



Geoparks

network
European Geoparks Magazine · issue 1

europaean GEO PARKS

The idea of
Geological Heritage

How to explain
geological Heritage to Children

Interview
In Dialog with Economy

Portraits of
10 European Geoparks

Welcome to the world of Geoparks

Have you ever walked across a landscape and wondered how so many varieties of rock and shapes of mountains, hills and valleys came to be? Have you ever experienced a moment of exhilaration when looking down from the top of a cliff to the sea crashing below or across the snowy ridge of high mountains and wondered, how did these things form? Likewise, have you ever picked up a rock from the floor of a quarry or from the sea-shore and wondered about that rock's long history? Were you able to find the answer for your questions? If not, then welcome to the world of European Geoparks where we aim to explore our geological heritage and provide the answers to many of these questions.

... it is necessary to start new ways and bring motion into thinking to design future.

Many people when asked about geological heritage think of places such as the Grand Canyon, Iceland, Mount Etna, the Giant's Causeway or the Alps. However there is more to geological heritage than these special, often exceptional outcrops. Across Europe there are examples of landscapes and rocks that provi-

de key evidence of a particular moment in Earth history and they too are part of our geological heritage. Geological heritage is also a recognition, or acceptance, of Man's role to provide an economically sustainable future for the development of society as a whole, as well as our responsibility to share, but also to safeguard, that heritage. In many ways the geological heritage of Europe is as diverse and interesting and dynamic as the multicultural heritage of Europe's many regions.

This might sound strange as many people think rocks, or indeed landscape are boring or even dead things. However, with the dawn of the 21st century there is a growing recognition that this mode of thinking is outdated and there is an increasing acceptance of the need not only to preserve but also to enjoy our geological heritage. For Europe's geological heritage is also our shared history and that history can be read written in stone in the landscapes and rocks that are all around us.

The team of European Geopark Network members



Sweeping gritstone cliffs - Fermanagh District Council - Northern Ireland - photo: Conor Burns

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Tramore, Copper Coast - Ireland - photo: Terry Murphy, Waterford

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Jüdkereith Iron Museum - Germany - photo: K. Stenhausen



● Foundation member
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Guy Martini



Nickolas Zouros

The creation of a European Geopark Network is an unusual idea.

Why bother? After all, Europe has many networks of cooperation but do such networks really work? Moreover, do they work on shared themes? Or does everybody have their own individual project and simply presents the results of that project to the others without the creation of an effective network? We hope that the cooperation being developed within the European Geoparks Network is different. The idea behind the creation of the network arose following a discussion between two unusual characters Guy Martini (from France) and Nickolas Zouros (from Greece) and occurred when both were far from home in Beijing (China). They met at the International Geological Congress in 1997, where a special section of the conference was about geological heritage. As usual this meant a series of presentations of individual case studies documenting extraordinary geological phenomena and outcrops from different

EUROPEAN GEOPARKS

GEOLOGICAL HERITAGE & EUROPEAN IDENTITY

- COOPERATION FOR A COMMON FUTURE

areas of the world and examples on how to protect them.

It is not unusual for geologists to travel such distances. However, to talk about geological heritage at that time was considered progressive as the idea of geological heritage was still in its infancy. Although some work had already begun, those already working in this field were frustrated that the bridge of understanding between geoscientists and the general public was proving a difficult one to cross. This led to the decision of these two active geologists to initiate work on establishing a network. In particular Guy Martini took up the challenge with the European Community in Brussels, applying for a preliminary study aimed to finding partners who shared the ideal and to assist in the preparation of an application for further European funding. In this first challenge, he succeeded. Some work had already been carried out at a regional level, especially in France, for example at the "Réserve Géologique de Haute Provence", which has been in existence since 1984.

Guy Martini started the effort to look across Europe for potential partners who shared his twin aims of geological heritage and enhancing the public understanding of earth science and with a third aim of using these to promote sustainable economic development on a regional level. It soon turned out that four regions have been quietly following

these very same aims alone: Haute Provence (France), Maestrazgo / Terruel (Spain), Lesvos Island (Greece) and Vulkaneifel (Germany). These groups were largely unaware of each other first but welcomed the idea to exchange experiences and to cooperate. This was a good start but to bring the idea of a network to fruition it was essential that these four groups shared the same ideals. Thankfully they did. As a result these four groups founded the European Geopark Network. At the time they felt like Galilei who said "... and definitely it moves!" even though they knew that it was only the first step on a long, hard road.

**like Galilei who said
 "..... and definitely it moves!"**

The first aim behind their will to cooperate is being open to the exchange of ideas, to have confidence in cooperation, to tolerate the different identities but to work towards solutions to allow development. The second aim is to use their different geological histories and different national mentalities to compare problems and work towards the sustainable development of our landscape resources for future generations. The third aim is that, in order to develop these ideals, they needed others to join them in the European Geopark Network and help them build a European Community of Regions with a sustainable future.●

• *)

Think globally, act locally*(Quoted by Fritjof Capra)*

More and more countries have started to develop schemes for recognising important geological and geomorphological sites within their national boundaries. Such Earth heritage sites are important for educating the general public in environmental matters. They also serve as tools for demonstrating sustainable development and for illustrating methods of site conservation as well as remembering that rocks, minerals, fossils, soils, landforms and landscapes are both the products and record of the evolution of our planet Earth and, as such, form an integral part of the natural world.

...the protection and enlightened management of the environment have been widely acknowledged as a top priority.

For a number of years now, but particularly since the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992, where Agenda 21 (the Agenda of Science for Environment and Development into the 21st Century) was adopted, the protection and enlightened management of the environment have been widely acknowledged as a top priority. UNESCO, the United Nations Organisation for Education, Science and Culture, contributes to this by promoting the protection and sustainable development of geological heritage through mainly two independent programme frameworks, the World Heritage Convention and bilateral co-operation in geological heritage matters through the Division of Earth Sciences.

GEOLOGICAL HERITAGE OF UNESCO

Through the international convention adopted by UNESCO in 1972 'Concerning the Protection of the World Cultural and Natural Heritage', the World Heritage Committee, identifies and monitors properties of outstanding universal value and decides which properties are included on the World Heritage List. The criteria guiding the World Heritage Committee for the selection of these sites are extremely strict. The sites included on the World Heritage List have to be of outstanding universal value exclusively, as stipulated in the Convention's Article 2 of natural heritage: 'geological and physiological formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from

the point of view of science or conservation'.

Only around 20 sites are inscribed primarily because of their geological interest.

As of today, a total of 690 sites have been inscribed on the World Heritage List of which 138 are natural, 23 mixed and 529 cultural. Only around 20 are inscribed primarily because of their geological interest. Among the outstanding sites currently inscribed on the World Heritage List are inter alia the Grand Canyon, the Carlsbad Caverns, the Hawaii Volcanoes, the Mammoth Cave, the Yellowstone Park, and the Yosemite-National Park (in the United States of America), the Rocky Mountain Parks, and the Dinosaur Provincial Park (both in Canada), the Great Barrier Reef, Shark Bay, the Uluru-Kata Tjuta (Ayers Rock) National Park, Macquarie Island, and the Fossil Mammal Sites of Riversleigh and Naracoorte (all in Australia), the Scočjan Caves (Slovenia), the Caves of the Aggtelek Karst (Hungary and Slovak Republic), the Giant's Causeway (N. Ireland), and the Messel Pit Fossil Site (Germany). The World Heritage List is predicted to eventually contain up to 1,500 sites in all (cultural as well as natural). This scenario suggests that the World Heritage List will eventually accommodate an additional 100 new sites nominated primarily because of their paramount geological/geomorphological interest. Seen on a world-wide scale, this is an amazingly small number. What should be done with the nume-

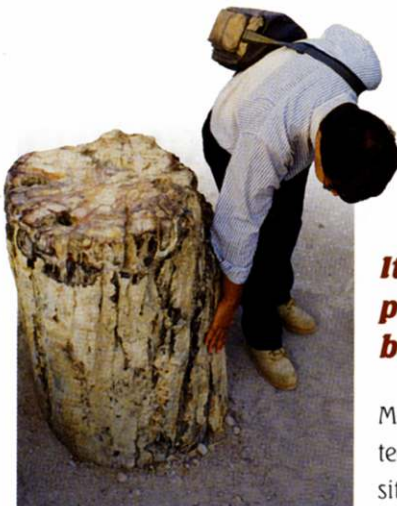
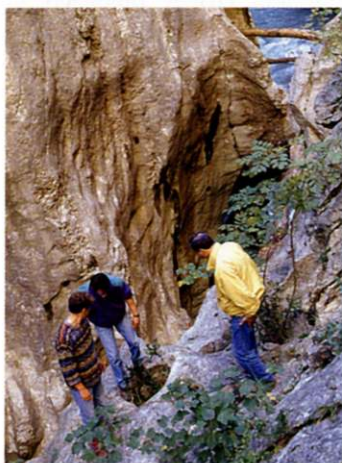


- Dr. F. Wolfgang Eder,
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rous sites, which are also of outstanding value but only of national and local value and do not meet the strict criterion of the World Heritage List? An alternative is required to meet this demand.

...the rising need for a global promotion of geological heritage ...

UNESCO has received a large number of requests from all over the world during recent years, from geological institutions and geoscientists and non-governmental organizations, reflect the rising need for the global promotion of geological heritage, at present recognised only nationally or not recognised at all. After a period of consultation and preparation, the Division of Earth Sciences at UNESCO presented a new concept named the UNESCO 'Geoparks Programme' to the governing bodies of the Organization. The Programme has been discussed three times since 1999 by the Executive Board of UNESCO which came to its final conclusion in June 2001. Although high importance was attached to geological heritage matters, the delegates - driven by the real budgetary constraints



It recognises as central principle the relationship between people and geology ...

Member States to recognise, protect and enhance Earth heritage sites at the global level, whereas the Network of European Geoparks, on the other hand, focuses on European sites. This new potential for interaction between the socio-economic development and conservation of the natural environment adds a new dimension to the scheme of the World Heritage List. It recognises as a central principle the relationship between people and geology and the ability of a site to serve as a focus for economic development, particularly through geological tourism. (Such sites will normally represent landscape elements rather than small geological outcrops of limited areal extent.)

and needs for concentration - decided not to pursue the development of a new Geoparks Programme. However, UNESCO's role was considered as crucial in enhancing the public awareness of geological heritage matters, in achieving their fullest international recognition, and in securing their most effective political impact. Therefore, the Division of Earth Sciences will continue to pursue the general objective of 'Education in Earth Sciences', through the promotion of geological heritage activities, providing UNESCO's support to, and co-operation with, national initiatives on an ad-hoc basis when requested by Member States. Few international programmes exist today, which offer the ability to identify, protect and promote sites of geological and geomorphological importance. Taking into account their common goals of pursuing activities in educating the public at large on environmental issues, promoting regional sustainable development and in supporting, training and developing scientific research in the various disciplines of Earth Sciences, the Division of Earth Sciences of UNESCO has established close ties of co-operation with the Network of European Geoparks. UNESCO, on the one hand, offers its sponsorship to interested

With respect to sustainable development, numerous areas in the world offer immediate potential for substantial economic development because of the presence of a diverse range of geological phenomena including, amongst others, structures, minerals and fossils. Geological heritage sites, properly managed, can generate employment and new economic activities, especially in regions in need of new or additional sources of income. We are glad to note that all around the world, there is a growing public awareness of the necessity to conserve nature and more and more people recognise that geological features play an essential part in managing our environment in a 'wise' way. ●

PUBLIC RELATION WORK - GEOTOURISM

Having a rich geological heritage and interesting geological phenomena with trails and museums is the first step to communicating geology to the public. One aim of the Geopark Network is to bring

the European Geopark philosophy to the broader public. This means using modern communication tools such as television,

radio, internet, reports in magazines as well as producing attractive promotional material for interested visitors.

Round table discussion, 1st Conference Oct. 2000 Molinos - Greece

tourist marketing and international tourism bourse

How can the aim of the LEADER IIC project "Development of geotourism in Europe" be achieved? This was the main focus at the first working meeting of the group in Digne (France) and subsequently, in Lesvos (Greece), the discussion concentrated on coming up with constructive proposals. An internet chat-room was chosen for a quick exchange of opinions and to inform each other about the operation of individual projects. However due to time constraints and technical problems, the good old phone established itself as the most efficient communication tool for the time being and additional meetings.

... even though an idea might be good, it still needs to be economically viable.

How does one develop geotourism related to geological phenomena in Europe? At the outset ideas were proposed to develop common projects in the field of "geotourism" such as offering trips across Europe linking all the Geoparks. Those with experience of the wider tourism sector, such as the Vulkaneifel which uses the Eifel Tourism Company Ltd. for its marketing, were able to ask

the experts about the merits of this idea. The tourism sector lives in the world of pragmatic economics and, even though an idea might be good, it still needs to be economically viable. The experts decided the "Geopark Trip" idea would not be viable. So what other ideas could be developed?

Such criticism can be positive and encourage you to think on different ways. If you definitely

sector, e.g. university groups or those interested in environmental matters or to beauty of landscapes.

First step then is, in addition to having information on a geological activity or project, is to make that information known to the public, possibly through an official network. To be successful though the European Geopark Network needed to have its aims and philosophy written down in



ITB - Mar. 2001 in Berlin - Germany - photo: C. Endres

think the idea is good, perhaps it is the development plan that needs to be more carefully thought about. Maybe you need to think again about what geotourism actually means and what could be done to develop it in agreement with the philosophy and aims of the Network and for the economic benefit of the various regions. Perhaps it means taking a decision to concentrate on a particular market

a charter and agreed upon by its members as the basis for future cooperation. The charter was prepared by the French team in Digne with support of the Spanish partners in Molinos. The latter published an explanatory leaflet that contains some information about the four partner regions and which has been distributed it to about 800 LEADER addresses across Europe as well as to the four partners.

What else do we need to promote the network's philosophy and work around Europe? Exchange of detail of the work being done in each region was already done through an information leaflet compiled by the Spanish team. They also worked on the logo with the French team, who produced and distributed the leaflet. This really marked the start of building up the image of the EUROPEAN GEOPARKS NETWORK. The second step was to expand the network. This process really commenced at the 1st Geopark conference, which was held in Molinos, Spain in October 2000. As the Networks first idea of offering "Geopark Trips" across Europe was dropped, the next idea, which came from the Greek team, seemed more plausible. They suggested targeting university groups as future potential visitors to the European Geo-



Nevertheless this did not preclude targeting the general public as well. The organisation responsible for regional tourism marketing in the Vulkaneifel area proposed a new strategy. They proposed that the Network attend the International Tourism Fair (ITB) in Berlin, March 2001, and present the European Geopark Network to a specially arranged press conference with the Minister of Culture for Rhenania-Palatinate in attendance. Also at the fair the national project "GeoLife Vulkaneifel," which is partially financed by LEADER IIC was presented to the market as

Geopark partners as well as for potential new tourism markets that might open up through places such as Hahn airport). The magazine provides information on the existing Geo-parks, trails, museums and other activities available in the Vulkaneifel

... got close contact with professional tourism marketing strategies.

By being part of a working session at the ITB the European Geopark members got close contact with professional tourism marketing strategies. Discussions were held in the presence of a representative of the Ministry of the Economy for Rhenania-Palatinate. At this session the partners also spoke about their own strategies e.g. the Geological Reserve de Haute Provence talked about their aim of leading visitors away from main arterial routes such as the Lyon-Avignon motorway eastwards towards Digne, Haute Provence and to the "Antennas," the museums that are managed from the Geological Reserve in Digne. The Spanish group talked about their aims of focussing on schools and universities as their main target group of visitors while the Greek team reported their activities of working closely together with hotels and creating and promoting thematic trails. ●



Conference 2001 in Lesvos - Greece

parks. They collected texts and photographs from the various Geoparks focussing on the scientific research potential in each park for use in a promotional brochure "A trip through European Geoparks Earth History" and which was published in October 2001 on Lesvos at the 2nd EU-Geopark Conference.

one of the new tourism magazines that forms part of the marketing strategy for the Eifel region. The magazine is published in German (30.000 edition), Dutch (20.000 edition; people from the Netherlands make up around 40% of the overnight visitor groups in the Vulkaneifel) and English (2.000 edition; for other

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PUBLIC PROMOTION OF GEOSCIENCES AND GEOLOGICAL HERITAGE

- a basic concept for sustainable development of our network co-operation

The aim of the established European geopark network is transferring geological knowledge to the public and by combining the idea of geological heritage with economic and social aspects to create perspectives for a new quality of life with the planet Earth as an important basis for our existence and society.

Facts shown and a discussion in "Public promotion of geological items" (e.g. KASIG 1993, 1996) as well as referring this to "... - an option for the future" (FREY, SCHÄFER & BÜCHEL, 2001) have lately shown that this is a very complex field. They picked up the example of a modern electrocable. By referring to the modern development of computer technique as well as modern communication by multi-media they stated that in the 1970's by passing a dues totally new fields were created which dominate daily life, especially holiday behavior and free-time arrangements. Secondly they stated that these approaches, too, need to be thought about and integrated into public promotion of geosciences, as it is the daily life basis of human beings today. The consequence of this is that there are different fields and by this different levels of target groups to transfer geosciences and geological heritage, too. The aim, philosophy, tasks and options of the European geopark network co-operation lie within the positive respond to them. At the end of this magazine you will have



Trophy for European Geoparks Qualification

some reflections on main experiences of the work of this LEADER IIC Project "Development of Geotourism in Europe".



Working session - Oct. 2001 Lesvos - Greece

The fields named above are for example finding

1) co-operation partners joining the idea of geological heritage, public promotion of geosciences and supporting sustainable development and transferring
2) new geological results of research work done in the regions of the European geopark network to the scientific community, e.g. geologists, archaeologists, biologists

- 3)** highlights of the landscape earth history, the geological heritage, actually processes of forming landscape as well as using landscape for human activities like building purposes, water supply, settlement and related information of discipline like drawing up relationship to cultural and historical development and so on - to the general public by creating geo-trails and museums
- 4)** necessity of conserving geological sites for public presentation and having exchange on methodological aspects
- 5)** aspects of new job perspectives to persons in the 3rd life as well as to young people like e.g. "geopark ranger"

- 6)** value of earth history processes fixed in geological heritage of a landscape and resources in rocks building up a landscape by educational programs to grades, adult groups etc. of the region and to visitors etc.
- 7)** fascination and value of earth history potential of the regions to visitors by preparing tourist packages for grades, visitor groups, etc.



Press-conference 2000 - Gerolstein - photo: G. Mäkeren

8) geological heritage image to the economic level of producing products to be sold in shops, hotels, museums and tourist-information-centers of the region or to invent new labels for a long term integration of geological heritage image into economic thinking

9) making geological heritage image obviously into the daily life by artistic creations or e.g. taking the items for the design of roundabouts

10) promoting the necessity of European, regional know-how exchange by geotourism.

11) showing to political bodies the necessity of know-how exchange to build up a management unit to organize a long term strategy on geo-monitoring and conservation of geological heritage, geotourism, economic and sustainable development as well as

12) creating an official network organization with support of over-regional and/or international political units like e.g. UNESCO, to stabilize the given investments.

The above aspects have been developed and worked on in the regions working together in the European Geopark Network. In the following articles the way of realizing and working on the different levels as well as the achieved results are shown. During the years of working together in LEADER IIC successful steps have been made especially on the level of creating a common image on geological heritage in the European geopark network as basis for an economic and sustainable development.

EXAMPLES OF THE EUROPEAN GEOPARK NETWORK REALIZING ITS AIMS BY EXCHANGING KNOW-HOW

The following examples demonstrate how communication at various levels between the network partners during the last few years exemplifies the philosophy behind the European Geopark Network. The articles also focus on how activities can come together to help create a common goal and how knowledge exchange can lead to new developments and activities. They help to illustrate that the future continuation of the Network is essential not only in order to cement those relationships already formed but also to ensure that future European development is built on regional stability.

Let's start with the origin of activities where most of the partners started off. This is the knowledge side or universities research work in landscapes. Each of the regions in the European geopark network has contacts to universities that have regular research activities in the territories. Some of them have own research tasks and budgets, and some not. This is the best way of having an actual informing pool for the public about scientific work and results. It also offers the opportunity from the scientific point of view to show

why it is necessary to support scientific work by general tax money.

The LEADER IIC Project started in 2000 for the partners having a basic structure and infrastructure to transfer geoscientific phenomena and geological heritage to visitors. ●



How science normally transfers actual results and how Geoparks do this?

It will be shown in the following contributions.

• *)



Kahlenberg/Hillesheim - Vulkaneifel - photo: H. Bürgel

...creates a new development without creating a concurrence situation

However, questions to volcano scientists led to the answer - this is not possible - there is no pumice in the western volcanic field. Parallel to this in some of the outcrops glass "jacket" coated fragments of sandstone were found. Asking for Information scientists were critical because of the fact they could not believe the existence of the described phenomena. Later the item was picked up after some time as thesis work, done by University of Jena, Institute for Applied Geosciences, Prof. Dr. G. Büchel / Prof. Dr. K. Heide. - This happens all over in European Geoparks, what to do?

An enthusiastic individual from the Vulkaneifel who acted as a guide around the geotrail in Hillesheim and who wanted to know more about volcanism offered to write up the discoveries in the paper, "Systematic documentation of the discovery of special phenomena in lava quarries: a basis for the transfer of geological knowledge to help explain the functioning of Planet Earth." His name was Horst Bürgel, aged around 70 years (Photo with G. Büchel). From this paper, the following text was written for an exhibition to the general public on volcanic processes and the volcanic heritage of the region.



Fieldwork: G. Büchel and H. Bürgel



photo: A. Goepel



Sandstone pumice - photo: A. Goepel

KNOWLEDGE TRANSFER: SCIENTIFIC RESULTS FOR SCIENTISTS

Many activities to promote geological heritage are possible because university institutes do research work in landscapes and publish their results which show interesting and/or extraordinary facts of earth history and/or other geological heritage phenomena. As already told, one level is the transfer of new regional geoscientific results to the scientific community. Let's show you the way in which this is usually done. In the following the importance of the transfer in the European geoparks - as well as the role in a territory will be shown. The quality of the way of transfer to the broadest public, to politicians etc. and its role for a sustainable development will become obvious. It will be given for Vulkaneifel. Scientific work is also done in the Geological Reserve in Haute Provence (e.g. on Sirenians) or in the Petrified Forest by the Natural History

Museum (e.g. impregnation conservation on petrified trees etc.) with a budget. However, if it is not there, new ways have to be looked after.

AN EXAMPLE FROM THE VULKANEIFEL, GERMANY

Some years ago in preparing the trails of Geopark Gerolstein, fieldwork led to interesting results. Looking for useful outcrops, quarries and items for information panels some strange material in the Westeifel Volcanic Field was found. It looked like pumice! Trying to prepare some practical things a still better thing happened, it floated on water. - Good indication for being pumice.



Glass jacket fragment in scoria - photo: A. Goepel

"Sandstone Pumice" and Glass-coated Rock Fragments as thermo-metamorphic Implications, Documentation and macroscopic Description

been destroyed by industrial extraction for the road construction industry.

In July 2000 systematic documentary work started on a lava sand quarry close to Hohenfels in the community of Gerolstein (Westefelian Volcanic Field). The geological setting is described as lavad dyke-like outcrop glass-coated rock fragments of different colours, being found at the base, the top and from the middle of the eastern part of the quarry close to the dyke or former fissure.

These glass-coated xenoliths, which are distributed like raisins in a cake, were sampled along with non-glass-coated, rock xenolith fragments from the basaltic rock dyke material. The material would otherwise have

The macroscopic description showed the following results. Within 25m of a dyke both glass-coated and non glass-coated rock fragments are found. The colour of the glass-coated xenoliths can be yellow or yellowish, brownish with green-black spots, pinkish, grey-greenish, bottle-green or azure-bluish (see photo). The non glass-coated fragments range in



Glass coated fragment - photo: A. Goepel

size from 1cm in diameter up to fragments measuring 0,6 x 0,5 x 0,2 m in size and show a thermo-metamorphic influence. The fragments range from unaltered bits of Devonian or Triassic red sandstone lying in solid lava up to porous, pumice-like rock pieces of sandstone origin, which have been structurally totally changed. Such fragments are referred to as sandstone pumice. This pumice also exhibits a colour change from orange-red (the original colour) to olive-green, pink-violet or light grey. Two transitional phases, between fragments that have been totally structurally altered and fragments with relicts of sedimentary layering, are documented. ●

- Dr. Marie-Luise Frey,
- Horst Bürgel

KNOW-HOW EXCHANGE

TRANSFERRING GEOLOGICAL HERITAGE TO THE GENERAL PUBLIC AND TO VISITORS



Presentation of petrified tree stams in outcrops - 2000 Levkos - Greece

Conservation of geological heritage - geo-trails and museums.

means conservation outside a museum is necessary and also a special tool to explain it to the public. Sometimes this also means there is no direct controlling mechanism e.g. by a ranger. Earth has already preserved documents and tells by lithification in layers its history belonging to the subject. But it is necessary to transfer this to the public to valorize the existence of the lithified documents, e.g. fossils.

The European geopark founding members did already have a management structure and infrastructures to transfer geoscientific phenomena and geological heritage to the public and to visitors when they started the LEADER IIC Programme in January

2000. But the stages of progress to a common quality level were different and for different items. Without geological phenomena no presentation! The philosophy of the European geoparks network is to leave the geological heritage subjects in place. This

All partners have fossilized strata packages of extraordinary importance and beauty. In France this is the ammonite slab with its unbelievable number of ammonites, near Digne. On Lesvos Island in Greece these are the multicolored petrified tree trunks, covered by acid volcanic ashes as well as well preserved leaves etc.. In the Cultural Parc of Maestrazgo deformation structures of young mountain formation (alpine) are conserved as well as dinosaur footprints. In Geopark Vulkaneifel the enormous number of maar craters, created by water and basaltic magma interaction, some of them filled with water, as well as the tertiary maar lake filling of Eckfeld with fossils like pre-horse with foetus and the Devonian trilobite fields near Gerolstein are extraordinary sites.

... that different regions had different methods and strategies to realize conservation.

Some of the extraordinary sites are protected and open to the public. Starting the LEADER IIC program "Development of Geotourism in Europe" the partners got to know that different regions had different methods and strategies to realize conservation. It is interesting to get a new approach by seeing the Greek colleagues digging out their buried petrified tree trunks with large, high



Excavating a petrified tree trunk (GR)



Petrified tree trunk afterwards, Lesvos (GR)



Site with sirenian bones (F)



Ammonite slab, Digne (F)

pressure air-hose (see photo during digging-off and afterwards presentation below). This tool is usually used for concrete taking off.

The dimensions of needed conservation became obvious, too, when a tree trunk of some meters high and a diameter of 0.5 m onwards needs e.g. an additional impregnation to get a long-term stabilization and to protect it not only because of natural weathering and erosion but also because of touching visitors. This fact also becomes obvious by having the sirenians conserved in the middle of nowhere, some kilometers north from Castellane (France). And - the technique to have it stable, putting around a concrete rim, to protect it from overrunning rain water in winter with afterwards weathering processes on the surface. You even can preserve it from sun by creating a protection frame with glass plates and having this closed, so that nobody can take off the fossilized bones of the sirenians.

... nobody thought of getting onto the extraordinary site and inventing new presentation possibilities.

Also see this means for German circumstances getting a totally new view, because usually in nature protected areas, even protected because of earth history reasons but years ago, nobody thought of getting onto the extraordinary site and inventing new presentation possibilities. No question having a metal frame with glass plates and transporting this by helicopter means new dimensions for financing this. But it shows - if the value of this heritage is clear to the population and people are aware of its extraordinary value, they are interested in keeping it.

It is a success to see that discussion and exchange of ideas work.

Just having an extraordinary and conserved object is usually not enough because a lot of people have no relationship towards earth history except those working mines in and even then their information status and understanding is limited. All founding members had already first presentations outside for visitors. Some of them focused on general understanding of geological cycles, others on details referring to the extraordinary situation. Some were already bilingual, some were produced only in native language. There are different techniques, which exist for producing information



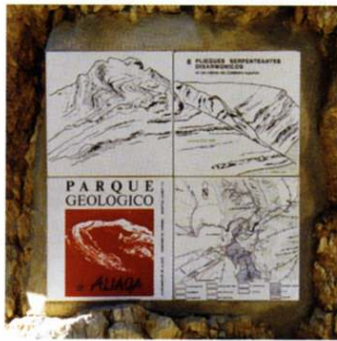
Panel - Nat. Hist. Mus. of the Lesvos Petrified Forest (GR)

PRESENTING GEOLOGICAL HERITAGE

- LOGISTICS OF GEO-TRAILS



Panel - Vulkaneifel European Geopark (D)



Panel - Maestrazgo Cultural Park (E)

It is a success to see that discussion and exchange of ideas work. The Greek colleagues realized this e.g. in developing a strategy for the new olive paths across the whole island of Lesvos as having walking trails as well as car trekking with view points as well as in the type of panels and having them bilingual. Following the idea of having outdoor-trails the necessity of management arises. In the Reserve Geologique de Haute Provence a responsible team with 4 geologists is working and giving consultancy in the field. On Lesvos (Greece) the Natural History Museum with 4 geologists, some of them seasonally employed, cares for this together with part-time employees. In the Vulkaneifel (Germany) local communities have two geologists for a geopark, geo-route and two museums of totally about 10 units existing. As the necessity of a common management has been understood for the existing geo-trails for keeping the outcrops and the panels in good condition as well as the way marking of the trails attractive, an approach to create a new common management unit was initiated and came nearly to realization. ●



Maestrazgo Cultural Park - Spain

panels to put them outside the museums aside the walking trails or close to roads. The photo series shows different types of panels, some done already before, some new. Discussion about not indicating "No Entrance" or how to avoid visitors touching and destroying conserved areas, arose already during the pre-study as well as on the bilingual necessity of panel texts for visitors. However, the situation also became obvious in different



Panel - Rés. géologique de Haute-Provence (F)

European regions, different main visitor groups exist. Therefore, different mentalities have to be taken into account for the design of the panels and leaflets prepared for them.



• *)



Willi Basalt puppet
made by Jutta Michels, Gees

not all guides are able to speak the foreign languages. Questions arose about the length of stay necessary for a valuable exchange of ideas. Because time was too short, we decided to leave this idea for a while and to look at it again in the future. So what could we do in the short time available?

HOW TO EXPLAIN GEOLOGICAL HERITAGE TO CHILDREN?

GEORIUM, LEOPOLDIA AND WILLI BASALT NEW TEACHING TOOLS

The founding members were already well advanced in developing teaching material for children before the start of the LEADER IIC initiative. However to progress these ideas the partners agreed that the best approach was to take only those parts of the various teaching programmes that they could use. This provides a good basis for partnership as it involves being critical and honest. It is important to learn about the success of various ideas but it is also useful to understand why others do not work.

The world of children is different from that of adults. It is different in the ability to observe as well as to understand and image, something that we usually forget as adults. Additionally the general public have very little knowledge of the Earth and its history and often have great difficulty in visualising the time-scales involved.

During discussions about common projects, we first thought about having an exchange of guides as all of us already offered trips for school children of different age. But School systems are different in each country, and

The following projects are done on national level and the results are being exchanged.

After having developed "Leopoldia" the small ammonite, with her friends and transferring them into present day situations, creating the GEORIUM 1996, a box system with 8 boxes 1,2 x 1,2 m size filled with moulds of typical fossils from throughout Earth history, the Geological Reserve in Haute Provence, funded by LEADER IIC, developed a teaching package in 2000 covering aspects of evolution, paleo-ecology and Earth history to be used in schools and on school trips. Spain developed teaching material that could be downloaded from the World Wide Web. Greece created new tools such as computer-based, interactive lectures for small children as well as Mini-GEORIUMs for schools that are given by the geologists of the Natural History Museum. They also offer new programmes like participating in excavation work in the Petrified Forest.

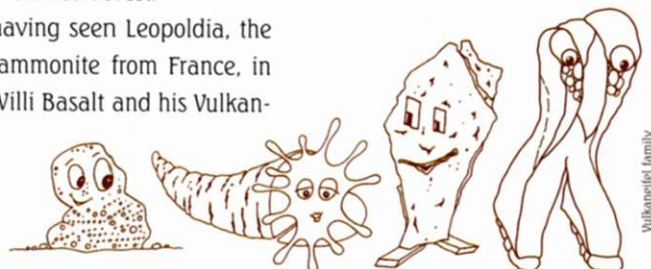
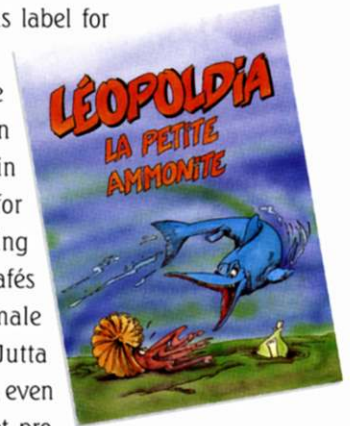
After having seen Leopoldia, the small ammonite from France, in 1994 Willi Basalt and his Vulkan-

eifel Family seemed to be an appropriate development for both kindergarten and primary school activities in Germany. The concept of this family is based on having geological names used in combination with familiar Christian names with the aim of bringing geological information to small children. As the "leading figure" Willi Basalt was chosen because of the geological heritage of the Eifel region, i.e. volcanoes. The story of the water cycle and the formation of mineral water is now told around Willi Basalt and his family. To promote this concept he was adopted as the logo for teaching trips with children as well as label for

economic products. Indeed he now appears on caps, T-shirts, in drawing book for children, drawing sheets for hotels, cafés etc. A local female puppet maker, Jutta Michels (Gees) has even produced a puppet prototype. The high quality product can be bought from her. A local trade company is producing a simpler version on a larger scale. A product explanation accompanies the puppet allowing the buyer a chance to get to know Willi Basalt, his task, his history and his function.

The exchange of information between the partners about their products was a first step - there is still a lot to do in developing good teaching tools for children.

• *)



Vulkan-eifel family



trilobite replica (D)



wax candle (D)



common postcard-set (D)



postcards with replicas (F)



crinoid replica (F)



ceramic replica (GR)

Each of the European network partners has its special focus. In developing economic products the French team of the Geological Reserve is ahead. They already started to create souvenirs together with artists e.g. ceramic pots etc. in the 1997s.

The variety of possibilities of geo-relevant, regional products was shown to the founding members in the beginning of the European project with a presentation of this kind of products in St. Benoit at the Geological Reserve of Haute Provence. The demand on this item was therefore not strong for the French team. Their focus was laid on the realization of the web site. For the Greece as well as for the German team economic products are an important sector. But how? And what to do as common economic product with all four partners together?

There have been three lines which have been developed

during the progress of the common LEADER IIC project:

- 1.) the national level with inventing, creating and producing a new geo-relevant product, finding regional companies to produce them
- 2.) the line of common "European Geopark" products of the four European partners together for the network as promotion material as well as for selling purposes (see postcard-set), and
- 3.) the line of trade, how to get the products into market together with studying the market of how to develop geotourism.

GEOPARK SOUVENIRS

Common and regional products with economic value



Willi Basalt cap (D)

Willi Basalt shirts (D)



Artist M. Husmann working on devonian replica of the Geolstein reef in his Eckfeld atelier (near Manderscheid)



postcard set (GR)



wax candle (D)
Ammonite by M. Moll
(Manderscheid)



ceramic pot (F)

Wherever the visitor goes in the "Réserve Géologique de Haute-Provence" the history of the Earth over the last 300 million years is well illustrated.

Réserve Géologique de Haute-Provence

... Europe's biggest geological open-air museum with numerous fossil-rich sites and fascinating rock formations

The geological reserve covers an area of 190,000 hectares of the southern Alps in France incorporating a total of 47 communities. It can also be regarded as Europe's biggest geological open-air museum with numerous fossil-rich sites and fascinating rock formations. The area stretches from the north of Digne-les-Bains to the Grand Canyon of Verdon in the south.

Réserve Naturelle Géologique de Haute Provence



Association pour la gestion de la Réserve géologique de Haute-Provence

Location:

Departement Haute-Provence, Digne-les-Bains, South-east of France

Publications:

Itinerary book
"Les Hautes Vallées de l'Asse"
"Par les chemins...à travers la Réserve Géologique"
Pedagogic books
Art books

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- Barbara Koziol
- Dr. Martin Koziol



Sign-posted discovery trails around the different sites can be reached from a series of interpretive centres within the reserve: The "Musée Promenade" in Digne-les-Bains, the "Terre et Temps" museum in Sisteron, the "Maison des Sirène et Siréniens" in Castellane and the "L'Atenne Temporaire" in Barles.

The "Réserve Géologique de Haute-Provence" was founded in 1979 after the plundering of the fossiliferous sites by collectors and dealers that had got out of control and threatened to destroy the sites completely. In 1984 an area of 269 hectares within the "Réserve Géologique de Haute-Provence" was designated as the "Geopark Haute-Provence." This protected area is divided into 18 nature zones. Most of them are accessible to the public.

Fossilised footprints of birds can be found in the reserve as well as fossilised plants. An extraordinary monument occurs within the attractive, wooded area of Saint Benoit two kilometres north of Digne. Here a huge rock shelf is covered with ammonites. More than 1,550 ammonites are preserved on a limestone wall 350 square metres in size.

The northern part of Digne is also the location of the administrative "Centre de Géologie" that includes exhibition rooms on the regional geology as well as libraries of both books and video tapes.

Guided tours are provided to sites where, for example, the imprint of an Ichthyosaurus can be found

while the Verdon gorge offers the opportunity to discover the beautiful landscape of Haute-Provence. Verdon is the most spectacular of the French canyons with a length of 21 kilometres and cliffs of up to 700 metres height.

Approximately 9,000 school students visit the geological reserve every year. On discovery tours and educational trips they learn about the need for, and the meaning of, geological heritage and protection. Information centres and exhibitions in Digne-les-Bains, also offer guided tours and special publications for all visitors. The museums in Digne-les-Bains, Sisteron and Castellane are opened all year round and also act as places where art and science meet. Occasionally exhibitions are organized illustrating how themes of contemporary art are influenced by the relation of the artists to the natural environment.



The "Réserve Géologique de Haute-Provence" is an association of local enterprises that work together for a systematic development of tourism in zones which have so far been ignored by the public. An example has been the establishment of footpaths in the "Haute Vallées de l'Asse", which was included in the European rural innovation programme, Leader II. ●

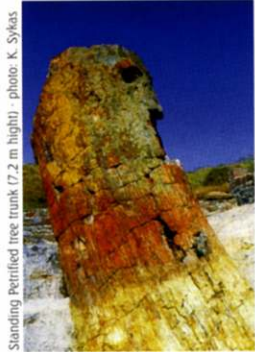
PETRIFIED FOREST OF LESVOS

The fossilised trunks of the Petrified Forest of Lesvos appear like bizarre, stiff, silent giant witnesses to a history that stretches back some 15 to 20 million years.

This unique geological monument is located on the western part of the Greek island of Lesvos and covers an area of 15,000 hectares. The most important sites are found in the vicinity of Sigrí, Eressos and Antissa.

... not only a group of ancient trees, but an entire ecosystem was fossilized in situ.

The visitor to the Petrified Forest of Lesvos will discover one of the



Standing Petrified tree trunk (7.2 m height) - photo: K. Sykias

world's most important natural heritage sites where, not only a group of ancient trees, but an entire ecosystem was fossilized in situ. Besides the many fossilised trunks found in fallen positions, a large number are found standing upright with

intact root systems proving that they were petrified in their natural position. The trees can be found scattered across the area. Some of the upright examples are more than seven metres high while some of the fallen trees are up to 20 metres long and 3 metres in diameter. The fossilised trunks have retained fine detail of their bark and interior and they reveal a great variety of colours. Branches, fruit and leaves have also been preserved.

The Lesvos Petrified Forest was created during the Miocene period when the northern Aegean Sea was characterised by intense volcanic activity. Major craters are located in central Lesvos. As a result of these volcanic eruptions, huge amounts of lava, ash and other materials were spewed into the atmosphere and covered wide areas. Heavy rainfall follo-

wing those eruptions saturated the ash and created huge mudflows of pyroclastic material. These flows moved from east to west with considerable speed and engulfed the trees of a dense, sub-tropical forest that covered the western part of Lesvos at that time.

The forest was comprised of enormous trees similar to the those of the Sequoia family found today on the North American continent as well as pines, oaks, conifers and cinnamon trees. The pyroclastic material protected the plant tissue from external conditions and the intense hydrothermal circulation of silica-rich fluids led to its perfect petrification.

Recognizing the major environmental, geological and palaeontological importance of the Petrified Forest of Lesvos, the Greek State declared the area an offici-



NATURAL HISTORY MUSEUM PETRIFIED FOREST OF LESVOS

Location:
Sigrí, Lesvos Island, Greece

Publications:
1999: The Roads of Water
2000: The Petrified Forest of Lesvos
Guide to the Lesvos Petrified Forest Park
Watermills of Lesvos
Sequoia (magazine)

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www.petrifiedforest.gr



Standing Petrified tree trunk (4m height) - photo: K. Sykias



Guidance - photo: N. Zouros

ally "Protected Natural Monument" in 1985. Within the forest specific sites have been further designated as "absolute protection areas". Thousands of tourists that come every year can see for themselves the fossilised trunks of the Lesvos Petrified Forest including those at the Sigrí Geopark and on the isle of Nisiopi. In 1994 the Natural History Museum was founded in the town of Sigrí with aim of studying, researching, conserving, protecting and developing the sustainable use of the area.

The Petrified Forest of Lesvos Geopark works together with university departments from Greece and abroad. It is also continually updated with the latest research in related areas such as paleontology, mineralogy and geomorphology. The Natural History Museum collaborates with local enterprises by creating publications and other products related to the Lesvos Petrified Forest. As a result of the activities tourism has grown strongly in western Lesvos and new jobs connected with geological tourism have become established. ●

- Barbara Koziol
- Dr. Martin Koziol

MAESTRAZGO CULTURAL PARK



Limestone layers



Palaeontological Parc of Galve

The "Parque cultural del Maestrazgo", covers an area of 270,000 ha and lies between Zaragoza and Teruel in the catchment of the Rio de Guadalope. The area belongs to the Cordillera, a dry mountain land characterised by hot summers and cold winters and with deeply-incised yellow-brown valleys. The area lies in the former kingdom of Aragón and in the Middle Ages it was named "Maestrazgo" by the "maestres.", a military order which administered this region. There are six centres within the Park: the Geological Park in Aliaga, the History Museum in Mas de als Matas, the Cultural Park of Molinos, the Centre for Science of Environment in Villarluengo, the Palaeontological Park in Galve and finally the Sculpture Park in Hinojosa de Jarque.

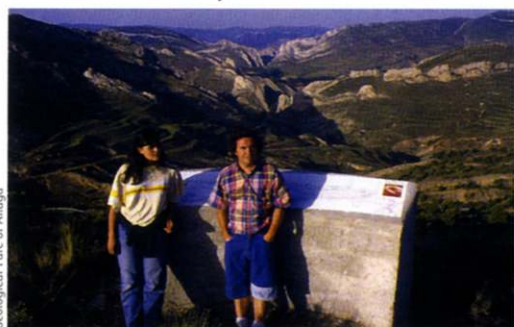
retreated and rivers deposited sediment here. 65 million years ago during the formation and folding of the Pyrenees a geological saddle, or anticline, orientated approximately north-south, was formed. Subsequently a geological depression, or syncline, running nearly towards east-west was created. After that the Guadalope river and its tributaries cut deep into these structures. Harder rocks like limestone, dolomite and conglomerates were resistant to erosion and are now preserved as mountain ridges and cliffs. Those parts of the landscape underlain by clay, marl and sandstones were more easily eroded and now account for the more gentle slopes of the area.

The geological and natural heritage of the region will be deve-

loped in the Geological Park of Aliaga by using an educational path with eleven special points, where ceramic boards with drawings and text explain the facts to interested amateurs, pupils, students or scientists. In the Palaeontological Park of Galve, fossils and printings of dinosaurs, as well as life-sized replicas, can be examined at in awe.

... the Geological and Palaeontological Park are known all the world over even under specialists and scientists ...

As a result of these projects the Geological and Palaeontological Park are now known all the world including specialists and scientists who regularly visit that region. LEADER made it possible to open a camping site and several guest houses and restaurants in Aliaga. A larger museum together with a youth hostel is under construction and in Aliaga a museum with a school is planned. The aim is to increase the provision of overnight accommodation which has been sparse until now. Finally, the entire project will benefit from the local administration's, "Dinopolis-Project" which should aims to promote the geological and palaeontological heritage of the region. The first example of this is a spectacular museum in Teruel, 40 kilometers from Galve, which has already recorded 40,000 visitors during the summer of 2001.●



Geological Parc of Aliaga

The little village of Aliaga, 50km north-east of the town of Teruel, is interesting because it lies at the nodal point of two geological folds that followed one another. In the Mesozoic, 220 - 65 million years ago, an embayment of a warm sea periodically covered this area. During these times the bottom of the sea was colonized by corals and other invertebrate animals. At other times, the sea



Location:
north-east Spain,
Iberian Mountains,
between Zaragoza and Teruel

Publications:
Leaflets on Molinos Parc Cultural
Pueblo Magico
Book: Guia del Parque Geologico
de Aliaga (J.L. SIMON, 1998)
Postcards-Set Palaeontological

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● Robert van der Veen

When the first earth scientists explored the Volcanic Eifel in the 19th century, they discovered a unique landscape full of natural beauty and geological treasures.

The rolling countryside of the West Eifel Volcanic Field or "Vulkaneifel" is located in the Southwest of Germany. Roughly 400 Million years old, the landscape covers an area of about 130.000 hectares. An extraordinary volcanic activity has created about 67 huge craters - the so-called maars - when rising magma made explosive contact with surface and ground water. 8 of these maar lakes, in the vicinity of Daun, are still filled with water: the "Eyes of the Eifel", as people call them today.

In terms of earth history, this volcanism is merely taking a nap. Though some of the oldest volcanoes date back 45 million years,



Vulkankarten Steffeln - photo: M. Bahrbrand

the youngest maar in Ulmen erupted just yesterday - about 11,000 years ago. Still, the most recent seismological study - the "Eifel Plume Project" - reports that volcanism will probably remain inactive for the next 5-10,000 years. Enough time for everybody who wants to explore this landscape of maars, craters on top of volcanic cones, tuff rings and a diversity of bizarre dolomitic rock cliffs. The variety of phenomena ranges from antidune structures and channels in the surroundings of Vulcano Garden Steffeln to solid lava lake fillings like those ones found near Gerolstein.



Dauner Maar - photo: K. Maas

A land of discovery:
**VULKANEIFEL
EUROPEAN
GEO PARK**



Papenkaule - photo: G. Klaren

Other highlights include fossils like the sensational discovery of the "Eckfeld Horse", a pre-horse skeleton bearing a foetus, from the Eckfeld Maar near the town of Manderscheid. In Triassic sediments the only known early dinosaur species in the Eifel has been found close to Hillesheim. Other discoveries include a variety of trilobite species in the southern Gerolstein reef.

Man's settlement has led to an intensive use of this region ever since the Romans came. One of the roads they paved can be found close to Kelberg. The Romans already used iron ores - in Germany this industry has its origin in the Eifel region. The cultural development was supported also by Man's most important resource: water. Until today, the volcanic past of the region produces mineral water, well known for its special taste and specific ingredients. Companies in Gerolstein, Dreis, Daun and other places produce millions of bottles fil-

led with sparkling water for a worldwide market.

The geological heritage has also led to a successful new kind of tourism. Communities all over the region have established geotrails providing lots of insight for visitors. Several museums directly public awareness towards all the geological and paleontological treasures of the region. People learn about the unique phenomena of volcanism and time dimension to understand earth sciences and processes on our planet by spectacular simulation shows, audiovisual presentation and examples of geological correlations.

Educational programs for families with children, for schools and other groups have been introduced successfully. In- and outdoor observations enable visitors to understand more about the geological heritage and all the other Geopark's treasures. ●



Hinkelstaar - photo: M. Kozioł



Location:
Southwest of Germany

Publications:
GeoLife Vulkaneifel Magazine
Geo-Infoband Vulkaneifel
several booklets, guides, reports on trails, museums, fossils
Geopark souvenirs: candles, postcard sets, fossil replica

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www.vulkaneifel-european-geopark.de

• Fritz-Peter Linden

ASTROBLÈME ROCHECHOUART- CHASSENON

*... 13km³ of rock got pulverized
or simply vaporized at the
moment of meteorite impact.*

Situated in west-central France, near the town Rochechouart and the village of Chassenon, the astroblème Rochechouart-Chassenon is the only meteorite crater in France. The astroblème is approximately 200 million years old, 1.5 kilometers wide, up to 5 kilometers deep and was created as 13km³ of rock got pulverized or simply vaporized at the moment of meteorite impact. An additional 66km³ of rock, across an area nearly 500km in radius, was melted to create a breccia of granite and gneiss where the clasts range from a few millimeters across up to several meters across and occur in a natural matrix riddled with gas bubbles. Following the impact the sea flooded the Rochechouart-Chassenon area. On the sea floor



layers of chalk and clay were deposited. Gradually, the seas regressed and the area once again became exposed as land. The erosive powers of both water and wind polished away the remaining crater walls. Many million of years later, Man used the breccias as construction materials.

At Rochechouart-Chassenon it is possible to observe the point of contact between the crystalline basement and impact melts as well as the entire sequence of shock-metamorphism.

The area of the impact crater is divided into three zones. The central zone contains 9 places that are accessible to the public and contain interesting, partially preserved geological exposures. These sites are quarries, rock formations, castles and hills and are also important for other sciences as well as for education and tourism. The exterior zone is an area where, uniquely in the world, many buildings, such as monuments including Gallic-Roman remains, are constructed of materials formed by the meteorite impact.

The Association Pierre de Lune, founded in 1993, was ordered to investigate the possible creation of a geological reserve that would be established under French Law. The aim was to obtain appropriate legal protection of the geological and natural heritage of the area against mali-

cious damage by visitors whether inadvertently or through the commercial collection of rock and minerals. The Association in cooperation with French universities is encouraging scientific research and educational programs at Rochechouart-Chassenon with the aim of developing meteorite-impact research study programmes. The Association is also working on ways to facilitate the work of scientists by finding them accommodation and field-laboratories when they do field work, as well as facilitating access to areas of scientific interest. Furthermore, the Association wants to create a prize in recognition of the best scientific meteorite-impact study at Rochechouart-Chassenon. It will also take part in school programmes covering all age groups.

The development of a Geo-Tourism is another objective of the Association because the central area of Rochechouart, covering 88,000 ha, is featureless and sparsely populated. Local and regional authorities are planning the construction of a museum, though presently the exhibition "Espace Meteorite Paul Pellas" in Rochechouart acts as a useful visitor and information-center. ●



Association
Pierre de Lune

Location: Département Charente
et Haute-Vienne

Publications:

« Les structures d'impact météoritique – un exemple en France Rochechouart-Chassenon, Claude Marchat, 1996 (french)

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Pipes of Baldbh - photo: Terry Murpy, Waterford

to promote eco-tourism and particular geological tourism with the aim of preserving the largely agricultural and traditional character of the area.

COPPER COAST TOURISM

The Copper Coast is located in southern Ireland between Fenor to Stradbally with a coastal strip between Cove and Tramore in the east to Clonea in the west.



Fenor Bog - photo: Terry Murpy, Waterford



lanarkstone engine house photo: Terry Murpy, Waterford

The coastal cliffs expose a spectacular cross-section through mudstones of Ordovician age (505 - 438 million years ago). They are intruded by volcanic rocks including andesite ("the Bunmahon Volcano") and rhyolite ("the Kilfarrasy Volcano"). Most of the resultant complex of dykes, sills and pyroclastics is exposed through selective erosion and is readily accessible. As a result the section is not only frequently visited by students of geology, but the scenery also attracts the more casual visitor. These Ordovician rocks are overlain by red sandstones of Devonian age (408-380 million years ago). The geological section is very fossiliferous and includes fossil-rich layers of Carboniferous age (380-290 million years ago). All these rocks are readily accessible and clearly exposed.



photo: Terry Murpy, Waterford

The Copper Coast has three protected sites of special geological interest plus several copper and lead/silver-rich veins. In 1997 five community groups came together and established a joint

committee to look at the question of tourism development. The Copper Coast committee decided that they did not want mass tourism but instead to promote eco-tourism and particular geological tourism with the aim of preserving the largely agricultural and traditional character of the area. The traditional character of the Copper Coast is typified by the preservation of many characteristics: old hedgerows are still in place and play host to a wide variety of fauna and flora. The unpolluted sea has its own diversity of wild life and supports a flourishing seabirds population.

With the help of Leader II a geological garden has been built along with a Heritage Centre (which includes a simulated mine as well as a mineral collection and articles on mine history), a mining trail has been established and some restoration work has been carried out on the old engine houses. Hiking trails have been developed together with information sheets and plaques. It is intended to run Summer Courses for adults and teenagers that will include geological interpretation as an aspect of local tourism. In the process it is

also intended to research and produce general field guides and specialist handbooks for particular locations and rock types. The Copper Coast is also hoping for an exchange of geological students.

Until now the work has been carried out by the local voluntary Copper Coast Tourism committee. As part of the European Geopark Network, the next step is to set up a Limited Company, which would invest in future development and employ an administrator with staff. ●

COPPER COAST
TOURISM



Copper Coast Tourism

Voluntary group

Location:

From Fenor to Stradbally

Publications:

Five walk pamphlets, a set of three geological pamphlets, various brochures and a History of Bunmahon mines

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ktoebbe@eircom.net

• Karen Többe

MARBLE ARCH CAVES



Cuilcagh Mountain

AND CUILCAGH MOUNTAIN PARK

the leading geological tourism projects in the region ...



Boat for



School group on Ulst. Pavement

Marble Arch Caves and Cuilcagh Mountain Park, are the leading geological tourism projects in the region and both are managed as one unit by Fermanagh District Council. They are located on the sedimentary Carboniferous rocks of south-west Northern Ireland close to the border with the Republic of Ireland.

The distinctive sandstone summit ridge of Cuilcagh Mountain dominates the area. Below the summit ridge are boulder fields while the middle slopes support one of Ireland's best preserved blanket bogs. Bog covers the northern sandstone and shale slopes before yielding to the most extensive area of karst in Northern Ireland.

The limestone contains important sites such as Marble Arch Caves, one of the most notable Irish caves. The cave has well-developed main stream passages formed by three rivers that rise on the bog and sink in the massively bedded limestone. The sinks are impressive earth science features as one river disappears into the gaping Pollasumera cave, another flows through the glacial melt water channel of Monastir Gorge to sink below cliffs and the third has an intermittent dry bed. The rivers unite in Marble Arch Caves before the combined flow emerges as the Cladagh River at

one of Ireland's largest resurgences beside the famous Marble Arch, a remnant cave passage. The Cladagh Glen is a National Nature Reserve and is one of the last Irish remnants of damp ash woodland.

The United Kingdom has designated the Cuilcagh bog an Area of Special Scientific Interest and an Environmentally Sensitive Area. The British and Irish government have designated the blanket bog as a cross-border candidate Special Area of Conservation (cSAC) creating excellent potential for an international European Geopark in the future.

Fermanagh District Council have developed Cuilcagh Mountain Park to conserve an internationally important area of active blanket bog and to increase public awareness of related Earth Science and environmental

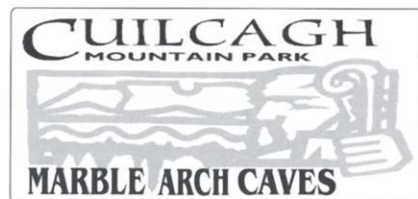


The Marble Arch

issues. The Geopark is twinned with a Scottish bog conservation project operated by the Royal Society for the Protection of Birds. Extensive research has been carried out into the earth science and biodiversity.

Limestone and bogland field study programmes attract 10,000 school children each year. The Cuilcagh Mountain Park interpretative centre is included within the visitor centre for Marble Arch Caves. The visitor centre facilities include an audio visual theatre, exhibition area, classroom, restaurant, shop, car park, toilets and adjacent woodland nature reserve. Guided tours of the caves operate every day from March to September in 15 minute intervals.

The Geopark creates important economic benefits including 50 directly linked jobs and annually draws up to 50,000 visitors and as such generates significant tourism revenue within the regional economy. ●



Fermanagh District Council

Location: south-west Northern Ireland

Publications: Several scientific papers; publicity brochures, environmental educational brochures

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• Richard Watson

NATURPARK NÖRDLICHER TEUTOBURGER WALD WIEHENGEBIRGE



Carbon quarry

What is so special about this landscape in relation to the preservation of Europe's geological heritage? This area documents, almost without interruption, the period of Earth history from the Carboniferous period, about 300 million years ago, to the present day. This huge time-span can be investigated, reconstructed and explained to visitors in a popular, non-scientific way by examining an enormous variety of different sedimentary rocks, all of which are accessible in either natural or artificial openings. One example of an impressive exposure of Carboniferous rock, is the quartzite-quarry of "Piesberg," north of Osnabrück. Here it is possible to visit an industrial heritage museum together with an accessible black coal adit from the 19th century

The footprint-quarry is the most important Geosite of the Nature Park.

The dinosaur-footprints of Barkhausen in the "Wiehengebirge," produced by a total eleven dinosaurs representing two different species, occur in rocks of Upper Jurassic age and are, in this respect, unique in Europe. The footprint-quarry is the most important geological site of the



Dinosaur footprints

Nature Park. The rocks of Dören- the expose rocks of Lower Cretaceous age. This naturally occurring exposure us also a tourism highlight in the western part of the Nature Park. The "Sea of Rocks" on the "Gattberg," including the so-called "butterstone," (a huge erratic block), provides the visitor with a sense of the enormous power of the glaciers and ice sheets that once moved through the Nature Park.

The "Soil-Experience Park" is an exhibition and activity facility covering 2 hectares where visitors are given a geological overview by the Nature Park team and where educational programmes for schools are offered.

Because of it's geological importance, the Nature Park has been well mapped and documented. The park is a popular field destination for scientists from all over Germany and the Netherlands. An on-going registration of geological sites will complete the listing of the area's geological heritage. The main target of future Geopark activities will be to protect the various geological sites as well as to increase public relation activities that will provide visitors, as well as local people, with a better understanding of our geological heritage. The extension and development of dinosaur footprints site by the creation of an open air museum in 1999 was one important step in this direction. This measure was useful not only for the protection of the footprints but also



Dinosaur exhibition

for helping to interpret the scientific facts behind the site for the general public.

Tourism activities such as thematic cycle-routes, action-tours for groups and thematic maps are provided by the Nature Park administrative team itself at this moment.

In order to bring geoscience to an increasing number of people, themes such as mining history, the use of mineral resources as well as archaeology will also become integrated within tourism activities. Since 1998 cooperation with regions in the Netherlands has been developed, focussing on the shared history of the mid-Triassic period and the Ice Age. ●



Location:

Northwestern Germany, across the mountain ridges of "Teutoburger Wald", "Wiehengebirge" and the Ankum-Bippen-Hills

Publications:

Various brochures,
8 walk pamphlets

Contact:

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Sunken reef in Mediterranean Sea

PARK NATURAL CABO DE GATA-NÍJAR

... one of the best-preserved and least developed parts of the Spanish coast.

The "Parque Natural Martimo" is situated thirty kilometers east of the Mediterranean town Almeria, Terrestre de Cabo de Gata-Níjar. Founded in 1987 and created a UNESCO Biosphere-Reservation in 1997, 38.000 ha of the Park is higher than 563 m above mean sea level while 12.000 ha are up to 60 m below mean sea level.

The Park is of great scientific and educational importance and belongs to the very rare European semi-desert zone, the 50 km long coastline is one of the best-preserved and least developed parts of the Spanish coast.

...the Sierra Nevada was a tropical island and surrounded by coral reefs.

Approximately 8 million years ago (Middle Miocene), the Sierra Nevada was a tropical island and surrounded by coral reefs. The connection between the Mediterranean Sea and the Atlantic Ocean was not via the Straits of Gibraltar but was located further south in Morocco. Rivers from the Sierra Nevada built out layers of sand and marl in front of the original coastline. The area was

also seismically active due to its position at a plate boundary with earthquakes setting off turbidity currents, "Turbiditas", where jumbled masses of sediment would flow into deeper water before eventually settling from suspension during periods of quiescence. Lava flows were discharged from submarine volcanoes. Today these lavas form red, ochre and black basalt columns. Subsequently this region was raised and the coastal mountains of the Sierra Alhamilla were created. The Turbiditas became dry and petrified coral reefs, torrential downpours eroded deep into the sediments forming talus-fans and the desert, the "Desierto de Tabernas" was created in a depression between the Sierra Nevada and the Sierra Alhamilla. In spite of the arid and poor soils, the Park is host to a rich flora and that is adapted to the dry conditions.

The Park is threatened by construction projects and greenhouse-based agriculture due to the expansion of the town of Almeria. The permanent establishment of the Park may help prevent this. At present the evaluation of the geo-resources outside the village Rodalquilar, with its mining heritage, is less developed. In June 2000 educational tours were organized for people from a nature conservation and social-economic background. Spanish and foreign geology students carried out field work here also. It is planned to offer thematic, circular tours in the cooler condi-



Lookout above the "sunken reef"



Volcanic rocks at the shore

tions of the early and late tourist-season. At the moment there are 14 places in the Park where buildings, dating before the establishment of the Park, could be used to house information boards explaining the geology of the area. These boards could also act as useful tools for visiting school parties. Finally, the Park Administration plans to re-open old mining footpaths, which connected the closed gold-mines of Rodalquilar, as educational paths for visitors. ●



tafoni erosion



PARQUE NATURAL
Cabo de Gata-Níjar

Location:
southern Spain, east of Almeria

Publications:
multilingual Leaflets on the geological history of the parc, biosphere reserve poster-series

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Almeria
Tel. +34-950-389742

• Robert van der Veen



Aidoneochori "Sculpture of Nature" - photo: C. Fassoulas



Pothole - photo: C. Fassoulas

Crete is famous not only for its antiquities and ancient civilizations, but also for its fascinating geology. An outstanding area is the Psiloritis Natural Park, located in Central Crete, covering the Psiloritis mountain chain and the northern hills. It encloses the main part of the Rethimno district as well as the western part of Iraklion and offers a lot of touristic destinations.

All kinds of geological structures can be studied in detail.

Within this Geopark the whole nappe pile of Crete and the majority of the island's rock types are preserved in excellent outcrops



AKOMM-Psiloritis S.A.
Location: Central Crete, Greece
Publications:
 Field guide to the Geology of Crete, 2001. C. Fassoulas.
 Natural History Museum of Crete, University of Crete.
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 Dimitrios Patakos, Director
 AKOMM-Psiloritis S.A., Anogia Mylopotamou, 74051, Greece
 Tel. 0030 8 3431402
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 Dr Charalampos Fassoulas
 Natural History Museum, University of Crete, Heraklion 71409, Greece.
 Tel: 0030 8 1393277
 E-Mail: fassoulas@nhmc.uoc.gr

and sections. All kinds of geological structures can be studied in detail. Colourful rocks, numerous beautiful caves, impressive gorges hosting many of the island's endemic species and geomorphological structures characterise the landscape.

The Psiloritis itself, attaining 2456 metre, is also the highest mountain on the island. Of great scientific value are the Nida plateau and the Damasta sections for the unique appearance of the detachment fault that has brought to the surface the deep buried rocks of the Psiloritis Mountains. The Basin to Range Park located at the eastern slopes of Psiloritis provides the opportunity to study the development of the Neogene basins of Crete in respect to the high mountains.

Many universities from all over the world have chosen these areas for their field studies because, along with the other geological sites, they are ideal for any educational activity related to weathering processes, tectonic activity, petrology and landscape development. Furthermore several sites are considered unique due to their appearance and degree of preservation, for example the Fodele area where "high pressure fossils" are perfectly preserved within metamorphic rocks. And one of the most important archeological sites is the Ideon Andron cave where Zeus, the king of the ancient Greek gods, is believed to have grown up.

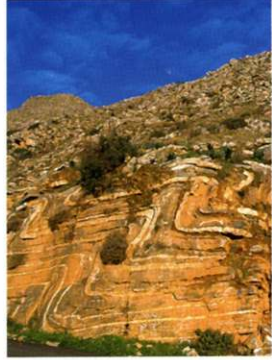
Zeus, the king of the ancient Greek gods, is believed to have grown up there.

**PSILORITIS
NATURAL PARK
CRETE**

The designation of the Psiloritis Natural Park as a European Geopark provides an opportunity to get support from the government and local authorities to protect as many of the geological attractions of the area as possible.

AKOMM-Psiloritis S.A., a development association founded in 1988, is responsible for the management of the Geopark and is scientifically supported by the Natural History Museum of the University of Crete in Iraklion. All the geological sites have been recorded in databases and have been studied with regard to their scientific value. Information boards have been designed for most of the monuments and leaflets, cards, calendars and books have been produced. Several projects to develop activities such as eco- and agro-tourism or speleology as well as educational programs have been established. Many local enterprises founded during the Leader I and II initiatives in the area provide support for these projects. Furthermore a number of educational and research programmes have been ongoing for several years between the Natural History Museum of Crete and the Natural History Museum of the Lesvos Petrified Forest. ●

- Barbara Koziol
- Dr. Martin Koziol



Vossakos, Talea of mts. - photo: C. Fassoulas

IN DIALOG WITH ECONOMY

**Interview with E. Perimenis,
Manager of ETAL, Greece**

What did you think about the project, when you got into contact with it - from the economic point of view?

E.P.: I believe we should break down a little the term "economic point of view" and examine the broader context of the project.

Our company, ETAL S.A. has been - since it was founded - constantly oriented towards the idea of acting as a "LOCAL ACTION GROUP", that is an organization aiming to enhance and integrate new ideas for sustainable development with the active participation of the local inhabitants of Rural Lesvos.

We are blessed in Lesvos to have a unique in the world monument of nature, the Petrified Forest, a heritage that is exceptionally well handled by the Natural History Museum of Lesvos - Sigri. This has been the context within we first got into contact with the LEADER IIC initiative concerning the current transnational co-operation, "Development of Geotourism in Europe". This co-operation for us is part of a larger project for Lesvos of about 3 million Euros. The IIC part of our project in co-operation with the Natural History Museum is of a budget of about 100 thousand Euros. The novelty we try together is to attempt to change the mentality and enhance specialized tourism. We aim not to "expose" the geological sites to the world so that they will just come to see a peculiar natural phenomenon, for us economic benefits should arise from the involvement of the local inhabitants. An example is the Women agricultural cooperative

of Mesagros, a cooperative that produces local products of high quality that are associated with the site itself, i.e. local ceramics of the shape of the petrified samples, local sweets with labels that relate the petrified cinnamon leaves and the cinnamon used in them etc. This involvement alongside with the scientific work and care of the museum can be interrelated and promote economic benefits for both. The local people and the site, which will be viewed as part of their life. Tourists that will visit the site and at the same time the sites of the other members of the network will get a clear idea of the Geological History of diverse regions in Europe and the world and at the same time they will be able to see the current social and economic life in these areas. **We must always bear in mind that our rocks and your volcanoes or fossils or ammonites "speak" the same "language", they where there a long time ago, they are there now and they should be there in the future, we are the ones that come and go and we should respect this fact.**

Does the support of the European Geoparks network project give an impact to your own work?

E.P.: Of course, for us it is a vivid example of a good co-operation. The common work gives us the opportunity to generate ideas and try to implement them in several other aspects of our own work. At the same time we consider ourselves part of a larger group and we expect to be able to assist and be assisted in other activities with which we are involved, i.e. employment issues, quality of life, capture etc. An example can be the idea that recently has been just discussed - and that on our behalf we need to look for its feasibility - to culturally get the European Geoparks

Network involved into the great gathering of the World during the return of the OLYMPIC GAMES in Greece, their homeland in 2004.

What do you think were weak points from economic and administrative point of view and need to be changed for further common European co-operation?

E.P.: Well, my point of view might differ from others, but still I feel happy I can freely express it. We very often all suffer from "Red Tape" procedures and bureaucracy in our administrations and local political authorities. Never the less **we need to show to all the authorities involved that we can work as a team, we can by-pass or solve problems and "smoothen ankles"**. I personally believe, we need to create a system of co-operation that will be much closer.

Do you see future projects for this network where European financial support could promote geological heritage ideas?

E.P.: Concluding, I believe that it is very important to promote the work already done and take it even further. It is important to evaluate the results in respect with the targets set at the beginning of this project and create a form of communication that can persuade the European authorities. **We can make a difference! We can make geological heritage a great tool for sustainable, local development.**

The financial tools and means exist. We are the ones that have to work now so that we will be able to promote what we believe and by now so well can be beneficial for our heritage and areas. On the behalf of ETAL S.A., at least LEADER PLUS will be a tool we will try hard to be again a lever for the further development of the "European Geoparks Network". ●



E. Perimenis, Manager of ETAL, Greece

CHARTER

A EUROPEAN GEOPARK

A European Geopark is a territory, which includes a particular geological heritage and a sustainable territorial development strategy supported by a European program 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.

The sites in European Geopark must be linked in a network and benefit from protection and management measures. No destruction or sale of geological objects from European Geopark may be tolerated. The European Geopark must be managed by a clearly defined structure able to enforce protection, enhancement and sustainable development policies within its territory.

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 reappropriate the values of the territory's heritage and actively participate in the territory's cultural revitalization as a whole.

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

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.

A European Geopark must work within the European Geopark Network to further the network's contraction 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.

Obtaining the European Geopark label

All requests for labialisation must be accompanied by a dossier, prepared on the model of the application dossier for nomination as a "European Geopark". This application dossier must be completed and submitted by the structure in charge of managing the territory where the Geopark is to be located. This application dossier must be sent directly to the Coordination Unit:

Cellule de coordination du reseau des Geoparks europeens,
Reserve Geologique de Haute-Provence, BP 156, F-04005 Digne-les-Bains Cedex
Tel.: +33 (0) 492 36 70 72, Fax: +33 (0) 492 36 70 71, E-Mail: contact@europeangeoparks.org

The European Geoparks Network Coordination Unit has formed an Expert Committee made up of specialists in sustainable development and the enhancement of the geological heritage from the zones having initiated this program and representatives of international structures working in the area of enhancement of the geological heritage. This Expert Committee gives advice for all decisions regarding the nomination and integration of new zones within the network.



with the auspices of:

