

# europaean GEOPARKS



**3<sup>rd</sup> International Conference  
on Geoparks 2008**

**TERRA.vita Geopark  
Osnabrueck Germany  
22-26 June 2008**

**network**

European Geoparks Magazine • Issue 5

**GEOPARKS: Celebrating  
Earth Heritage**







## European Geoparks: Expanding activities and impact on local societies through cooperation

Members of the European Geoparks Network (EGN) are frequently asked *What are Geoparks?* and, *Are Geoparks just about rocks?*

Readers will find answers to these questions in the diverse range of contributions contained in this edition of the EGN Magazine. These provide a vision of an expanding international network whose members co-operate to maintain and develop the ideals outlined in the EGN Charter and share their experiences in conferences and workshops.

New EGN members introduce the reader to the nature and attractions of their respective Geoparks. English Riviera Geopark, the EGN's first Urban Geopark, has a significant geological heritage and a long history of tourism. Papuk Geopark, with the most beautiful mountain in Slavonia, is noted for its geodiversity, wildlife and cultural history. Mineral exploitation over thousands of years has had a considerable impact on the social and cultural history of the Geological and Mining Geopark of Sardinia. Subbeticas Geopark contains one of Spain's most spectacular landscapes.

Well established Geoparks present a range of innovative projects, based on their respective cultural, geological and natural heritages. These are concerned with communities, training programmes, tourism and conservation. Geoparks Cabo de Gata-Níjar and Madonie introduce projects which focus on field monuments. Geoparks Harz Braunschweiger Land, and Swabian Alb describe projects based on significant fossil localities. Naturtejo shows how an important fossil locality is being used to regenerate a village. Beigua Geopark is using its historical geology to raise public awareness of the need for geoconservation. Luberon Geopark has opened a new exhibition for regional geology. Geoparks Eisenwurzen, Sobrarbe and Fforest Fawr describe educational projects for schoolchildren. Reserve Géologique de Haute Provence and Geopark Kamptal-Manhartsberg emphasize the importance of their natural histories.

Common geopark activities include the first International Summer School on Geopark Management and Geotourism, examples of co-operation within the EGN members, UNESCO World Heritage Site and members of UNESCO Global Geoparks Network (GGN). Copper Coast Geopark highlights a choir festival involving the twinned villages in Vulkaneifel and Eisenwurzen Geoparks. The Lesvos Petrified Forest Geopark and Bergstrasse - Odenwald Geopark show how collaborating Geoparks provided vocational training.

In September 2007 the North West Highlands Geopark hosted the successful 7th European Geopark Network Conference: **Landscapes and People: Earth Heritage, Culture and Economy**. In October 2007 the EGN was a co-organizer of The Workshop on New Practices in Geodiversity for the Sustainable Development of the Regions (Sibiu and Hateg Roumania) and in November 2007 EGN delegates participated in The first Regional Conference on Asia-Pacific Geoparks.

In 2008 we look forward to the Global Geoparks Fair, 21st-22nd June and the associated **3<sup>rd</sup> International UNESCO-Conference on Geoparks** Osnabrueck, Geopark TERRA.vita, Germany, 22nd -26th June 2008. The Natural Reserve of Haute-Provence invites Geoparks to engage in their project Children of the Earth to celebrate the International Year of the Planet Earth (IYPE) - 2008, proposed by the United Nations.

The range of projects and activities contained in this issue clearly demonstrate that Geoparks are not just about rocks, they are about people. Geoparks celebrate, conserve and use the relationships between their cultural, industrial, geological and natural heritages to generate sustainable economic growth through tourism for the benefit of their communities.

*Tony Ramsay, Member of the Editorial Board*



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## GEOPARKS calendar

### 1-4 April 2008

EGN Meeting  
Beigua Geopark, Liguria, Italy

### 25 May- 6 June 2008

European Geoparks Week - 32 EGN Members celebrate Earth heritage

### 21-22 June 2008

1<sup>st</sup> Global Geoparks Fair  
TERRA.vita Geopark  
Osnabrueck, Germany

### 22-26 June 2008

3<sup>rd</sup> International Conference on Geoparks  
TERRA.vita Geopark  
Osnabrueck, Germany

### 6-14 August 2008

International Geological Congress (33<sup>rd</sup> IGC)  
Oslo, Norway

### 17-20 August 2008

1<sup>st</sup> Inaugural Geotourism Conference  
Canning Bridge, Western Australia

### 23-28 September 2008

International Intensive Course on Geoparks - Lesvos Petrified Forest Geopark, Greece

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





## 7th Annual Meeting of the European Geoparks Network Geoparks in Scotland

Scotland's geology is unparalleled internationally in terms of its quality and access. Together with a significant legacy in terms of the history of science during the 19th century, and landscapes which can offer a range of outdoor, cultural and wildlife experiences, involvement with the European Geoparks Network and through it UNESCO is already showing

### **Michael Russell, MSP** **Minister for the** **Environment of Scotland**

benefits in terms of promoting Scotland and Scottish culture. The Scottish people are honoured to have been part of the EGN since 2004. In that year North West Highlands Geopark became Scotland's first European Geopark. This year Scotland was delighted to gain a second Geopark when

range of age groups and abilities. North West Highlands is also focussing on local secondary schools, giving work experience opportunities to convey a clear idea of the kind of business and employment opportunities which geotourism can facilitate, along with the relevant skills range.

This includes development of the local and social economy with key sectors being tourism, agriculture, food, arts and crafts

### **7th EGN Annual Meeting** **Landscapes and People:** **Earth Heritage, Culture** **and Economy**

Great success for the 7th European Geoparks Network Meeting, held in Ullapool, a small scenic fishing village, gateway to the North West Highlands Geopark, Scotland, UK, in September 2007. More than 200 participants from 20 European countries attended the meeting, including official representatives from the UNESCO and representatives of potential new members of the Network. The opening of the meeting was greeted by the Scottish Minister for the Environment and the President of the European Parliament.

The theme of the conference was "Landscape & People: Earth Heritage, Culture & Economy" and the presentations covered a wide variety of topics, such as "Cultural Landscapes: Linking Culture, Geology & Environment" and "Traditional Agriculture in the Geoparks: Tactics for Survival".

During the Conference, four Geoparks were officially nominated with the European Geopark status, i.e. Lochaber Geopark (Scotland, UK), Geological and Mining Geopark of Sardinia (Italy), Papuk Geopark (Croatia) and English Riviera Geopark (England, UK). After the meeting, the participants had the opportunity to enjoy the beauty of geotopes and landscape of the Scottish Geopark.



Lochaber was accepted into the Network. This is very important both for the areas in question - Northwest Highlands and now Lochaber - and for Scotland as a whole.

European Geopark status is neither gained nor maintained easily. Standards are high and getting higher. European Geopark status is an accolade to the quality of our geology and the drive and determination of our Highland communities to achieve sustainable development at their own hand. Membership of the Network gives us the opportunity to meet the challenges and celebrate what is precious in these unique landscapes and communities.

In fact, the EGN provides potential for youth development for a

and education. Environmental art may have an important presence. In both the North West Highlands and Lochaber there is a great deal of potential and the EGN expects the local communities to meet the challenge at the grass-roots level. Already in Scotland there are many organisations and agencies involved in working with the community to manage Geoparks including the British Geological Survey, the Crofters Commission, local enterprise companies, the Forestry Commission, local Councils, the John Muir Trust, the National Trust for Scotland, Scottish Natural Heritage, Visit Scotland, Sutherland Partnership, the University of the Highlands and Islands Millenium project.

I realise that there is a great



## Geoparks increase awareness of our rich geological history

**Hans-Gert Poettering,  
President of the European Parliament**

In the seven years since you created the European Geoparks Network, you have grown to link together 31 parks spread across 13 European countries. Naturally, I am very familiar with the splendid Terra Vita Naturepark in my own part of Germany, the Lower Saxony region, close to the City of Osnabruck. I can testify that geoparks offer a wonderful opportunity for local visitors as well as scientists and geologists to increase their awareness of our rich geological history.

The creation of a network of Geoparks serves a very useful purpose in uniting people who share a common dedication to preserve our geographical heritage.

The fact that the network has received UNESCO recognition speaks for the importance of the project. By coming together and sharing best practice, your member parks can also help each other in their efforts to secure partnership funding. In particular, I am pleased that European Union funds, through the **INTERREG** Programme have been used to support your initiative.

In conclusion, I wish you every success for this important 7th Annual Conference of the EGN. All the best for a fruitful event in a beautiful part of our European continent.

deal of learning involved in building the local alliances necessary, which is why this EGN conference is of such value and I do hope it will turn out to be a most productive and informative event. I also hope it will provide the opportunity to foster links and look to establish joint projects, including work exchanges between Geoparks. I would like to take this opportunity to thank Issie MacPhail and her colleagues on the Steering Group who have put in a lot of work to get things organised.

Also new in the Geoparks will be an increase in sustainable tourism. We will be looking for Geoparks to expand on the academic field trips which have been the mainstay of business during certain times of the year, and indeed the cultural and ecological assets of our Geoparks fit well with current market trends in other tourism sectors. This centres on visitors making a low impact on the environment and local culture,

and being ecologically and culturally sensitive to the surroundings.

A European example is in the Petrified Forest of Lesvos Geopark in Greece where grants have been provided to households for the development of self-catering accommodation. The Women's Agricultural Co-ops also sell local food in the museum such as preserves, olive oil and pasta. Another example is Bergstrasse-Odenwald in Germany where Geoparks programmes have been linked to regional enterprises by creating Geopark products such as Geopark wines.

However we must not forget that rural Scotland is primarily a place where people live and work - in land-based activities such as agriculture and forestry, and in the wider economy such as processing, tourism and other services. The role of agriculture is particularly vital in our Geoparks, crafting being a lead-

ing player in the protection and enhancement of local environments, in terms of tourism and landscape.

We intend to protect and enhance Scotland's landscapes through Scotland's Rural Development Programme which is a key mechanism for delivery of this objective. It focuses on those who are engaged in living and working in the landscape and provides them with the opportunity to contribute positively to the management and enhancement of one of Scotland's most important assets.

I am therefore delighted to warmly welcome current members and aspiring members of the EGN and GGN to Scotland and to the North West Highlands Geopark. It is an honour to host this event on your behalf during what is our Highland Year of Culture. This event is the highlight of our environmentally focused activities during Year of Culture - and I cannot think of a more appropriate focus than earth heritage for those celebrations. The history and destiny of the Highlands and Islands people has been strongly influenced by their geography and geology past and present.



\* Speech of MSP Minister for the Environment Michael Russell, at the opening of the 7th EGN Conference, at the Macphail Centre, Ullapool, Scotland, on September 13, 2007.



## 3<sup>rd</sup> International Conference on Geoparks Communicating Earth Heritage

For the first time, the International UNESCO-Conference on Geoparks will be held in the heart of a Global Geopark in 2008.

**The venue:** Osnabrueck, capital of the Global Geopark TERRA.vita.

**The topic:** Communication

**The goal:** To create appropriate methods to raise the awareness of the geological heritage of our planet - far beyond the Geopark's borders.

**Osnabrueck  
Germany,  
22-26 June 2008**

The Earth is a huge, dynamic system. Humans are part of this system and while admittedly we are a small part, we have the

potential to destabilise it. The history of the Earth shows that our planet is in a state of continuous change, its rocks tell us about past environments, fossils tell us about the changes of ecosystems.

How best to communicate the fascination of these topics to a wider public?

How to use them to promote tourism?

Can they enhance regional development?

What is the objective of the Global Geoparks in this process?

In numerous lectures and workshops, strategies will be developed, answers found and solutions introduced. Excursions to the highlights of the Geopark TERRA.vita and other Geoparks will be offered following the meeting. A wide-ranging supporting programme with the 1<sup>st</sup> Global Geoparks Fair, school projects and public lecture courses will ensure that the conference reaches a wider public.

Who should attend? Senior officials from local authorities, national and international government, professional geo-scientists and practitioners in the fields of tourism, education and cultural heritage associations will find items of interest in the conference programme.

The conference in 2008 in Osnabrueck will be embedded in the "International Year of Planet Earth 2008" (IYPE), proclaimed by the United Nations in December 2005. For this initiative the conference in Osnabrueck can play a major role in communicating the global objectives.

The key themes of the International Year have been decided by a panel of world experts and assembled by the Year's Science Programme



Committee. A selection of these themes, such as "Earth and Health", "Resources issues - towards sustainable use", and "Soil - Earth's living skin", will be explored in workshops and sessions during the Osnabrueck conference, while the main focus of the Year, "Outreach - bringing Earth sciences to everyone", is stressing our main conference theme "Communication".

By working in partnership with the largest environmental foundation The Deutsche Bundesstiftung Umwelt (DBU) and its Centre for Environmental Communication in conjunction with the two Universities of Osnabrueck this conference has a solid financial basis and is guaranteed the broad scientific background for its main theme "Communicating Earth Heritage".

The experienced Conference and Convention Bureau of the City Marketing organisation in Osnabrueck will ensure the professional and efficient organisation of the conference, including reservations, booking etc.

More Information on the conference, the venue, the agenda, the call for papers and the registration can be found on the website of the conference, [www.geoparks2008.com](http://www.geoparks2008.com).

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Communicating Earth Heritage



Osnabrueck Convention Hall





## 1<sup>st</sup> Global Geoparks Fair in Osnabrueck

**The Goal:** Outreach of Geoparks - Get local people informed and involved - Let us raise awareness for Global Geoparks.

**The Date:** 21-22 June 2008 (Saturday, Sunday)  
Opening: Saturday 11.00, by the president of the German UNESCO Commission  
Geopark Party: Saturday 18.00

**The Location:** Historical market place of Osnabrueck



### The Presentation:

TERRA.vita will provide:

- Tents (pagodas 4 x 4 m) with wooden floor, electricity
- There will be two chairs, one table and one presentation wall for each park.
- We will try to find a student in Osnabrueck to serve as a translator for each participating language (to be able to communicate with the public)
- We plan to have 2 Geoparks in each tent and will arrange groups of tents (Chinese, Southern Europe etc.)
- Music, cultural program, 2 musicals, catering with regional and international products

Participating Geopark provides:

- Leaflets, Flyers and one Poster (Size A0) of your park, "Roll Ups" if available,
- At least one person to represent your park

**Reservations:** [kluttig@lkos.de](mailto:kluttig@lkos.de)

**We welcome all Geoparks of the Global Network in Osnabrueck!**

## Global Networking

### Cooperation contract between the Global Geoparks Mt. Lushan (PR China) and Bergstrasse-Odenwald (Germany)

The protection of the geological and cultural heritage and the development of geotouristic products are included in the cooperation contract, as well as the exchange of knowledge concerning management, visitor service, infrastructure and administration, environmental education and public information.

The contract, which reflects a wide range of potential fields of cooperation, was signed by a delegation of the Global Geopark Mt. Lushan (PR China), led by its Director of Administration Zhang Jia Jian and Zhu Dong E, Deputy Director of foreign publicity, during their visit to the Global and European Geopark Bergstrasse-Odenwald (Germany).

The Geopark team offered the delegation a comprehensive overview of the geological and cultural heritage of the territory, like the "Felsenmeer", the cities of Heidelberg, Lorsch and Erbach, the Auerbach castle, the show cave Buchen and the World Heritage Sites Messel Pit and Lorsch Abbey. The guests were impressed by the complex infrastructure and educational tools, which they considered to be very useful and attractive for the general public.

They also experienced the hospitality extended by the Geopark's local cooperation partners, represented by county and community chairpersons, as well as representatives of tourism associations, gateways and information centres of the Geopark Bergstrasse-Odenwald.

The Chinese delegation could also taste the culinary delights presented at special events like "Rocks and wine", during a

walk through the vineyards. Without doubt, the highlight of this culinary fest was the "Fancy cooperation cake", decorated with the National flags and Global Geoparks Logos of



both new partners, offered during the official ceremony following the official signature. After three intensive days, the new partners from China and Germany were convinced that

**Signing the cooperation agreement:**  
R. Diehl,  
Zhang Jia  
Jiang and  
M. Wilkes



both territories will learn and benefit from each other through this transcontinental cooperation and contribute to the Global Geoparks aims of UNESCO, which are "Conservation, Education and Tourism".

**Rocks and Wine - visit to the wine grower adventure trail**

Jutta Weber  
[www.geo-naturpark.de](http://www.geo-naturpark.de)



# Getting together

## Geotourism, exchange and the common benefit for the European Geoparks & UNESCO WHS Messel Pit

Many approaches exist to promote Earth heritage on a global scale. However, which of these can be considered as common knowledge within the general population? Currently the European Geoparks Network provides a new and successful approach for raising public awareness of Earth heritage with specific reference to its geology and geological history. In this respect, we need to ask the following questions: how has this been developed?; why are people interested?; how can this achievement continue on a long term basis and benefit all regions of the EGN?; and why collaborate, for example, with the Messel Pit World Heritage Site?

World Heritage Sites were established by UNESCO in 1972. These sites are generally unique and require protection and conservation. Unfortunately, not all sites are situated in areas with easy access for the general public.

The EGN was founded by four partners in 2000, with the aim to promote the heritage of Geoparks, to encourage a pride in these territories by the local population and to introduce these areas to a wider audience. Messel Pit WHS was established in 1995 and is the only natural WHS in Germany which has 33 cultural World Heritage Sites. A marketing association has existed for these sites since 2002 and includes Messel Pit as a member. However, how does one market a pre-industrial and UNESCO-fossil site within a group of beautiful cultural monuments such as cathedrals? In 2003, the opportunity arose to collaborate and develop a partnership with the Geopark



**Members of the Tourbook Project partnership**

Bergstrasse - Odenwald and to promote geotourism.

The partners in the EGN are widely distributed; they are culturally and naturally diverse and are often at varying stages of development. The success of the Network requires the exchange of ideas, collaboration among partners in raising funds for projects discussed at the annual Coordination Committee Meetings and during conferences. The development of trans-national projects as a common activity is essential for the future development of the EGN.

It is good to have a single partner, within the network, who has already developed competence in a specific field (e.g. tourism) and can propose a collaborative project based on this expertise. The "Tourbook Project", funded by INTERREG IIIB, focussing on "Volcanism, Water & Landscape", is an example of a common project initiated by one partner, the Vulkaneifel Geopark. Other partners within the EGN joined the project and produced a sim-

ilar Tourbook, based on the nature and possibilities for tourism within their geoparks. The group of project managers, including Dr. J. Weber, S. Cathgart, W. Reh, R. Watson, Dr. K. Lemon, M. Cosgrove, S. Petresseille, C. Eckhardt, Dr. A. Schuller, agreed on the production of a booklet which represented an important attempt at a new type of cross-marketing geotourism within the EGN.

In each of the European regions where the booklet was printed and distributed, members of the public became aware of the partners in the project, of their respective geoparks and of the activities of the EGN. The "Tourbook Project" represents an innovative approach to marketing "Geological / Earth Heritage" to the general public. Hopefully, other geoparks will develop their own Tourbook and demonstrate how a common project, developed by a few geoparks, can be extended to include the whole network.

Marie-Luise Frey  
[www.grube-messel.de](http://www.grube-messel.de)



# International Intensive Course

in Lesvos Petrified Forest Geopark Greece

## Geopark Management & Geotourism



Under the  
auspices of



Ask the participants about the 1<sup>st</sup> International Intensive Course on Geoparks held on the island of Lesvos and they will tell you it was a great success. A variety of lectures, workshops and fieldtrips revolved around the "Geopark Management and Geotourism" themes of this intensive course which took place on September 25-29, 2007. This was followed by a workshop focusing on "Geomorphosites, Geoparks and Geotourism". Thirty postgraduate students participated along with university professors, researchers and geopark executives from 14 countries. The combined high level of interest and the international participation in the course have led to the initial steps to establish Lesvos as the location for an international graduate school on an annual basis.

The course was organized under the aegis of UNESCO by the Univ. of the Aegean and the Lesvos Petrified Forest Geopark,

with the support of the EGN and the IAG Working Group "Geomorphosites". It was co-financed by **LEADER+**.

The main objective of the course was to promote the creation of geoparks and the training of staff to coordinate research in the geosciences with the holistic management of rural areas by raising the awareness of the geological and cultural heritage. The basic aims of this approach are the protection and promotion of the geological and ecological value of a region, its sustainable development through focusing on its local identity, its traditions and local products, and the cooperation and participation of the local authorities and communities.

Participants came from all over the world (Brazil, Venezuela, Mexico, Portugal, Spain, Italy, Switzerland, Ireland, Germany, UK, Poland, Rumania, Austria, Turkey and Greece). Speakers included Dr. P. Mc Keever (EGN and UNESCO Geoparks Bureau), Dr. M.L. Frey (WHS Messel Pit), C. Eckhardt (Geopark Bergstrasse-Odenwald), Prof. F. Steininger (Kamptal Geopark), Dr. Ch. Fasoulas (Psiloritis Geopark), Prof. J. Poch (Autonomous Univ. of Barcelona, Spain), Prof. M. Panizza (Univ. of Modena, Italian Society Geology and Tourism), Prof. E. Reynard (Univ. of Lausanne), Prof. J. Brilha (Univ. of Minho, Portugal), Dr. N. Zouros and Dr. A. Kizos (Univ. of the Aegean), I. Valiakos, Dr. K. Vasileiadou and E. Kyriazi (Lesvos Geopark).

The intensive course involved a wide variety of seminars organized into eight sessions covering topics such as "Integrating geosite protection, landscape management and cultural her-

itage in nature conservation and local development strategies", "Educational activities in Geoparks" and "International cooperation for geotourism development". Working groups focused, and presented their findings, on geotourism, geoconservation and geopark management. Participants also visited the Petrified Forest of Lesvos and the Museum of the Lesvos Petrified Forest. Guided tours also included visits to nearby volcanic domes and the

### INTENSIVE COURSE 2008

**"Geoconservation and Geoparks:  
Interpretation and Communication"**

**The Lesvos Petrified Forest Geopark  
invites you to the 2<sup>nd</sup> International  
Intensive Course on Geoparks in  
Lesvos, Greece, 23-28 September,  
2008.**

**Information: [www.europeangeoparks.org](http://www.europeangeoparks.org)  
[www.lesvosmuseum.gr](http://www.lesvosmuseum.gr)**

Agrotouristic Women's cooperative of Mesotopos (collaborator of the Lesvos Geopark) where the women introduced the participants to the art of making traditional sweets. The workshop following the course involved sessions on Geomorphosites, Geoparks and Geotourism. Sixty participants benefited from the exchange of experiences from all over the world, as experts presented their ideas on geomorphosite assessment and management, operating and managing geoparks, geotourism and sustainable development in rural areas, initiatives on geotourism and local development.

*Nickolas Zouros  
Katerina Vasileiadou  
[www.petrifiedforest.gr](http://www.petrifiedforest.gr)*





In addition to the strict protection and enhancement of its geological heritage, the Reserve Géologique de Haute-Provence Geopark has always been concerned with all components of the territory's natural heritage. Consequently, after completing an inventory of its geological heritage, it undertook, in 2006 and 2007, an inventory of remarkable trees in part of its territory. This project covered a total area of 1,429 km<sup>2</sup> ranging in altitude from 407 to 2,960 m above sea level, with a rich variety of biotopes and a broad range of environments variously influenced by human activity.

Since the Middle Ages, the High Provence was deforested to supply pasture for animals and, little by little, the forest culture disappeared from the minds of its inhabitants. It is only during the past hundred years that the number of trees increased thanks to reforestation (to combat erosion) and the natural growth of forest cover due to a rural exodus. In this context, it seemed interesting to explore the presence of outstanding trees.

There are many criteria defining the nature of a remarkable tree. The most obvious is age, which is

## Haute-Provence Geopark Remarkable trees of Upper Provence



**A poplar tree in the valley of Clumanc, near Barreme.**



**An old olive tree near Digne les Bains.**

closely linked to size. Longevity, which can be expressed in centuries, harks back to the notion of geological time and explains the fascination with certain trees. The other characteristics taken into account include their place in the landscape, along with traditional uses and local legends. Two seasons of data collection with the help of the local population produced very interesting results, with over 320 trees identified, some of which extremely spectacular. The inventory also revealed the unsuspected occurrence of a wide range of over 60 species within a territory which, at first glance, appeared to have a low biological diversity. The trees were divided into three categories according to their degree of interest. The first includes the most spectacular individuals or groups of trees or those which combined significant several criteria. The other categories are recorded in decreasing order of interest, but there is a dynamic aspect, since the trees are so classified according to their future potential. It must be remembered that this is a living heritage with a past and espe-

cially a future, for which we are responsible.

The data thus gathered are used in two different ways. They are made available to elected officials and decision makers to try to provide the maximum protection for the trees within a framework of current regulatory statutes, but mainly to avoid future damage due to ignorance. Thus, a copy of the inventory is provided to each community and private owner. On another level, the fabulous diversity and spectacular longevity of trees is used for tourism through the inclusion of trees in a discovery tour. The Geopark's tourist partners (mountain guides, and accommodation providers) are closely associated with this development which takes into account both the vulnerability and accessibility of the trees' and their owners' peace and quiet.

*Sylvie Giraud*  
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\* The inventory of remarkable trees in the area of Digne received financial support from the European Union (Leader+ programme) and the Provence-Alpes-Côte-d'Azur Region.



**A very old larch tree more than 6 meters in circumference.**



In 2000, the Vocational Training Centre of the Natural History Museum of the Lesvos Petrified Forest was founded aiming to train young unemployed people in the techniques of conservation, excavation and preservation of fossils, as well as in methods of dealing with visitors and promoting Geoparks. Until 2007, five courses were delivered, during which 108 young locals of the Lesvos Petrified Forest Geopark, a rural area in Lesvos Island, were trained. Thirty four of these trainees are/were employed in the Lesvos Petrified Forest Geopark after their training.

## Vocational training in Geoparks

### Collaboration between Lesvos Petrified Forest & Bergstrasse-Odenwald

During spring 2007, a 3-month course on "Techniques of Protection and Conservation of fossils" was delivered, in collaboration with the European and Global Geopark Bergstrasse - Odenwald (Germany). The 24 participants attended 240 hours of theoretical training in Lesvos, followed by 160 hours of practical work in the Lesvos Petrified Forest and in the Bergstrasse - Odenwald Geopark which they visited for five days. The main components of the course included an introduction to geosites and geological monuments, protected areas and geoparks, fossil excavation and recording techniques, geosite identification and recording techniques, fossil conservation and the use of Global Information System techniques for mapping fossil occurrences. In Germany, the trainees were introduced to the local geology, as well as to conservation activ-



**The Lesvos Geopark trainees in front of the WHS Messel Pit Gate**

ities and the geo-education programme of the hosting Geopark. Visits to locations of special interest included, as a highlight, the UNESCO World Heritage Site Messel Pit. Guided by Geopark and Messel Pit staff, the trainees learned preservation techniques for fossil material completely different from that of the Lesvos Geopark. The programme also contained visits to museum and university exhibitions, thereby providing information on the presentation of fossil material to the public. An additional focus was placed on the communication of the Earth's heritage including fossils, through guided tour programmes and educational activities.

This project represents the first occasion in the history of the EGN where a group of trainees from one Geopark visits another Geopark for educational purposes. Both the visiting and the hosting Geopark agree that the experience was beneficial for



**Lesvos trainees introduced to educational tools by Bergstrasse-Odenwald Geopark Rangers**

everybody involved. Both want to propose that these types of visits and exchanges, for educational purposes, should be encouraged and promoted within the EGN.

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**Trainees during practical work of conservation of petrified trees in the Lesvos Petrified Forest Geopark**





## Copper Coast Geopark

Five community groups along the Waterford coast came together in 1997 to form Copper Coast Tourism with an emphasis on interpreting for visitors the geo-history of what they could see along the cliffs. In 2001 the area was designated a European Geopark and in 2003 European funding was obtained to develop, more fully, a geotourism structure. The iconic copper mine engine houses on the cliffs were preserved and presented along

### Recent developments and twinning report

with a series of other geo-presentations. An educational programme for schools was also established and a Copper Coast Bistro doubles as a heritage centre and sales outlet.

The final infrastructure of the Copper Coast Geopark was completed by late summer 2007 with the last of the information boards in place, new walk trail pamphlets and other publications, and extensive sign-posting all with the EGN logo. All but the last were of our own devising and therefore to our satisfaction. The National Roads Authority, who erected the signposts provided, howev-



Road sign along the Copper Coast



The church bought to turn into a Copper Coast Geopark Centre

er, about three times as many as we had dared to request from the County Council!

The result is that one is clearly directed by large signs at all the exit points on the main trunk road west from the ferry-port towards a European Geopark. When visitors arrive, notices direct them to every single accessible feature along the Copper Coast. However, in extending these signs outside our Geopark's area, especially to the west, they have given the impression that we are about 50% bigger than we are. Coincidentally, this area contains some nice additional accessible geological features - so we might have to consider how to turn this lack of consultation to our advantage.

Meanwhile, we have to concentrate on immediate future developments. We are buying a disused church with a view to turning it into the Copper Coast Geopark Centre with offices, bistro, heritage and archives as well as meeting rooms for the

local communities. In order to consult with these communities, presentations about the church have been made in each of the villages by local people to get their opinions and solicit their help. The result has been so overwhelming that it will be a major job to harness and co-ordinate all the skills and energies offered.

We had already experienced this in June 2006 when the small community of Bunmahon (60 houses) found themselves with the challenge of having to accommodate 65 people for a Choir Festival from the twinned villages of Strohn in Vulkaneifel and Gams in Eisenwurzen Geoparks. People for miles around offered to take in the visitors and transport them to the various venues. The concert functions were packed and a wonderful atmosphere of cordiality prevailed.

This twinning was initiated in 2004 with exchange visits and the formal launch of the project by Waterford County Council that October. Primary school children from each of the partners were hosted on the Copper Coast in 2005 and 2006 with a secondary school exchange taking place in October 2006. People from the Bunmahon area travelled to the annual Backfest in Strohn in September 2007.

In the meantime there have been many informal visits as friendships are cemented. Therefore underlying the formalities of the EGN (and indeed the collegiality that has developed between representatives) is the sense of sharing between these small communities in Austria, Germany and Ireland and the wider publicity that such events generate. This surely is what the European Geopark ideal is all about.

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One of the Geopark choirs at the twinning information board in Bunmahon in June 2006



# Marble Arch Caves Geopark



In 2001, Marble Arch Caves and the adjoining Cuilcagh Mountain became one of the first European Geoparks to be recognised by UNESCO. The Marble Arch Caves European Geopark is now being expanded to 10 times its size to embrace swathes of the beautiful forested landscape of county Fermanagh in Northern Ireland. This eco-tourism destination and geologically important area will grow from 1,800 to 16,000 hectares, taking in Forest Service land and other areas managed by the Environment and Heritage Service and Fermanagh District Council. One of the new key sites in the geopark is the scenic Lough Navar clifftop viewpoint that will now stand tall under the Geopark umbrella. Tourists standing at the viewpoint can see the Atlantic Ocean and look out for over 80 kilometres across the panoramic mountains and lakes of northwest Ireland.

Speaking on the 5<sup>th</sup> October 2007, the Minister of Agriculture and Rural Development, Michelle Gildernew said: "Our

forests offer an enormous range of economic, social and environmental benefits and the Geopark expansion will enable further development of that potential." The Minister explained that European Geoparks were keys in promoting geological heritage through sustainable tourism and stressed her commitment to rural areas and to supporting such sustainable projects.

Alex Baird, the Chairman of Fermanagh District Council, said: "We are confident the expanded geopark will boost Fermanagh's reputation as an attractive tourist destination and will create new development opportunities in the future. One of Fermanagh's tourism jewels is the beautiful countryside owned and looked after by Forest Service for over 50 years. Forest Service is the largest landowner in Fermanagh, possessing over 18,000 hectares of some of our most scenic and environmentally important areas of countryside. Within state forests in Fermanagh there are over 130 kilometres of walking trails and paths that allow visitors to see some of the most unspoilt countryside and the best views in Ireland." Hartmut Escher,

from Terra.vita European Geopark (Germany), visited the Marble Arch Geopark on behalf of UNESCO and the EGN. Mr. Escher stressed the importance of eco-tourism, geo-tourism and having opportunities to learn about Earth history and Earth sciences and climate change in such a special setting. "With so many tourists coming, it is also important to have communications and marketing to let people know you have something special," he

## Expansion will boost tourism

said, "If you have more space, you can invite people to come and show them the geology and the possibilities for recreation. These forestry areas will add a lot more to the geopark. We have 32 Geoparks in 13 European countries and we very much welcome this first major expansion to one of our existing European Geoparks."

*Richard Watson*

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Standing at the Lough Navar viewpoint (from left to right): Ian Irwin, District Officer, Forest Service; Alex Baird, Chairman of Fermanagh District Council; David Small, Chief Executive Forest service; Richard Watson, Geopark Manager; Hartmut Escher, Terra.vita European Geopark (Germany)





For the Madonie Geopark, which promotes "the art of the earth" and sustainable development, the work by Luigi Romana *"Snow trenches and snow preservers. The preservation and commerce of snow in central-western Sicily (1500-1900)"*, recounts a short but significant period in the area's history.

## Snow trenches & snow preservers of the past

Today, in the heart of the 400 km<sup>2</sup> Geopark, the limestone, at 1,600 metres above sea level, is riddled by over 400 dolines and various snow trenches created and managed by snow vendors, shrewd mountain men, before the discovery of the refrigerator. The dolines and snow trenches are very similar and it is difficult to distinguish between them. Romana used archive sources which clearly document the construction of snow trenches. This practice was even advantageous from an economic point of view. Romana tells us that: "Man perhaps learned the technique of preservation of snow by observing nature: imitating the doline. Indeed, you just have to cover a doline full of snow with a few leaves and you obtain preserved ice. A clear example of a sequence of snow trenches is at Piano della Principessa; running in the northeast direction, it opens up with a big hollow followed by seven snow trenches; the last, like a well, is the one that still today best pre-

serves ice, also thanks to its depth of around 30 metres, with little human intervention."

The 310-page study was recently published by the Madonie Geopark to strengthen its cultural identity, to provide suggestions for environmental education and to promote geotourism by bringing to light unpublished documents on the work of the now forgotten "snow preserver". It describes the technique of conservation, the methods and costs of transporting the snow to



Snow trench at Piano della Principessa 1,860 m above sea level

Trapani and Agrigento. Other aspects considered are the annual snow requirement for a city like Palermo, the use of snow in the food and the therapeutic sectors and the reasons why the old trade of the snow vendors died out. Today it is hard to believe, says the President of the Geopark, that an ice cream tub, eaten on a torrid August evening on the terraces of the noble palazzos in the historic area of Palermo, originated from the work of the Madonie snow preservers, who every year cleaned out the snow trenches and prepared them for the fresh

snow, which came regularly and abundantly in winter. The secrets of collecting, pressing and covering the snow with "branches" ensured that it remained intact for the whole summer. If this appears extraordinary, we also need to consider the incredible skills of the carrier, who by wrapping the snow with straw transported it on a mule's back and by exploiting the coolness of the night succeeded in making his delivery in the centre of Palermo.

We welcome the author's proposal to visit the snow trenches and possibly to discover new ones. Those who love the mountain will find a new reason to appreciate it. Those who have never visited the mountain will have the experience of appreciating the simplicity of a snow trench, amid alluring and satisfying views of high mountains, the scents, different sounds and sweet solitude that can make us know and love nature. The book inspired this message from our President to the younger and future generations: "If a young person or group of young people whose curiosity has been aroused by this book wanted to bring back to life one of the Madonie snow trenches for intelligent and also innovative enjoyment of our Park, I am certain the project would find full support from the author and from the institution that I have the honour and the pleasure to preside over."

The Madonie Geopark provided the raw material for refreshing oneself in the summer and getting warm in the winter and today, through geotourism, it still provides what is required in any season.

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## Geopark Kamptal -Manhartsberg

### The "Kogelsteine"- "Fehaube" Geo/Biotope

The "Kulturpark Kamptal" has been reorganised and renamed as "Geopark Kamptal-Manhartsberg".

Recently, in addition to creating new geotopes ("Loess - Geology and Wine" and viewpoint to understand the landscape), we concentrated on the understanding of biotopes such as "Wind-schutzgurtel" (Wind-Erosion-Protection). Here we present the work on a geotope/biotope which combines granite and granite-weathering in order to re-establish dry grassland habitats.

The geo/biotopes "Kogelsteine" and "Fehaube", near the city Eggenburg, are famous and extensively visited tourist attractions. They provide excellent examples of the Thaya-Batholith ("Maissau-Granite"), the weathering of this granite and of dry grassland biotopes with special Pannonian plant and faunal elements.

However, the two biotopes are separated from each

other by agricultural land. The problem is that these two isolated biotopes are too small for a future survival as dry grassland habitats. Dry grassland habitats can exist only under extreme conditions, which result from an arid and warm climate, a thin soil with a limited ability to retain water and the habitat's exposed position. Since these two dry grassland habitats occur on the weathering products of granite, they are listed under the special "Siliceous Dry Grassland Habitats".

According to the European Union (EU) Habitats Directive, the Pannonian Steppes and Dry Grasslands are endangered and are designated as priority habitat types. They have diminished in extent, especially in Eastern Lower Austria, to a few hundred hectares during the last decade. The EU and the Lower Austria Government introduced a LIFE-Nature project, approved

2004, for the promotion, development and long-term protection of such habitats. The geo/biotopes "Kogelsteine" and "Fehaube" represent extremely endangered habitats because of their small size and isolation. The Geopark Kamptal-Manhartsberg, in collaboration with the Krahuletz-Museum in Eggenburg, the LIFE-Nature Project and the Austrian Nature-Conservation-Organisation, has recently managed to purchase all the agricultural land between these geo/biotopes and has created a parking space and a picnic area outside the protected geo/biotope area. Funding for the purchase of these 4.3 hectares of land (total cost up to € 70,400) was provided by the Government of Lower Austria (60%), the Austrian Nature-Conservation-Organisation (20%) and the Zoological Society of Frankfurt (20%). Hopefully, this action will contribute to the protection of these endangered "Silicate Dry Grassland Biotopes" and save them for future generations.

Our sincere thanks go to our sponsors for providing the necessary funding, but also to the people of the region, who understood the importance of this project and even sold us their ground.

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#### Flora and Fauna

The **flora** is dominated either by indigenous species or species which have emigrated from the southern (Mediterranean) and eastern steppes and have survived here, in the periglacial areas, under stable climatic conditions. There are various sclerophytes, lichens and mosses. The most endangered lily, *Iris humilis* subsp. *arenaria*, and *Cytisus procumbens* can also be found here.

The area hosts a diverse **fauna**. Mammals, like the ground squirrel (souslik) and the European common hamster share this habitat with reptiles like the sand lizard. The bird life includes the indigenous linnet and common European serin together with the kestrel, skylark and stonechat which are typical for open landscapes. Common insects e.g. the tree-cricket and bush-cricket occur together with the less common black-spotted grasshopper, blue-winged grasshopper and rare swallowtail butterfly. These biotopes also define the western limit of the, still commonly occurring, praying mantis.



## Eisenwurzen Geopark

### GeoBox: A geological exhibition by children for children

The potential to involve visitors in the geological heritage is one of the strengths of geoparks. For the European Geoparks Week 2007, we developed a project together with 17 thirteen-year-old children from the Weissenbach school. The project, named "GeoBox", combined research, collecting material in the field and presenting it in a small exhibition. The idea was to develop a geological subject and convey it to other individuals of comparable educational level. In our project, two large wooden boxes designed to contain the collection had to be finished within two school days. The school provided access to all necessary equipment, computers and workshops. The project would not have succeeded without the strong support by the school director and staff.

The subject of research was erosion, transportation and deposition of gravel by the nearby Enns River during the Great Ice Age and at present. For this purpose, the work was organized in the following way:

**Stage 1.** General instructions on the scientific background and the planned exhibition

**Stage 2.** Field sampling and collection of photographic and scientific data. Representative pebbles were collected from the river banks and from the Ice Age river terraces and their approximate source area was determined. Limestone and dolomite from the Northern Calcareous Alps was distinguished from schists of the Grauwacke Zone and marbles, gneisses and mica schists of the Central Zone of the Alps. The rate of erosion was calcu-

lated from the depth of a channel cut into the Ice Age deposits by a small post-glacial tributary stream. The deposition of sand and gravel and the patterns of vegetation developed within the pioneer vegetation of the riparian forests were examined.

**Stage 3.** The technical work was performed: the boxes were painted and pebbles were selected and prepared for exhibition. The layout of the exhibition was produced, field photographs were enlarged and a model of the river channel cut into the Ice Age sediments was constructed.

**Stage 4.** The specimens and pictures were arranged in the boxes. Simple interactive devices were constructed: sediment deposition in water was demonstrated using a wine bottle, bending willow branches illustrate their flexibility and ability to withstand flooding of the river banks.

**Stage 5.** For writing the text, the class was again subdivided. Each group had to write the text for a certain subject. Finally, the specimens and pictures were labelled.

**Stage 6.** A photograph of the proud students posing in front of the GeoBoxes ended the project.

#### Objectives of the Geo-Box

In an exhibition the curator delivers a message and establishes communication with the visiting public. Exhibitions are generally targeted at an educational level above that of secondary school. Research by the Natural History Museum of Vienna shows that this educational level is under represented among visitors. Producing an exhibition together with students is stimulating in

many respects: the students gain first-hand insight into a scientific topic and learn how to present the results; we have gained from learning and understanding the students' expectations of scientific presentations.

As the GeoBox is prepared by students, it satisfies the demands of other students. "Self-guided" visits to the school were therefore common, but it was still satisfying to see the producers of the



exhibition proudly showing their work to fellow students and teachers. Of course, the GeoBoxes will also be shown at other schools which, hopefully, will follow this example and develop their own exhibitions.

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# 'Wheels to the Wild' in the North Pennines AONB

Geotourism is much more than just printing leaflets and books about rocks! It is about creating interpretive and educational products which are fully linked to the existing businesses and attractions of an area, and which can be marketed by tourism marketing organisations. By encouraging people to visit an area and to discover and enjoy its geology and landscape, we can help the local economy and support sustainable development.

In places such as the North Pennines AONB and European Geopark, in northern England, where remote rural communities have limited economic

opportunities, this can provide a much-needed financial boost.

A recent example from the North Pennines is 'Wheels to the Wild', a geological cycle trail around the area's stunning and fascinating landscapes. The guide contains directions for a three-day main route and three day-rides, and simple, colourful interpretation of the geology and landscapes along the way. It interweaves all aspects of the landscape, emphasising the links between the underlying rocks and the area's rich mining heritage and special natural habitats. The guide encourages cyclists to take a break and visit attractions along the route, such as Killhope Lead Mining Museum, Nenthead Mines Heritage Centre and Bowlees Visitor Centre.

But this is much more than just a guidebook. It includes an accommodation and services guide, which lists local B&Bs, guest houses and youth hostels, and highlights those with 'Cyclists Welcome' accreditation and those which are participating in the 'Know Your North Pennines' training programme. The guide also lists local companies which provide bike hire, repair and cycle holidays. An accompanying leaflet highlights other cycling opportunities, publications and cycle routes in and around the North Pennines. As part of 'Wheels to the Wild' we have improved cycling infrastructure around the route, with new facilities for bike storage and repair in accommodation and local attractions. We have also bought bikes adapted for use by disabled people, which can be hired through a local business. A marketing campaign in the cycling press and two launch rides - one of which was part of our annual geology festival in celebration of

European Geoparks Week - have led to many enquiries and sales. Producing the trail has led to interest by one of the UK's leading cycling holiday companies. The guide has appeared in the local press and has been reviewed in magazines as varied as 'Cycling Plus' and 'Earth Heritage'. All this work has helped to get the Geopark more geared up for cycle tourism and has promoted the area as a great place for cyclists to visit and explore.

All of this has been done using funding raised for geological interpretation. We have taken money for rocks and turned it into bike racks and repair kits - creating an integrated geotourism product that local businesses can appreciate and build on. We are now starting to receive feedback on the product (from the feedback card included in the guide) and can start to assess its success and impact on the local economy. The Wheels to the Wild cycle route is part of the Rockworks project, an initiative of the North Pennines AONB Partnership. It was funded by the Heritage Lottery Fund, Natural England and the Neighbourhood Renewal Unit.

For further information: Elizabeth Pickett (Geodiversity Officer) or Chris Woodley-Stewart (North Pennines AONB Officer and Geopark Manager)

## NORTH PENNINES

Area of Outstanding Natural Beauty

North Pennines AONB Partnership,  
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op Building, 1 Martin Str., Stanhope,  
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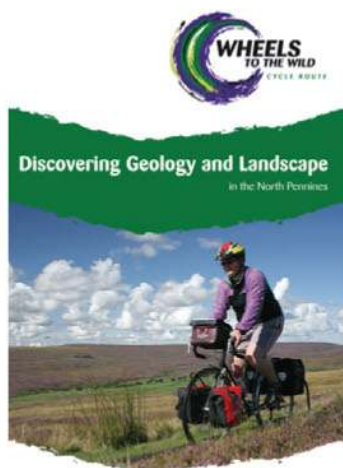
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## Using rocks to help the local economy





## Geopark Luberon in Apt



October 2007 saw the opening ceremony of two new exhibition halls at the Maison Du Parc, the headquarters of the Luberon Regional Natural Park and Geopark. The Maison du Parc occupies an impressive 18<sup>th</sup> century mansion, located in the small town of Apt (12,000 inhabitants) in the south of France, and accommodates the park's technical personnel, a public reception area, exhibition halls, an auditorium and a shop. A permanent exhibition on the regional geology and palaeontology has been housed in the remarkable vaulted cellars for 20 years.

This first exhibition, created in 1987, marked the establishment by the Department of the Environment of the Luberon Natural Geological Reserve, of which the park was entrusted with the management. Due to the illegal sampling at the fossil sites, it quickly became obvious that coordinated communication and information aimed at the public, locals or visitors, alongside with school children, were indispensable tools in effective protection of the earth's treasures.

Discussions began three years ago, in order to consider the total refurbishment of the reception area and the exhibition halls (the geology, natural environment, the architecture...). Initially, the complete

re-examination of the area presenting the regional geology was decided, this being the oldest, displaying signs of wear and tear with recurrent breakdowns, and whose valuable contents deserved updating. Moreover, the Park had been integrated into the EGN in 2004, but there was no mention of this anywhere.

At the end of 2005, internal discussions were under way for the design concept of the new geological area. The chosen scenario was to present the close relationship between geology and landscape. The Luberon area has the advantage of relatively simple geology, very perceivable in the landscape. The relief, the mountains and valleys, match the geological structure: a simple structure consisting of synclinal and anticlinal folds. Informative interpretation of the geology can be drawn based on the visible examples.



Additionally, numerous fossiliferous deposits allowed for a palaeogeographical and palaeoecological reconstruction of the area.

In spring 2006, a scene builders' team was selected. A preliminary draft was defined, specifying the museographical choices and the budget necessary. Further subsidy requests were lodged from various authorities (Conseil Régional, Conseil Général, the State) to secure the total estimated cost, which

### New Exhibition Area for Regional Geology at the Maison du Park

rose to 195,000 €. At the end of 2006, the final project was worked out. The old museum was totally dismantled. The work was completed between the workshop and site from May to October 2007 for the reopening at the end of October.

This reopening gave another opportunity to celebrate the 20<sup>th</sup> anniversary of the Luberon Natural Geological Reserve. This event was also marked by the 40<sup>th</sup> anniversary celebration of the Federation of Regional Natural Parks of France. (2007 is also the 30<sup>th</sup> anniversary of the Parc du Luberon!)

Hopefully, the new exhibition will allow visitors to take a fresh look at the landscape and history of the Luberon. Moreover, it can make us realise that rocks, fossils and minerals are archives of life on Earth and that this heritage is often more fragile and threatened than it appears. This exhibition is part of a network of organised sites of interest (museums, footpaths) aimed at promoting the richness of the area's geological heritage and, thus, the area's cultural and economic development.

Christine Balrne

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# Integrated Geo-information within the Geopark Swabian Alb

One of the main goals of Geoparks is the improvement of geo-knowledge for residents and tourists. This can be reached in many different ways. Publications, lectures, museums, geotrails and geo-related actions can contribute to a better understanding of geology, palaeontology and the Earth history of a region. Here, with one of many possible examples from the Swabian Alb, we demonstrate how the

than 150 years and have been the target of systematic excavations by the Natural History State Museum of Stuttgart over the last 15 years. The wealth of fossils (vertebrates, invertebrates and plants) is documented in 125 scientific papers. This research allowed the reconstruction of a tropical Jurassic sea lagoon and of the way in which organisms lived and died in this environment. These publications, however, are directed mainly at a specialist audience and the information they contain needs to be transferred to the general public.

This has been achieved in several ways. The media have been involved in the excavations from the very beginning. A book has been published [G. Gietl & G. Schweigert: *Im Reich der Meerengel* (In the empire of sea angels)], explaining all the facts related to the locality, its history and its fossil content. An English version of this book is in preparation. A geological trail has been established, providing with information on the history and mythology of the area and explaining the geology and palaeontology of the site. The explanations are given in German and English. The visitors can obtain more information from a leaflet which is available from the Nusplingen Town Hall or directly at the trail. The starting point of the trail consists of a shelter which offers protection from the weather and provides general information concerning the locality and its fossils. About 50 excursions and guided tours for universities, schools and interested groups of amateurs are arranged per year, mostly delivered by scientific staff of the Stuttgart Museum, but also by local guides who took part in



the excavations and are highly experienced in dealing with all questions concerning the locality.

For the moment, the fossils from Nusplingen can only be viewed in the exhibition of the Natural History State Museum of Stuttgart. Temporary exhibitions have been and will be shown at many sites both within and outside the Geopark. These exhibitions contribute to the fame of this extraordinary window into Earth history and also stimulate people to visit the Geopark and the locality itself. Plans exist to arrange an on-site exhibition at Nusplingen, providing the visitors with the possibility of an even more direct impression. The Nusplingen website is another way of providing information about the locality and local activities.

The work at Nusplingen provides an example of the many methods in which the dissemination of geo-information may be improved. These methods, however, need to be coordinated in order to convey a better understanding of the Earth history of an area. In this way painting a picture of the past which can be appreciated and understood by everyone who is interested can be achieved. Geoparks are an excellent tool for accomplishing this task.

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information transfer from science to the public can be optimized.

The Upper Jurassic locality Nusplingen is famous for the fossil extraordinary diversity and excellent preservation. The lithographic limestone containing the ancient life remains have been known for more





## Discovering the history of geo-research in Beigua Geopark

The Beigua Geopark has focussed on the history of geological research in the area to demonstrate its geological significance and show how investigations by pioneering scientists provide a framework for interpreting the area's geology and raising awareness in geoconservation.

Scientific investigation in the Beigua district was initiated in the mid-19<sup>th</sup> Century by pioneers of Ligurian geology. These workers provided pas-

sionate descriptions of the territory's richness, amenities and natural heritage. Among them were Lorenzo Pareto, Arturo Issel and Gaetano Rovereto, three of the most important scientists in the Italian scientific community at that time.

The Marquis L. Pareto (1800-1865) is considered to be the founder of Ligurian geology. The publication in 1846 of the "Geological outline on maritime Liguria" (in "Description of Genoa and its area") and the production of the first geo-

logical map of Liguria including the Beigua area, represent major contributions to geological science in Italy and formed the basis for future research.

A. Issel (1842-1922) was the first scientist to adopt a systematic approach to the geology, geomorphology, mineralogy, palaeontology and palaeoethnology of the Ligurian area. In addition to his numerous publications, his "Geological and prehistorical Liguria" (1892) and "Prehistorical Liguria" (1908) are monumental works and contain brilliant syntheses of his studies. In 1890 he, together with S. Squinabol, published "The Geological Map of Liguria". Following his directives, some important collections of specimens from Liguria, originating from his own research activity and from other scholars and amateur geologists were acquired. These include the important collections from the Piedmont Tertiary Basin (P.T.B.) and the Perrando Collection (in Sassello), which play an essential role in the study of the Oligocene flora of the P.T.B. and molluscan faunas (Issel, 1889) in Beigua Geopark.

In 1892, A. Issel surveyed the Ligurian Apennine in the "Voltri Group" zone (inside Beigua Geopark) where he recorded the presence of small moraines resulting from small glaciers. His observations provided the first record of the presence of Quaternary glaciers in the Ligurian Apennines.

Issel maintained contacts with important scientists throughout his working life; among these scholars were Don Deogratias Perrando and Prof. Paolo Principi. Don D. Perrando, for many years parish priest in

Stella S. Giustina, was a self-educated nature lover who studied with specific interest the geology and palaeontology of the Savona hinterland (Issel, 1889). His contribution to the Perrando fossil collection is part of his valuable legacy.

Prof. P. Principi was assistant for the geology course at the Univ. of Genoa working firstly with Issel and then with Rovereto. His contributions to the field of pedology and plant palaeontology are particularly important. His studies of S. Giustina and Sassello phillites and of the Perrando Collections are valuable contributions in the analysis of Oligocene floras (Principi, 1912, 1914, 1916, 1921, 1924). Issel's contributions were followed by the studies of Prof. G. Rovereto (1870-1952), whose early strong interest in the natural sciences later became focussed on geological subjects thanks to the contacts he developed with people such as Issel and S. Squinabol through attending conferences and participating in scientific excursions. His contributions, especially within the Beigua area, include his competent and innovative analyses of geological, palaeontological, geomorphological and geotechnical features. His studies on the Tongrian of the Piedmont-Ligurian Basin (Rovereto, 1897, 1898, 1900, 1913, 1914) and the monumental monography "Geological Liguria" (Rovereto, 1939), are worthy successors to the publication "Geological and Prehistorical Liguria" by Issel. Recently, in Italy, there is a growing interest in the history of geological research and Beigua Geopark introduces this topic not only in its interpretation activities but also in educational programmes. We regard it as another important tool for involving people and raising awareness in geoconservation.

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**Lorenzo Pareto (1800 - 1865)**



**Gaetano Rovereto (1870-1952)**



**Arturo Issel (1842-1922)**



# The 100<sup>th</sup> anniversary of the term 'stromatolite'

## Geopark Harz Braunschweiger Land Ostfalen

The Heeseberg near Jerxheim in the southern district of Helmstedt in Northern Germany is well known for the quarry exposures of Triassic sedimentary rocks (approximately 230 million years old). Within the Triassic succession the rocks are an oolitic limestone called 'Rogenstein' and laminated limestone reefs created by cyanobacteria called Stromatolites are of particular significance. The Heeseberg quarries contain impressive exposures of stromatolitic domes of Triassic "Buntsandstein"-Age. This locality has been of international importance since the first descriptions of KALKOWSKI (1908)\* one hundred years ago and is nowadays an important part of the Geopark Harz Braunschweiger Land Ostfalen. The Rogenstein consists of ooliths, i. e. spherical grains consisting of several concentric layers of calcium carbonate, which formed under the influence of the rhythmic movement of the waves in warm, shallow saline seas which were similar to modern playa lakes. The name Rogenstein is derived from its similarity to fish eggs (German term = "Rogen"). Stromatolites are the oldest known fossils, dating back to approximately 3.4 billion years. They are colonial structures formed by photosynthesizing cyanobacteria and other bacteria. Cyanobacteria (formerly called blue-green algae) are prokaryotes (primitive organisms lacking a cellular nucleus) that lived in warm aquatic environments and built the first reefs. The layers were produced as calcium carbonate precipitated over the growing mat of bac-



An example of a stromatolite from the Heeseberg Quarry

terial filaments. Photosynthesis in the bacteria depleted carbon dioxide in the surrounding water, initiating the precipitation. Cyanobacteria were probably responsible for the creation of Earth's oxygen-rich atmosphere. They were the dominant life form on Earth for over 2 billion years. Today, stromatolites occur in only a few localities such as the Shark Bay in Western Australia.

In a new project our Geopark is creating management concepts for the Heeseberg area in cooperation with nature conservation associations, foundations, local authorities and farmers. Booklets and information panels are generated for different target groups to impart knowledge concerning the sustainable use and protection of this unique and precious geosite.

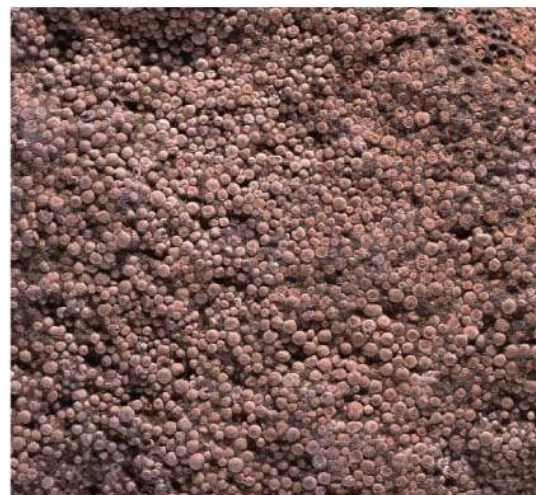
\*KALKOWSKI, E. (1908): Oolith und Stromatolith im norddeutschen Buntsandstein.- Z. dt. geol. Ges. 60: 68-125; Berlin.

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The Heeseberg Quarry, type locality of stromatolites



Examples of Ooliths from the Rogenstein



## Water: From Ground to Bottle in the Fforest Fawr Geopark

The rising demand for fresh water for domestic, agricultural and industrial use is one of the most important issues facing all nations in the 21<sup>st</sup> Century, particularly because the future availability of this resource is linked to global climate change. The availability of water is a limiting factor in manufacturing, and in agricultural and urban development. In developing countries the peoples aspirations are already restricted where water is in short supply. In this article we introduce an educational programme, aimed primarily at schoolchildren between the ages of 9 - 16 years, which the Fforest Fawr Geopark is developing in partnership with Spadel UK, Brecon Carreg Natural Mineral Waters (a local business) and The School of Earth Ocean and Planetary Sciences, Cardiff University.

Due to its low population density, the absence of intensive farming practices requiring

enters the groundwater system where it can be stored and transmitted in confined aquifers (sandwiched between overlying and underlying relatively impervious layers) and unconfined aquifers. The nature of aquifers, within Fforest Fawr Geopark, and their porosity is determined by the geology.

Our multidisciplinary educational programme is an exercise in applied science. It uses well-data from the Fforest Fawr aquifers to inform young people about the nature of the water cycle and the relationship between geology, landscape, aquifers, groundwater supply and water quality. The schoolchildren are able to investigate the characteristics of sediments and sedimentary rocks, including their composition, porosity, permeability and hydraulic conductivity. Experiments enable pupils to compare differences in these properties between sediments, such as sand and mud. The children are also introduced to the nature and origin of the karst landforms of the Carboniferous Limestone and the development of cave systems by circulating groundwater. They gain an understanding of the nature of the water table and the transmission of water through fracture zones from upland areas of recharge to springs, rivers and wells.

The groundwater quality in the Fforest Fawr Geopark aquifers is directly related to the geology. The water extracted from the aquifers is extremely pure. The pupils are introduced to the need to understand land use and are shown how the areas of protection zones around wells are calculated in order to avoid contamination and to ensure the purity and safety of water which is extracted, bottled and sold, e.g. in supermarkets and



**View of the Black Mountain Landscape: the area of groundwater recharge**

restaurants.

Groundwater extraction from many of the world's aquifers involves mining rather than managing the water resource. Producing wells need to be managed in order to sustain a supply of water. Our education programme uses conceptual models to explain how water flows to a pumping well and how equilibrium between the rate of flow (recharge) and the rate of extraction can be achieved. The potential effect of global climate change on water supply is emphasized and we show how this might occur, in temperate latitudes, by the extended growing season of plants. The programme involves an excursion to the catchment area and a visit to the bottling plant.

Our education programme introduces young people of school age both to the concept of geoconservation and the need to protect, manage and sustain the supply of a precious resource namely groundwater. The programme also introduces pupils to methods of collecting, recording and interpreting scientific data.

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**The resurgence at the entrance to the Llygad Llŵchwr cave system**

heavy use of pesticides and fertilizers and its location within The Brecon Beacons National Park, Fforest Fawr Geopark is an important source of high quality surface and groundwater. Of the ~200cm of rainfall in the upland area of the Geopark 75% is removed by streams (runoff), by evaporation from the land surface and through transpiration by plants (evapotranspiration). Only 25% (~50cm) of the precipitation



# Establishment of the Czech National Geopark Network

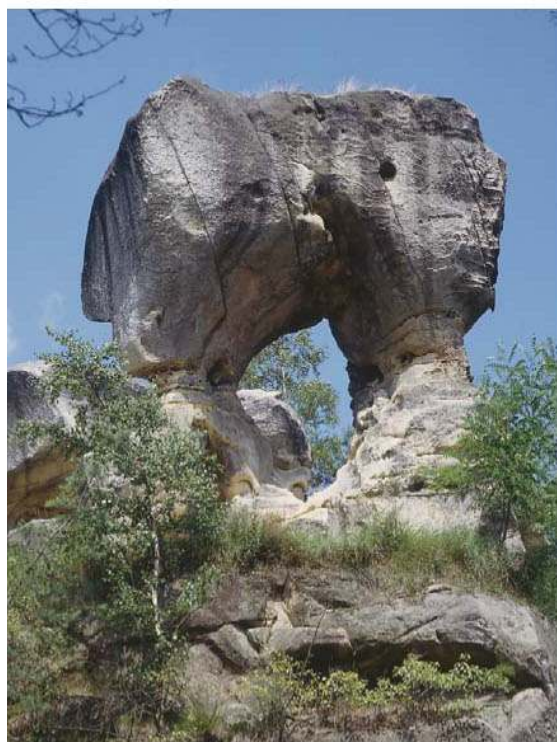
Following the Chinese and German examples, the Czech Ministry of the Environment established a National Geopark Network in 2006. One of the main objectives of this initiative was to generate verifiable quality procedures for areas aspiring to membership of the EGN (and UNESCO GGN). A further objective was to create the best conditions for a long term approach to support, protect, interpret and promote the sustainable use of the national, regional and local geological heritage. The Czech Ministry of the Environment has established the Council of National Geoparks. It involves experts from the Ministry, the Czech Geological Survey, National Museum, Institute for the Preservation of Monuments, Charles University, Masaryk's University, Geological

Institute of Academy of Science and other relevant representatives. The Council meets three times per year and its agenda includes general issues connected to geoheritage activities. The progress of Bohemian Paradise Geopark performance and new proposals for the National Geopark Network and EGN activities are not included in the group's remit. The Network has created a unified logo for its geoparks and negotiates with other ministries (Ministry for Regional Development, Ministry of Culture and Ministry of Agriculture) on issues concerning financial support. It already has the support of the Tourism Department of the Ministry for Regional Development in terms of its Tourism Mid-term Strategy and the promotional activi-

ties of its agency CzechTourism. Some regional governments are also interested in the development of Geoparks.

The creation of the National Geopark Network as a voluntary instrument for environmentally friendly regional sustainable development is perceived positively by the public. The Bohemian Paradise Geopark is the first and only member of the EGN. There are, however, candidates for membership of the National Geopark Network [e.g. Czech-Bavarian Geopark, Bohemia Centralis (Barrandien, Moravian Karst area)] with ambitions to progress their candidacy on a European level.

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**Sandstone pinacles in the Bohemian Paradise geopark sculpted by water, frost, sun and wind**



**A view of sculpted rock pinacles in the Bohemian Paradise geopark**



## Geopark Cabo de Gata-Nijar

Wind and water have, throughout time, contributed to the unique nature of the natural and cultural landscapes of the Cabo de Gata region. The nature of the cultural landscape is one of the most significant features of the Geopark and the influence of the various cultures and how they exploited the natural resources is clearly evident.

This isolated region, one of the few European semi-desert areas, has an extreme climate charac-

### Regeneration and preservation of cisterns, water-wheels and mills

terised by powerful winds, few continuously flowing streams and a lack of fertile soils. Consequently, settlers in this region constructed a system of water-wheels, wells and windmills to extract water and cisterns to store it. In 2001, 145 widely dispersed sites of extraction (windmills) and storage of water (cisterns) were registered in The General Catalogue of the Historical Heritage of Andalusia.

The necessity for a conservation programme concerned with the restoration of the traditional architec-

ture of Cabo de Gata has resulted in the collaboration of the Departments of Culture and the Environment of the Government of Andalusia. This collaboration is concerned with the regeneration of some aspects of the cultural heritage and involves the development of the project "Regeneration and Conservation of Cisterns, Water-Wheels and Windmills of the Cape of Gata-Nijar Natural Park".

Cisterns ("aljibes") are one of the most abundant architectural features in the landscape of the Cabo de Gata region and were built to store rainwater derived from rare torrential downpours and floods. They were constructed within small natural basins and stream beds from stonework, unrelated to rocks from the local areas, and consist of vaults of differing shapes with white-washed inner and outer walls. The insides of the vaults were painted with red iron oxides to prevent leakage. These structures, the majority of which are still in use, are well preserved owing to the simplicity of their construction and to the continued maintenance by their owners.

Water wheels were used to extract groundwater and were sited close to the courses of ephemeral streams. They are known as blood wheels, as they were turned by animals. Generally a wheel consisted of two large hardwood wheels constructed above a well with a stone surround. One wheel, the water wheel, turned in a vertical plane and raised the water from the well in clay bowls secured to the wheel. The water was poured into a drainpipe and carried to a



**A water wheel, Cabo Gata Noria Pozo de los Frailes**

nearby pool where it was stored. The water wheel was turned by another wheel which revolved in a horizontal plane and was driven by mules or donkeys. The platform, used by the animals, is nowadays the best preserved element and is the only remaining evidence for the existence of a water wheel.

The windmills, classified as Mediterranean Windmills with Sails, were located in the windiest positions on the tops of hills or on plains. The windmills have not been used since the middle of the 20th Century. Only two mills contain some of the original machinery and structure; as for the rest only the tower remains. The interest in restoring the windmills of the Cabo de Gata Geopark stems both from their significance in the history of the development of the landscape and because they comprise the major group of windmills in Andalusia. The first phase of restoration will include the Mill of Aguamarga and the Mill of Collado de los Genoveses, both contain most of the original machinery and mill structure.

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**Cabo Gata Molino Genoveses**



# Geology & Geodiversity in the Subbeticas Geopark, Andalusia, Spain

The Subbeticas Geopark, a territory of approximately 320 km<sup>2</sup>, contains one of Spain's most spectacular landscapes and provides exceptional access into the geology of the Betic Mountain Ranges: the intermediate area of the External Zones domain. This area was designated as one of the first protected areas within the Andalusia Natural Park (1988) and is the recipient of several international awards. It became a member of the EGN in 2006. The Geopark is surrounded by 8 municipalities with 21 villages; there are no villages within the Geopark, only small settlements.

The landscape and geology of the Geopark are closely related; ridges are formed of hard limestone, valleys occupy areas underlain by softer argillaceous carbonates and other sediments. The rocks, ranging in age from Jurassic to Tertiary, were deposited between approximately 200 and 25 million years ago. These marine sediments were compressed, folded and uplifted in discrete tectonic units during the slow process of mountain building that began over 25 million years ago and continues to the present day. It is, therefore, an important area for studying the

history of the formation of the Betic Cordillera. The rocks of the Geopark are rich in fossils and are noted for their Mesozoic ammonites. The Geopark is recognised internationally as one of the most significant areas for studying the evolution of this extinct group of marine molluscs. The geological heritage is revealed in more than 16 geologically significant sites. The section to the west of the village of Carcabuey is of particular interest since it contains the globally recognised Jurassic/Cretaceous boundary. The geological features include a karst landscape containing practically all the features associated with the processes of dissolution of limestone rocks. These include surface features like the Nava polje, the sinkholes of Los Hoyones and the Lanchares karren. There are also subsurface features, such as the 116 metre deep Cabra Abyss noted for its abundant stalagmites and the Bats Cave which contains cave paintings and palaeontological and archaeological remains. The Geopark has more than 700 recorded caves. Evidence for the occurrence of palaeokarst is provided by the presence of Neptunian dikes in Dogger oolitic limestones, filled with nodular Malm limestone (Venta Los Pelaos).

The Geopark also contains several remarkable tectonic features including the thrust of Zuheros, which has pushed the front of the subbetic zone mantle over the younger deposits of the Guadalquivir Basin. The Picacho de Cabra is characterised by the remains of a mantle (klippe). From this peak it is possible to observe the three major geological domains

that form Andalusia: the Sierra Morena Range (Hesperic Massif), the Guadalquivir Basin and the Betic Ranges.

Plant and animal species are perfectly adapted to this rocky environment. More than 1,200 plant species are catalogued; 30 are endemic to the area and



**Ammonite  
cross-section**

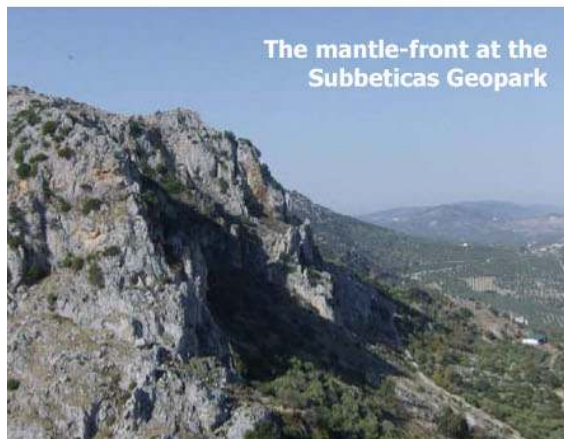
several threatened species are recorded. The most remarkable animals in the Geopark are the birds of prey whereas the Pilgrim Falcon is used as the Geopark's symbol. The caverns provide habitats for an interesting fauna of cave dwellers. Fungi are of exceptional interest, especially the truffles, and the area is one of the few places in the world characterised by a major diversity of truffles.

In order to cater for tourists, the Geopark has developed a visitors' centre, an Eco-Museum, several view points and 9 trails. These facilities show the visitor how the geology provides the basis for the biological, archaeological and cultural patterns of the region.

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**The mantle-front at the  
Subbeticas Geopark**





## Ichnological Park of Penha Garcia Naturtejo Geopark, Portugal

Penha Garcia is a small village located near the border between Portugal and Spain. This year, Penha Garcia commemorates 750 years of a history marked by invasions and hardships and the loss of the old municipal autonomy to Idanha-a-Nova, 35 km away. The migration of young people to the cities has resulted in an aging and rapidly decreasing population within the village. Economic activities in the area are still based on declining agricultural and domestic industries. In 2003, the development of tourism was initiated in this territory. This area of the Portuguese hinterland, which is removed from the main tourist routes, is responding to the new and specialised Cultural and Nature Tourism where the client encounters hospitality and experiences genuine traditions in a wonderfully rich natural setting.

The project which united geologists, economists, peo-

### A very special place to celebrate Earth History

ple from marketing and politics was initiated in Penha Garcia and led to the creation of the first Portuguese Geopark under the political umbrella of geology for social-economical development. The internationally important Vale do Ponsul fossil site, with its exceptionally preserved trace fossils revealing a stage in the evolution of life 480 million years ago, is being developed as the Ichnological Park of



Penha Garcia. It began with the designation of the Fossils Trail foot path and the restoration of the complex of water-mills, which now includes the House of Fossils exhibition room. A climbing school and open air swimming pool provide tourism facilities at Penha Garcia, in addition to the wide landscapes which can be viewed from the previously restored small medieval castle. Within two years visitor numbers in Penha Garcia increased by 40.5% with 123.8% more foreigner visitors, reaching 9000 in 2006, when of the territory became a member of the European Geoparks Network and UNESCO Global Geoparks Network. The need for visitors and the interpretation of natural and cultural sites led to the creation of a Tourism Office and to the development of the Palaeozoic Museum, devoted to the understanding of a primordial stage in animal and

plant evolution. Thanks to an unforgettable geological setting consisting of massive folded and uplifted quartzite rocks in which the deeply entrenched Ponsul River exposes large slabs with magnificent trace fossils of trilobites and other marine animals, outdoor tourism companies are beginning to develop businesses in Penha Garcia. A young couple is just beginning a new life in the village, managing the horse ranch and the climbing school, working in the Ichnological Park of Penha Garcia and providing thematic routes that present local traditions, such as the hand-made bread or panning for gold. The new company is appropriately called Trilobite-Adventure! We envisage a new sunrise for Penha Garcia, set in its past but directly related to the needs of a modern population.

[www.naturtejo.com](http://www.naturtejo.com)



# Sobrarbe Geopark

There is great international awareness of the need to conserve mining heritage. Several territories have already restored former mining operations and have integrated them into sustainable development plans, which directly benefit regions that are depressed as a consequence of the termination of mining activities. Many Geoparks have this type of heritage and the success of their management is undoubtedly another example of the power of networking. Within this context, the territory of the Sobrarbe Geopark takes advantage of the exchange of experiences in order to develop an educational strategy based on mining heritage and focused on the mining activities during the 19<sup>th</sup> and 20<sup>th</sup> Centuries. The mining heritage is a legacy of what is called the "Last Iron Age". The utopian belief existed that everything that society needed could be made from iron. The main objectives are:

**(1)** The recording of memories linked to former mining activity so that new generations can understand the difficult work of their elders.

**(2)** Mining activities were extremely damaging to the environment. Deciphering the causes of the changes that our landscape has undergone as a result of mining offers the

inhabitants of the territory new arguments for a large-scale debate. These discussions about the future of the landscape of our territory cannot be postponed.

The Sobrarbe territory is located in the central part of the southern slope of the Pyrenees. In the north of the territory the oldest rock units are Palaeozoic in age. Ore deposits (iron, silver, lead, cobalt) occurred in these rocks, but they were not very abundant and this territory was never considered to be a real mining region.

Silver coins minted by the ancient Romans with minerals from these mines are testimony to the antiquity of mining in Sobrarbe. The mining of silver, iron and lead reached its peak in the 16<sup>th</sup> Century. This activity declined during the 20<sup>th</sup> Century and the last mine was completely abandoned in the 1970s.

This extensive extraction has left a deep footprint on the landscape of the high valleys of the Cinca and Cinqueta rivers. Thousands of tons of land and rock were displaced, entire forests were cut down and the stream network was diverted. For generations, many families' destinies were linked to the ups and downs of mining activities. There are currently three infrastructures that complement

each other in order to obtain these objectives: the Geopark Interpretation Centre, the Bielsa Museum and the Geomining circuit.

The Interpretation Centre is located in the area with the highest level of tourism (Ainsa Castle). This particular location allows us to inform visitors and guide them to all the places of interest at the Geopark. The Centre presents the mining heritage, especially the geology related to the formation of ore deposits. The community's way of life is highlighted at the Bielsa Museum. Lastly, the Geo-

## Educational strategy based on the mining heritage of Sobrarbe's upper valleys

mining circuit summarizes, on five panels, the role of mining technology across this landscape. The circuit, near the capital of the old mining valley (Bielsa) makes it possible to discover "in situ" the extent of the transformation of the landscape from the remains of the mining infrastructures. A brochure has been published so that visitors can discover this heritage at their own pace. The information is available in three languages: Spanish, English and French.

This initiative is not finished. We are working on training guides in order to improve the quality of guided tours. We continue to recover materials and to record testimonials (stories, legends, folklore) about life in the mines. There are also plans to restore the mining paths 'of iron and silver' that join different mining regions on both sides of the border, from the Aure Valley (France) to Cinca Valley (Spain).

Joan Poch  
[www.sobrarbe.com](http://www.sobrarbe.com)

The "Luisa" cableway arrival station as it appears today.  
 Photo: J. Poch





Due to its environmental characteristics, the Island of Sardinia is a unique territory in the middle of the western basin of the Mediterranean Sea. Here, geology, natural history, spectacular landscapes, coastal morphology, caverns and archaeological remains combine to create a small yet complete continent. Of these varied characteristics, geology and mining had the greatest impact on the social and cultural history of the island. The occurrence of abundant strategically important mineral resources attracted Mediterranean and other peoples to Sardinia from ancient to modern times.

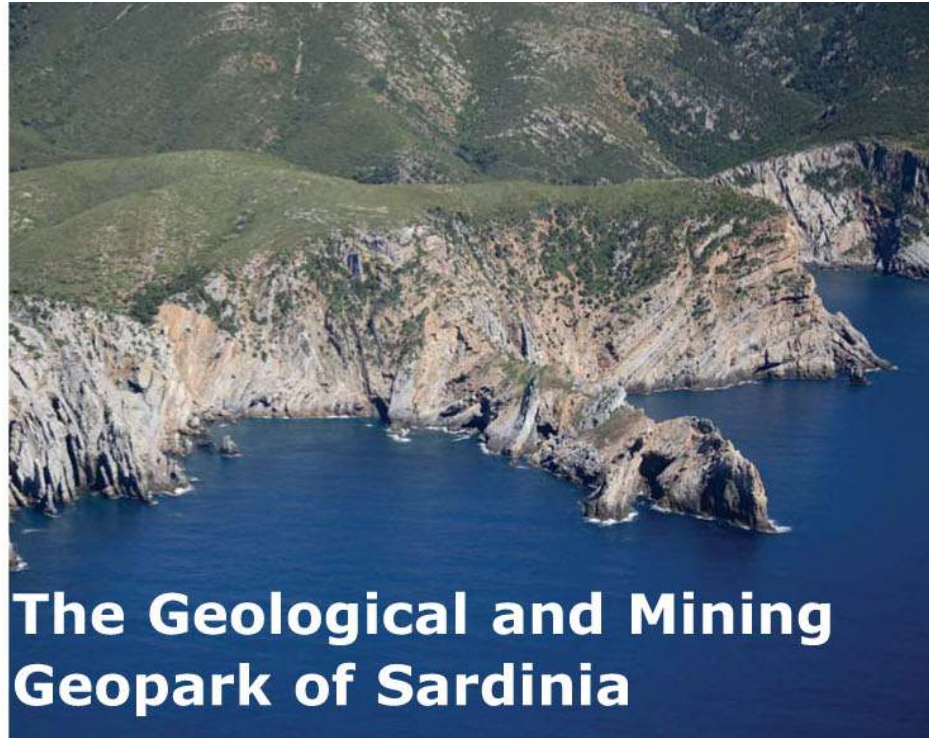
In this territory, the closure of the mines has left a heritage of landscapes, infrastructures, equipment, facilities, documents and archives. The mining industry also created a legacy of human values, professional skills and know-how, that formed the roots of the island's cultural identity over many generations. This culture needs to be respected, protected and passed on.

The restoration of mining areas is not a new problem to Sardinia. In recent years, provisions for the remediation of derelict mines coupled with the acceptance of the necessity for environmental protection have resulted in some important projects involving the restoration of mining sites. This has also led to a number of projects concerned mostly with developing exhibitions at restored sites and using these as tourist attractions.

The Geological and Mining Park of Sardinia contains 8 distinct



Remains of a Roman temple



areas, within a territory of 3,770 km<sup>2</sup>, where the mining heritage is protected. Each area is distinguished by its unique geological deposits, by its mineralogical characteristics, the history of its mining activity and the mining techniques which were used in each area. Particular emphasis is placed on the historical and archaeological aspects of mining. The 8 areas contain an extraordinary heritage of mining archaeology which, combined with the natural history and archaeological heritage, make the "Geological and Mining Park of Sardinia" unique in the world. Among the most historically significant sites are a few sites at Monte Arci, where obsidian was first mined in about 6,000 B.C. (Early Neolithic); the area of Orani and Sarule, where steatite was mined in about 3,000 B.C. (Late Neolithic); the area of Funtana Raminosa where copper was mined in about 1,200 B.C. (Nuraghi period) - this copper was also used in the production of the Nuraghi bronze statuettes; the areas in Gallura where granites were extracted and processed in Roman times; and the areas of Argentiera, Guzzurra - Sos Enattos, Sarrabus Gerrei and Sulcis-Iglesiente-Guspinese where intense mining activity involving the production of silver, lead, zinc, tin, copper, iron, coal, fluorite and barite occurred from

about 600 B.C. up to the industrial age.

In 1997, UNESCO designated the Geomineral Historic and Environmental Park of Sardinia as "the first Park in the geosite-geopark world net". In 1998, UNESCO, the Italian Government, the Sardinia Autonomous Region, EMSA (Sardinian Mining Authority), and the University of Cagliari and Sassari signed the "Carta di Cagliari" to acknowledge the international importance of the "Geological, Mining, Historic and Environment Park of Sardinia". In 2007, the park became a member of the European Geoparks Network. Projects in the geopark are concerned with providing visitors with new and interesting perspectives of this wonderful island. These include unique examples of mining engineering such as Porto Flavia, Henry Gallery, other mines now contain the Museum for the Italian Centre of Coal Culture and Saint Barbara's Cave. Scientists and tourists can visit the unique historic and environmental Geomineral Museum where they can observe 8,000 years of mining history, in which different peoples searching for minerals followed one another, each leaving the indelible marks of a fascinating series of cultures.

**Exposures  
of Palaeozoic  
rocks**

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# Papuk Geopark

## The first European Geopark in Croatia

The main feature in the landscape of the Eastern part of Croatia - Slavonia - consists of flat lowlands with large cultivated tracts. Driving through fields stretching away toward the horizon there are mountains which rise to almost a thousand meters above sea-level from the plain which was once the bottom of the Pannonian Sea. The most beautiful mountain in Slavonia is Papuk Mountain.

In 1999, Papuk was designated as Nature Park on the basis of its cultural and historical features. In 2007, Papuk became the first Croatian European Geopark. Papuk Mountain is situated in the southernmost part of the Tisia Tectonic Unit, is part of the crystalline basement of the Pannonian Basin and consists of metamorphic and igneous Pre-Alpine rocks (Precambrian - L. Palaeozoic). This basement was covered by Permian-Mesozoic sediments and the Pannonian Basin Neogene - Quaternary deposits. Mesozoic formations are represented by carbonate rocks with typical karst features such as abysses, sinkholes and caves on the crest of Papuk. The Cenozoic is represented by fossiliferous sediments, particularly

of Miocene age when Papuk was an island in the "Pannonian Sea". Tectonic uplift and the continuous erosion of the rocks in Slavonian Mountains created the material of the more than 1 km thick deposits of the Sava and Drava river valleys. The Rupnica site, in the north-western part of the Park, is the first recognised Natural Geological Monument in Croatia, with impressive square and hexagonal shaped, columnar jointed albite rhyolites.

Papuk is also significant for its wildlife and cultural history. Forests dominate the landscape of Papuk Nature Park covering an area of more than 95% of the Park. Thirteen different forest types are represented in the territory; this diversity is a consequence of contrasts in relief, geology and a variety of pedological and climatic influences. The dominant forest species are beech trees' but oak and mixed beech - fir forest also occurs. Calcareous grasslands are botanically very valuable localities. Blue Anemone, Gentle Fritillary and Rose Daphne are just few of the rare and endangered plant species that grow in this habitat. Almost all representatives of Central European fauna are recorded. More than 200 years ago, however, the now eradicated, bears, wolves and lynxes lived in the Papuk territory. Populations of bats are especially important. Of the eleven species of over-wintering bats in the Uvirajka abyss, six are included in the IUCN list of endangered species.

Significant remains from the cultural heritage of the Papuk Nature Park area are connected to the pre-historic period and the Middle Ages. A significant archaeological site of the Early



Iron Age Hallstatt culture, dating back to the 8<sup>th</sup> to 3<sup>rd</sup> Century B.C., is located near the Kaptol village. Remnants of seven Middle Ages fortified castles testify to the importance of this area as border zone of an area threatened by the expansion of the Ottoman Empire.

Finally, the great diversity of the Papuk Geopark offers a variety of possibilities for recreation and education. This refers primarily to all-year round hiking in the beautiful countryside.

For those looking for adventure rock climbing, newly constructed mountain bike trails and a paragliding runway offer exciting possibilities. Three educational paths with educational panels introduce visitors to the natural and cultural heritage of the area.

Becoming a member of the EGN provides new opportunities for wider cooperation. Future projects will certainly contribute to the enhancement of geotourism and involve the local communities in many activities. This will be an important step towards the sustainable social-economic development of the region.

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GEOPARKS





The geological tale behind the English Riviera Geopark is undeniably quite spectacular and one of extremes. From a seascape bathed in the warm and beautiful tropical seas of the Marine Devonian, to a landscape of arid, barren Permian desert and from our earliest relatives, living in caves, to modern civilization.

Unique in Western Europe the English Riviera Geopark is geologically renowned for its Marine Devonian limestone, which are of great historical importance. The rich faunas yielded by these rocks were used, in part, to characterise the original Devonian System of the pioneering geologists

central to the pioneering work carried out in the nineteenth century and influenced public opinion worldwide as to the antiquity of man. Very few raised beach localities elsewhere in Britain have revealed so much palaeoenvironmental information as those in the English Riviera Geopark. The limestone, in addition, has created a range of habitats supporting plant communities and mammal species of national and international importance.

From a cultural perspective the English Riviera Geopark area provides an amazing example of how geology is the overriding influence on the history and development of an area; from the Bay's earliest residents at Kents Cavern through to the Tourism industry of today. The shape of the Bay provided safety for the naval fleet during times of crisis and thus was a catalyst for the building of the Napoleonic Forts, while its sheltered natural harbours led to the growth of what at one point became the UK's largest fishing port. The beauty of the area influenced the early development of a tourism industry and led to the exploitation of its geological resources, through extensive limestone quarrying, for building and the marble and terracotta industries. There is always the excitement of "murder in the Geopark", as the area had a great influence on the work of Dame Agatha Christie, the world's most famous mystery and crime writer who was born in Torquay and lived much of her life in the area. Agatha Christie famously refers to Kents Cavern in her thriller "The Man in the Brown Suit".

Today, our designation as a Geopark has inspired, excited and generated enthusiastic support from our community, as the concept of a Geopark fits well with the area's development and regeneration plans. At 62.4 km<sup>2</sup> the boundary of

English Riviera Geopark is concurrent with the administrative boundary of Torbay Council, a Unitary Authority; hence Torbay Council is the lead partner in the Geopark's development. Torbay is comprised of three towns, Torquay, Paignton and Brixham and the area acquired the name of "The English Riviera" during the Victorian era when it became a seaside resort of great style and refinement. New approaches to the management and promotion of geological heritage are currently being developed in Torbay. The Geopark status is compatible with promoting the sustainable use of a geological resource and is extremely relevant in the context of existing nature conservation strategies and philosophies within the Bay. Crucially, Geopark designation will become a framework within which other heritage tourism initiatives in the area can develop and provides an identity through which Torbay can be recognised globally for the excellence of its facilities.

The unique combination of a superb geological resource, well-developed tourism facilities, a dedicated conservation trust and well-developed partnerships between the public, private and voluntary sectors makes this area well suited to develop a dynamic and successful Geopark, promoting geological heritage and sustainable development.

But perhaps saving the best to last... the English Riviera Geopark is an innovative concept for the European Geopark Network and provides the ideal opportunity to challenge global thinking...we may be European Geopark number 32 but we are the first Urban Geopark.

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## Introducing the English Riviera Geopark

Sedgwick and Murchison. In addition, excellent exposures of classic desert sandstone in the Permian "Red Bed" sequences are recorded. The Marine Devonian limestone themselves also include important Quaternary karstic features such as bone caves, which provide one of the longest records



**During the inspection of the Geopark by EGN referees**

of Pleistocene events not only in Southwest England but also in Western Europe. Pengelly's excavations of the caves were



# 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 32 Geoparks in 13 European countries (September 2007)



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. Fforest Fawr Geopark	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 - Manhartsberg	AUSTRIA	26. Sierras Subbeticas Natural Park	ANDALUCIA, SPAIN
11. Naturpark Steirische Eisenwurzen	AUSTRIA	27. Sobrarbe Geopark	ARAGON, SPAIN
12. Geo-Naturpark Bergstrasse-Odenwald	GERMANY	28. Gea Norvegica Geopark	NORWAY
13. North Pennines AONB	ENGLAND, UK	29. Sardinia Geominerario Park	ITALY
14. Abberley and Malvern Hills Geopark	ENGLAND, UK	30. Papuk Geopark	CROATIA
15. Park Naturel Regional du Luberon	FRANCE	31. Lochaber Geopark	SCOTLAND, UK
16. North West Highlands	SCOTLAND, UK	32. English Riviera Geopark	ENGLAND, UK