quartzite quarry with coal adits and will

A product of the synergy created by cooperation between Osnabruck Museum and the geopark

contain abundant information, partly hidden under rocks and in fissures or clefts, to make the visitors search for it in the same way as scientists collect data. All the subsequent periods up to the ice age will be presented in a similar way, each focussing on a special aspect. In addition each component of the exhibition will contain one element that is designed by the geopark consisting of a display containing a 19" monitor, a trackball, a little relief-model of the geopark and a leaflet-holder. The monitor will display a panoramic photograph of a significant site in the geop-

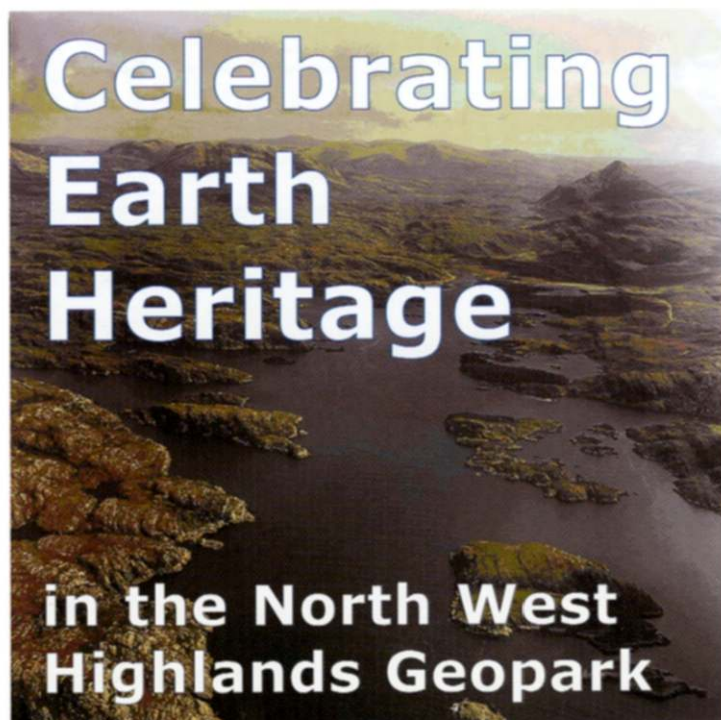
ark, where examples of rocks from a specific period can be viewed in situ. The panoramic photograph is shown in a 360° quicktime format so it can be rotated by the visitor using the trackball and will provide a realistic impression of the site. A diode in the relief model shows where the site is located. Leaflets providing further information will enable the visitor to find her/his way to the site on leaving the exhibition. The sites will be equipped with panels which, in addition to information concerning individual sites, will also inform the visitor about the exhibition in the museum. This approach will link the 'outdoors with the indoors', encourage visitors to visit the geopark's attractions and find out more about these from the museum's exhibits.

The new information centre will open to the public in autumn 2007.

Hartmut Escher and Timo Kluttig



TERRA.vita information centre: The "Upper Cretaceous quarry" in construction



Early spring on Loch Laxford with views of Fionaven, Ben Stack and Arkle. The rocks in the foreground are Lewisian Gneiss, polished by glaciers, the mountains in the background are from quartzite.

Spring and autumn in Scotland's European Geopark in the North West Highlands are a good time to visit. In the spring the days are rapidly getting longer. That means long light nights, the return of the many migratory birds which summer here, and spring plants and flowers. In the autumn the days are once again getting shorter in preparation for the darker winter months. The whole landscape changes colour as the nights get just a little cooler. The palette changes from greens and blues to reds and purples, as the heather becomes in bloom.

Spring and autumn are also a good time to enjoy a special

range of events which celebrates local and European earth heritage. In late May the communities in the North West Highlands join in the Europe wide celebrations with all of the other European Geoparks. This is European Geoparks Week.

This year down on the coast, families explored the relationship between geology and wildlife in the company of the Countryside Rangers - and encountered a few seals along the way. Inland a number of guided walks led by British Geological Survey and the Countryside Rangers introduced visitors and local people to the effects of the Moine Thrust. In the fishing villages of Kinlochbervie and Lochinver illustrated evening talks about the Ice Age and Deep Time drew audiences of some forty people each night.

September 2006 heralds a change in the way Scotland celebrates geology. The Scottish Geology Festival is now an annual event instead of bi-annual and North West Highlands Geopark created a special events pro-

gramme for the occasion. A very exciting illustrated talk about a new geological discovery was hosted in the gateway village of Ullapool. This talk by Dr Tom Bradwell of the British Geological Survey focused on megagrooves - the footprints of ancient ice streams. They are in effect long deep channels or grooves in the bedrock. These are to be found in the southern part of the Geopark. The next day Dr Bradwell and Meryl Carr, the Countryside Ranger, led a guided walk of some 10km to visit these megagrooves. The megagrooves can mainly be seen on Cambrian Quartzite and are likely to have been formed by high-energy subglacial meltwater erosion during the Late Devensian Glaciation. Similar features have been discovered on the seabed off north-west Scotland.

For local school children the highly successful Kenspeckle Puppet Theatre paid a visit to celebrate Scottish geology. The production 'Out of the Frying Pan, Into the Fire' is aimed at primary school children and inspired by local geology. There were songs to join in, stories to tell, fossils and rocks to identify and of course the puppets to play with.

A total of one hundred and thirty pupils attended from local primary schools at three village halls in the Geopark. For a fairly new European Geopark it is very exciting to see so much enthusiasm amongst local people and visitors for geologically inspired events, be they fieldvisits, illustrated talks or children's activities.

Attendances at events continue to outstrip our expectations - and people are even asking for more! Membership of the European Geoparks Network will help us to get new ideas for challenging events in future years by sharing in the experiences of our colleagues around Europe. Thank you to the EGN for all their support and advice.



An autumn afternoon - Quinag from Ardvreck Castle on Loch Assynt. Lush green grass grows on the limestone, whilst the quartzite of Quinag gives a more barren slope.

For info:

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Website: www.northwest-highlands-geopark.org.uk

Marble Arch Caves European Geopark

The No. 1 Tourist Attraction in Northern Ireland



Many congratulations to the team at the Marble Arch European Geopark! Their geopark was voted the No.

1 tourist attraction in Northern Ireland. Operating since 1985, the park has attracted over 1,000,000 visitors from over 100 countries.

A visit to the geopark includes a boat tour along a subterranean river and the manager of the Marble Arch Caves, Richard Watson, figures that with the 1,000,000 plus visitors, they operate the "busiest ferry on any of Ireland's inland waterways."

The high number of visitors to the park is not only a result of the territory's natural beauty but also of the dedicated work of the geopark team. Their skills in pro-

moting, organizing and managing the geopark more than satisfy the expectations of today's visitors. Competition judges were very impressed by the high quality of interpretation at the park. The tour guides were able to answer all questions and provide anecdotal and factual information, making the visit to the geopark the top Visitor Attraction of the Year.

Richard Watson



NORTH WEST HIGHLANDS GEOPARK



7th European Geopark Network Open Conference in Scotland

Landscapes and People: Earth Heritage, Culture and Economy

13th – 16th September 2007

Plus a range of Scottish fieldtrips

17th – 20th September 2007

Key Conference Themes:

- Discoveries in Earth Sciences: Current & Historical Research
- Cultural Landscapes: Linking Culture, Geology & Environment
- Making an Impact: Geoparks & Economy
- Sustainable Tourism: Challenges & Experiences
- Environmental Priorities: Models for Working Landscapes
- Interpreting our Environment: Global Best Practice
- Traditional Agriculture in the Geoparks: Tactics for Survival
- Plus Conference Fieldtrips on these themes...
- And Post Conference Fieldtrips in North West Highlands, Lochaber and Shetland.

The Cretaceous / Tertiary Extinction Event

in the Eisenwurzen Geopark

Geological research in the area began in the first half of the 19th century with a contribution by Ami Boué in 1829 on rocks of the Cretaceous period from Gams. The area around Gams is known as the "Basin of Gams". It contains a record of more than 1500 metres of Cretaceous to Tertiary rocks and spans a time interval of 40 million years. Approximately 20 species of fossil plants, fish, molluscs, corals and unicellular foraminifera were first described from Gams and are an important component of our scientific knowledge.

In 1988, a few years after Luis Alvarez presented his fascinating theory that an impacting asteroid or comet produced the mass extinction at the Cretaceous/Tertiary boundary - the so-called K/T boundary - the occurrence of the dark boundary layer associated with this event was also described from Gams. New investigations by scientists from the Russian Academy of Sciences and the Vienna Museum



The Cretaceous to Paleogene rocks of the Gams Basin include a time interval of 40 million years

of Natural History during 2005 allow us to re-write the history of the events which proved lethal for so many animal groups. Detailed analysis has shown the hitherto unrecorded bipartite nature of the boundary layer: The lower component of the 2 cm thick layer contains gold, copper, titanomagnetite, iridium, lead, zinc, arsenic and chromium, which indicate that it originated as a volcanic aerosol. Although there is no visible change, the mineral composition of the upper component of the layer is completely different: This contains spherules of nickel and of an iron-nickel alloy, together with tiny diamond crystals. These upper, few millimetres of clay indicate that the impact of an asteroid or comet occurred between 500 and 800 years after the main peak of volcanic activity.

These new data should end a long discussion among scientists concerning the nature of the K/T boundary events. The evidence

from Gams also shows that iridium, which was generally considered to be extraterrestrial, is mostly of volcanic origin. For the first time, a direct connection could be established between the events at the K/T boundary and the worldwide mass extinction. The rocks, at Eisenwurzen, were deposited in a deep sea and contain small shells of the unicellular foraminifera. Some species already became extinct before the K/T boundary. With the release of large quantities of arsenic and heavy minerals like chromium, lead and zinc into the atmosphere, the number of species decreased to zero. Clearly, the poisoning of the atmosphere through volcanic emissions some 65 million years ago was not only lethal for marine life forms but also for the land-living dinosaurs. In contrast to the volcanic activity, the impact event had little effect on life on Earth.

Heinz A. Kollmann



The 2 cm thick K/T boundary



Welcome to the European Geoparks

**4 billion years of Earth History
to serve tomorrow**

Twenty eight European Geoparks working together on the conservation and the valorisation of their geological heritage for sustainable territorial development, are pleased to welcome you.

We hope that you will
enjoy your visit.



Fforest Fawr Geopark

The first European Geopark in Wales

The 763 km² geopark is sited within the western area of the Brecon Beacons National Park and contains some of the most spectacular upland scenery in southern Britain. The relationship between the geology, landscape, altitude, and flora contributes to a rich natural heritage acknowledged by the designation of 2 National Nature Reserves, 31 sites of Special Scientific Interest and 166 Sites of Interest for Nature Conservation. Approximately 7,500 years of

mately 480 million years of Earth history and has been the subject of significant research and mapping since the mid nineteenth century when Adam Sedgewick and Roderick Murchison studied the Old Red Sandstone and underlying rocks. The terms Llandovery and Silurian were derived from a local town and from the Celtic Silures tribe who inhabited the area in Roman times. The Ordovician - Lower Devonian Old Red Sandstone rocks were deposited during the Caledonian Orogeny. Late Devonian uplift and erosion resulted in the unconformity between the Upper and Lower Devonian rocks and the development of major Caledonian structures. The Upper Devonian-Upper Westphalian rocks contain a nearly complete record of the history of the Variscan Orogeny in a sequence which includes evidence of shallow, tropical Carboniferous Limestone seas, Coal Measures forests and fluctuating late Dinantian -Westphalian sea-levels, probably in response to southern hemisphere glaciations. The Variscan Orogeny ended with the formation of the South Wales Syncline.

A major unconformity separates the Carboniferous and Quaternary deposits. The landscape was shaped by successive Pleistocene glacial events, but the preserved landforms and deposits probably relate to the



Sgwd Gwladus a waterfall on the River Pyrrddin at Pontneddfechan.

growth and decay of the late Devensian ice sheet (26,000-15,400 BP) and to Holocene erosion and deposition.

The geopark is managed by a Senior Partnership Board and a Management Group.

These aim to use its landscape, geological, ecological, historical and cultural heritage to provide a major educational and recreational resource for the local population and for visitors to the area. Fforest Fawr Geopark provides exciting opportunities for recreation throughout the year. Walking, in particular, is a growing activity and the area affords a variety of walks ranging from strenuous hikes in rugged landscapes to gentle walks in wooded valleys with clear streams and spectacular waterfalls. Other energetic pursuits include horse riding, mountain biking, cycling, rock climbing and exploring caves in the Carboniferous Limestone. More leisurely activities include boat trips on the Brecon Canal, rides on the Brecon Mountain Railway and opportunities to explore historical sites of interest as well as enjoying the hospitality provided within the local communities.

Tony Ramsay



A view of the Brecon Beacons from Llanfrynach.
Photograph provided by Dr. Peter Bräbham, Cardiff University

human occupation has produced a cultural landscape in which picturesque pre-industrial relics ranging from Neolithic stone circles to Norman castles contrast with industrial monuments including limestone quarries, silica mines and canals which attest to over 200 years of geo-exploitation.

The geopark contains approxi-



Llyn y Fan Fach a lake in the Black Mountain (left) and Carreg Cennen Castle (right)

The Gea Norvegica Geopark is characterized by its geodiversity. Its geology records many important events during the last 1/3 of Earth history. The strong and obvious links between geodiversity, biodiversity, settlement history, agriculture, industry and culture makes this geopark ideal for education and tourism.

The approximately 3000 km² Gea Norvegica Geopark is situated 1.5 hours drive southwest of Oslo in the boundary area of the counties of Telemark and Vestfold. The landscape is characterized by a low, rocky southern coast with many small islands; elevation increases towards the north via a hill-and-lake landscape culminating in the northern low-mountain landscape at approximately 800 m above sea-level. The geopark is easily accessible via Torp International Airport, and the main car-ferry from Denmark which docks within the geopark.

Geological Highlights:

Almost the whole of the western half of the geopark consists of various Proterozoic rocks, up to 1,600,000 million years old, that were metamorphosed and deformed during the Sveconorwegian orogeny about 1 billion years ago.

In the late Proterozoic, about 580 million years ago, evidence of limestone volcanism is preserved in the very deeply eroded remnant of the Fen Volcano. This was the first place in the world where the geology of limestone volcanism ("carbonatites") was described, and the area is recognised internationally as a reference area for carbonatites.

By the Early Cambrian the Sveconorwegian mountains were eroded forming a peneplain. This was submerged during marine transgression and became a site for the deposition of Cambrian - Silurian fossiliferous limestones, shales and sandstones. Red



The first European Geopark in Scandinavia

sandstones were deposited during the late Carboniferous. Today a questa-landscape characterizes the area of the Cambrian-Carboniferous sediments.

During the very late Carboniferous and Early Permian continental rifting, generating the volcanic Oslo Rift, affected the whole geopark. The crust was extensively intruded by magmas forming volcanoes on the surface and large plutonic massifs at deeper crustal levels. The older sedimentary country rocks were tilted, faulted and contact metamorphosed. Today surface exposures of these deep-seated plutonic rocks, including "larvikite" famous for its blue twinkling feldspars, and various volcanic rocks are exposed on the surface in the eastern half of the geopark. Pegmatites associated with the plutons contain rare minerals the most remarkable of which is thorite, from which the element "thorium" was isolated.

During the Quaternary the geopark

area was glaciated a number of times. At the end of the last glaciation, i.e. between 10.000 and 9.500 years B.P. large gravel ridges were deposited along the margin of the ice-sheet. Two spectacular geopark localities (M?len and Jomfruland) are situated on the largest of these deposits, the "Ra", which formed 10.000 years B.P.

The Gea Norvegica Geopark area has been used in teaching at universities and in the schools for the last two centuries. Today geopark personnel and teachers in the local schools cooperate in the development of new teaching programs. Visitors are welcome to explore public areas along the coast and to walk the forest and mountain trails. During the season there are a number of cultural events for every taste. Please see the links to our tourist partners on our web-site: www.geanor.no.

Welcome to our geopark!

*Sven Dahlgren
Geological Advisor of the BTV
region. Geopark manager.*



Naturtejo Geopark

Geopark Naturtejo Meseta Meridional - European and UNESCO Global Geopark - is the first Portuguese European Geopark. This 4625km² territory unites the municipalities of Castelo Branco, Idanha-a-Nova, Nisa, Oleiros, Proença-a-Nova and Vila Velha de Ródão. Sites within the Geopark that provide key-testimonies to Earth history will be used to develop geotourism and to promote regional sustainable development.

Highlights of the wonderful geomorphological, geological, palaeontological and mining heritage are contained in sites of national and international interest. These include: the impressive quartzite gorges of Portas do Ródão and Vale Mourão, the gigantic meanders of the Zézere River, the strange granite morphologies from Serra da Gardunha and Monsanto, the trilobite ichnofossils contained in the wonderful exposures at Penha Garcia, and the huge Roman gold mine of Conhal do Arneiro. In addition to its geological monuments the Geopark Naturtejo also includes the Tejo Internacional Natural Park, Portas do Ródão

Natural Monument and sites protected by municipalities as part of the Natura 2000 Network (Gardunha, Nisa and S. Mamede), the important bird sanctuaries of (Penha Garcia-Touloes and the quartzite range of Ródão).

The cultural history of this region is revealed in hundreds of archaeological sites, the high concentration of Templar castles and the diversity of churches and manor houses which is exceptional for Portugal. The ruins of the Roman Civitas Egítania in Idanha-a-Velha, the widespread Palaeolithic settlements and rock art in the Tejo Valley and the megalithic regions of Nisa and Rosmaninhal are sites of significant archaeological importance. The present cultural diversity provides a lively testimony to the multiple and unique characteristics of a borderland culture which has its roots in the ancient landscape. The prize of "most Portuguese village" which was awarded to Monsanto and the Slate Villages symbolises the recognition of this still well preserved ethnic diversity.

Geopark Naturtejo Meseta Meridional contains one of the densest networks of short and long trails in Portugal. These con-

nect tourist hotspots within the territory. Trails with a geological theme include the Fossils Trail, the Mines Foot-path and the Granites Foot-path in Monsanto (all in Idanha-a-Nova), the Secrets of the Almourão Valley Foot-path (Proença-a-Nova) and the Cobbles Trails in Nisa. In addition to the trails, the Geopark Naturtejo presents, annually, an original program of thematic trails, usually with a strong multidisciplinary interest. Other activities in the Geopark include rock climbing (Penha Garcia Climbing School, Idanha-a-Nova), horse riding following the old smuggling routes that crossed the Penha Garcia syncline, visits to the thermal spas of Monfortinho (Idanha-a-Nova) and Fadagosa de Nisa, boat trips exploring the gorges, rock art and nesting sites of gryphon vultures along the Tejo River and a tasting of the best of local in Petiscos & Granitos, the first geological restaurant.

The geotourist will experience a variety of activities including gastronomy, the historical heritage and events involving sport or traditional religious festivities. Are you feeling curious? Why not accept a challenge: come to Geopark Naturtejo Meseta Meridional either next weekend or for your holidays and lose yourself in its most hidden trails. There are 600 million years of natural wonders to discover. I guarantee you it will be worthwhile!



Nature from behind Hell Fall (Portas de Almourão geomonument)



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The Geological Park of the Pyrenees Sobrarbe Geopark

Sobrarbe Geopark is located in the north of Spain (Aragón, Huesca), on the southern slope of the Pyrenees. It contains 19 municipalities within a single regional government body called "La Comarca".

This 2,202 km² territory is contains three main geomorphological units. The oldest rocks (500 Ma) occur in the northern area within the axis of the Pyrenees chain at elevations > 3000 metres. These rocks, together with the Mesozoic rocks, constitute the most significant calcareous massif in Europe. This area also contains evidence of the Quaternary glaciations, a karst system represented by well-known caves such as "Gruta de Casteret" or the "Sima S-11 de Armeñaca", and the now abandoned coal and iron mines. In the central region, the Cinca and Ara rivers (altitude 600 m) have

eroded Tertiary marls and sandstones. This area is important because it contains evidence of the phases of tectonic uplift involved in the building of the Pyrenees and marine sedimentation within the Eocene basin. The southern area Olsón, Sevil and Balcós mountain ranges (altitudes <1500m) contain late Eocene and Oligocene terrestrial and marginal marine deposits which accumulated following the late Eocene regression of the Tertiary sea and cessation of the formation of the Pyrenees. These rocks contain a large variety of fossils ranging from Nummulites within ancient beach deposits to salt water crocodiles. To the southwest of the territory, the Guara limestone mountain range forms an

incomparable karstic landscape, with numerous canyons where



adventure sports are combined with environmental education activities.

For more than 100 years, Sobrarbe has attracted geologists from many different countries. Every year, primary school children, university students and oil industry professionals visit the Sobrarbe territory. All benefit from easy access to a geologically diverse area, a benign climate which makes field work possible all-year-round and, above all, the friendliness of the residents who offer a warm welcome and provide a high quality infrastructure for tourism.

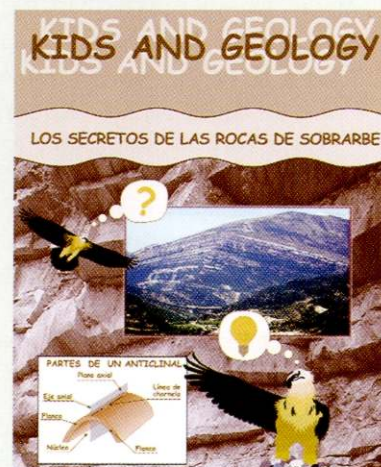
The same rugged relief which isolated the territory and hindered economic development, has preserved a relatively unchanged rich and unique natural and cultural heritage. In order to conserve this heritage, 50% of the Sobrarbe Geopark has been declared a protected area. There are more than 25 nature reserves on the NATURA 2000 network. The Posets - Maladeta Natural Park, the Sierra de Guara Canyons Natural Park, and in particular the Ordesa and Monte Perdido National Park (which is designated by UNESCO as a World Heritage Site and Man and Biosphere Reserve) are of special interest.

The Geopark project has enabled its residents to regard

the Sobrarbe's hitherto obscure and undervalued rough, rocky substrate as a potential resource for sustainable economic development. The government of the Sobrarbe territory has created the Patronato, in which politicians, businessmen, scientists, promoters, citizen associations, etc. are represented, to manage, promote

and protect the geological heritage. The 2007 training courses for tourist guides are designed to revitalise the cultural tours and provide attractive links to the geology. There is no question that the culture of Sobrarbe, from the architecture of its buildings to the character of its people, is deeply influenced by the wild beauty of its landscape.

The Sobrarbe people warmly welcome you!



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Cabo de Gata - Nijar Geopark

The Cabo de Gata-Nijar Geopark area coincides with the Cabo de Gata-Nijar Natural Park which was designated in 1987 and is the first Maritime and Mainland Protected Area in Andalusia (Community of the Southern Iberian Peninsula). It is one of the few protected areas in Europe containing sub-desert and steppe features and has received several international awards in recognition of its contribution to natural conservation. This semiarid land contains one of the most diverse and unique floras in Europe with more than 1.000 autochthonous plant species. The fauna of the Geopark contains significant communities of marine birds, steppe birds and salt marsh birds. The coastal waters are, probably, the cleanest and the most transparent in the Mediterranean. For this reason eco-diving in the Geopark provides an unforgettable experience.

The Cabo de Gata volcanic complex, the largest area of Neogene - Quaternary volcanic activity in Southern Spain, is characterised by lava flows, volcanic domes, volcanic calderas and columnar jointed volcanic rocks produced mainly by sub-marine volcanism. Some of the oldest volcanic structures may have formed volcanic islands. The volcanic activity was associated with, and superseded by, the accumulation of marine deposits. The majority of these deposits are represented by carbonates formed, initially, from the fossilised skeletons of bryozoans, bivalves, calcareous red algae, echinoderms, barnacles, and foraminifera. An increase in the water temperature resulted in the growth of coral reefs. During the Quaternary repeated climatic change, unstable sea levels and changes in the position of the coastline altered the distribution

and abundance patterns of marine and continental deposits. Magnificent records of changes in depositional environments can be observed, ranging from continental (alluvial fans, dune systems, etc.) to littoral and transitional marine environments (submarine deltas, beaches, lagoons and littoral features, etc.).

The complex geological processes are linked to the occurrence of a wide variety of minerals. Industrial monuments, mainly in the Aguamarga and Rodalquilar areas, are relicts of the exploitation of gold, lead, bentonite, iron, alunite, etc. in the Geopark during the 19th and 20th centuries. The mining heritage and associated industrial archaeology now provides a valuable resource for ecotourism.

The ecology, geology and industrial history of the Geopark provide an open air museum of considerable interest to scientists and tourists. In order to optimize

the territory for public use, the Geopark/Natural Park has: 1 visitors centre, 6 points of information, 6 vantage points, 16 trails, 5 hides for bird watching, 1 botanical garden, 1 exhibition and conference centre, 1 maritime classroom, and 1 naturalists classroom.

The Natural Park / Geopark is currently a site of conservation in which the resident population (4.000 inhabitants in 23 settlements) are actively involved in the restoration, regeneration and rehabilitation of damaged natural systems. The Geopark also functions as a museum for socioeconomic experiences. The Geopark looks forward to using the resources contained within its landscape for continued sustainable development. Please visit and enjoy the Geopark but, if you allow us to make a suggestion, do not just consider a summer visit, after all there are 365 days in the year.



The European Geoparks Network today...

At present, the Network is comprised of 31 Geoparks, from 12 European countries



1. Reserve Geologique de Haute - Provence	FRANCE	17. Geopark Swabian Albs	GERMANY
2. Vulkaneifel European Geopark	GERMANY	18. Geopark Harz Braunschweiger Land Ostfalen	GERMANY
3. Petrified Forest of Lesvos	GREECE	19. Mecklenburg Ice age Park	GERMANY
4. Maestrazgo Cultural Park	ARAGON, SPAIN	20. Hateg Country Dinosaurs Geopark	ROMANIA
5. Psiloritis Natural Park	GREECE	21. Beigua Geopark	ITALY
6. Terra.Vita Naturpark	GERMANY	22. Parc Daearegol Fforest Fawr	WALES, UK
7. Copper Coast Geopark	IRELAND	23. Bohemian Paradise Geopark	CZECH REPUBLIC
8. Marble Arch Caves & Cuilcagh Mountain Park	NORTHERN IRELAND, UK	24. Cabo de Gata - Nijar Natural Park	ANDALUCIA, SPAIN
9. Madonie Geopark	ITALY	25. Naturtejo Geopark	PORTUGAL
10. Kulturpark Kamptal	AUSTRIA	26. Sierras Subbeticas Natural Park	ANDALUCIA, SPAIN
11. Naturpark Steirische Eisenwurzen	AUSTRIA	27. Sobrarbe Geopark	ARAGON, SPAIN
12. Naturpark Bergstrasse Odenwald	GERMANY	28. Gea Norvegica	NORWAY
13. North Pennines AONB	ENGLAND, UK	29. Sardenia Geominerario Park	ITALY
14. Abberley and Malvern Hills Geopark	ENGLAND, UK	30. Papuk Geopark	CROATIA
15. Park Naturel Regional du Luberon	FRANCE	31. Lockaber Geopark	SCOTLAND, UK
16. North West Highlands	SCOTLAND, UK		

Intensive course "Geopark management and Geotourism"

Lesvos - Greece, 25-29 September 2007

Under the
auspices of



Co-financed by the European Agricultural Guidance and Guarantee Fund - Guidance Section (EAGGF-G)