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**Sustainability through Knowledge – Communicating Geoparks**

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Under the auspices of:



**Gea Norvegica Geopark**

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Under the auspices of



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This list is organized after year of admittance and is updated pr October 2010.

The first four geoparks are the funding members.

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3. Petrified Forest of Lesvos – GREECE
4. Maestrazgo Cultural Park – Aragon, SPAIN
5. Psiloritis Nature Park – GREECE
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10. Rocca di Cerere - ITALY
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17. Geopark Harz Braunschweiger Land Ostfalen Geopark – GERMANY
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26. Gea Norvegica – NORWAY
27. Geological, Mining Park of Sardinia – ITALY
28. Papuk Geopark - CROATIA
29. Lochaber Geopark – SCOTLAND, UK
30. English Riviera Geopark – ENGLAND, UK
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39. Parco Nazionale del Cilento e Vallo di Diano, Campania - ITALY
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## **EUROPEAN GEOPARKS CONFERENCES AND OTHER MILESTONES**

- **FOUNDING MEETING OF THE EUROPEAN GEOPARKS NETWORK** (June 2000). Lesvos (Greece)
- **1<sup>st</sup> European Geoparks Conference** (October 2000). Maestrazgo Cultural Park (Spain)
- **SIGNATURE of the CONVENTION of COOPERATION between UNESCO and the EUROPEAN GEOPARKS NETWORK** (April 2001). Parc Cabo de Gata, Spain
- **2<sup>nd</sup> European Geoparks Conference** (October 2001). Lesvos, Greece
- **3<sup>rd</sup> European Geoparks Conference** (October 2002). Kamptal Geopark, Austria
- **4<sup>th</sup> European Geoparks Conference** (October 2003). Psiloritis Geopark , Greece
- **ESTABLISHMENT of the GLOBAL GEOPARKS NETWORK** (February 2004). Paris, France
- **Madonie Declaration** - Cooperation agreement between UNESCO and the EUROPEAN GEOPARKS NETWORK (October 2004). Madonie Geopark, Italy
- **5<sup>th</sup> European Geoparks Conference** (October 2004). Madonie Geopark, Italy
- **6<sup>th</sup> European Geoparks Conference** (October 2005). Lesvos Petrified Forest Geopark, Greece
- **2<sup>nd</sup> International Conference on Geoparks** (September 2006). Belfast, Northern Ireland
- **7<sup>th</sup> European Geoparks Conference** (September 2007). Northwest Highlands Geopark, Scotland UK
- **3<sup>rd</sup> International Conference on Geoparks** (June 2008). Terra Vita Geopark ,Germany
- **8<sup>th</sup> European Geoparks Conference** (September 2009). Naturtejo Geopark, Portugal
- **4<sup>th</sup> International Conference on Geoparks** (April 2010). Langkawi , Malaysia
- **9<sup>th</sup> European Geoparks Conference – 10<sup>th</sup> Anniversary of EGN** (September 2010). Lesvos Petrified Forest Geopark, Greece
- **10<sup>th</sup> European Geoparks Conference** (September 2011). Gea Norvegica Geopark, Norway



# Keynote presentations



# Pollution of geological heritage - how to reduce the damage

**Sven Dahlgren**

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In the late summer of 2009, the night between July 31<sup>st</sup> and August 1<sup>st</sup> Southern Norway experienced an unusually heavy summer storm. During this storm the ship "Full City" was wrecked off the coast and stranded on one of the islets at the coast of Bamble in Gea Norvegica Geopark. A large oil spill was an immediate result, and the oil was a refined oil of a very heavy type. The wind and waves broke up the large oil spill sheet which was floating on sea water into several smaller, but still quite large, heavy-oil sheets. During the first night some of these sheets reached land at Krogshavn and Steinvika near Langesund, and somewhat later at Mølen and Oddane in Brunlanes. The remaining heavy oil sheet fragments floated offshore upward along the coast. As the wind calmed, the various oil sheet fragments were carried back downward along the coast again due to the southwestwardly moving sea currents in this region. Renewed strong wind, however, this time from the southeast, blew these free floating oil sheets on shore at different localities. Thus many places along the coast of Gea Norvegica Geopark became heavily polluted by oil.

Heavily oil-polluted birds, plants and beaches were shown on TV and in the newspapers, and the catastrophe was evident to everybody. A big operation involving a great number of professionals and volunteers started to remove the oil. Soon it was clear that this job would take months or years, or perhaps never be possible to finish. After a few days the "free" oil sheets trapped in the inlets and beaches had been collected and the cleaning of the shoreline, in practice the geological material, could start. Soon it became clear that a detailed geological knowledge of the area was needed and that was the reason why I was involved. Cleaning of the heavily polluted porous and fragile Ordovician limestones with protected fossil localities at Langesund, and the cobble-beaches of Mølen needed careful but efficient cleaning procedures. The goal was to clean the rocks, cobbles and gravels without damaging fragile fossils and delicate ice scoured surfaces. The use of chemicals dangerous to the environment was banned.

After a couple weeks simple renovation procedures, especially worked out for each of the different geotopes, had been established. These procedures were based on the use of environmental friendly bark and turf, high-pressure steaming and an excavator equipped with a sieve tumbler. Very efficient help from the local bacteria populations and natural geological beach processes was also essential. But a lot of manpower was needed: Hundreds of dedicated volunteers led by numerous professionals were working massively with oil removal every day from August till December 2009 when the snow and ice made further work impossible. In the spring of 2010 the work was continued and was not completed until late that year.

The bark and turf absorbed relatively easily oil from the oil covered rock cliffs and rock boulders, and the turf and bark was collected and shipped away for destruction. The high pressure steam cleaner was used only on smooth rock surfaces being tough enough to resist the heat and pressure. The gravel and cobble beaches were heavily polluted down to at least one meter depth and the cleaning obviously was a challenge. Here scoops of gravel were taken with the 14 tons excavator and mixed with bark / turf and then tumbled for a few minutes. Then the gravel was virtually free for oil since it had stuck to the bark / turf. But how could we easily and environmental-friendly separate the gravel from the oily bark / turf? We simply dumped the mixture into the sea and the waves finished the job: The gravel was thrown back up on shore and the bark / turf floated away! Easy! And efficient! But what about the oil? Oil is a natural substance and some bacteria types just love to eat it. The

removed oil formed a thin cover on the bark and turf particles, and then enormously large areas of thin oil surfaces became easily available for the bacteria to attack. We believe that it has all been eaten by now!

Today the shoreline of Gea Norvegica Geopark is virtually free for oil pollution. At an economically very high cost and because of many thousands day's work though. A couple small areas have been left polluted to serve as natural laboratories to see how long time, if ever, nature will need to clean up this itself.

# Geoconservation strategies. An European perspective based on new legislation in Norway.

Lars Erikstad

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Geoconservation has a long history. Evaluation of geological heritage and protection of geosites are well developed in many countries. Different aspects of geoheritage spans from the international level of World Heritage via the national level of site selection to the local level of the everyday landscape. All these levels need their own geoconservation strategy.

Value criteria have traditionally been developed for selection of sites on a national/international level. In the everyday landscape, this produce a problem, as most sites and features tend to produce a low value score. As a result the everyday landscape will systematically experience a loss of geodiversity that will affect the nature character.

One of the main practical trends over the last years has been integration in nature management via concepts such as geodiversity. This is seen in practical legislation in Norway. The new IUCN interest and acceptance of geoconservation belong to this trend, but is contradicted by the formal suggestion in EU to include geoconservation in the soil strategy rather than integrated in the habitat directive.

The Norwegian legislation states its aim as, *by nature conservation and sustainable use, that the nature with its biological, landscape and geological diversity and ecological processes can be preserved for the future*. Geological sites are specifically mentioned as basis for protected areas. One major new feature is management rules of nature types. The term “nature type” basically is the same as “habitat” in an EU-context, but as the aim with the legislation is wider, the neutral terms nature type and nature diversity are used rather than habitat and biological diversity.

The Norwegian Biodiversity information Centre ([www.biodiversity.no](http://www.biodiversity.no)) has worked out a new classification of Nature types for Norway for facilitate the new legislation. The new classification system is divided into a set of classifications on different scales (substrate, nature systems, landscape parts and landscapes). The system reflects a higher degree of integration of geological and ecological features. The nature types make the foundation of definitions of selected, vulnerable or threatened nature types which calls for special action in land use planning. This year the first red list of nature types was launched and several geological nature types were included, perhaps with caves as the most important.

# **A short history of nearly everything - in Gea Norvegica Geopark**

**Mona Holte**

Gea Norvegica geopark stretches over more than 3000 km<sup>2</sup> of land areal. The geographic outerborder of this area is defined by the eight municipalities that owns and constitute the geopark. Together, these eight municipalities possess a geological history of more than 1500 millions years and present a large geodiversity.

The geology is fundamental and is reflecting the natural diversity within the geopark; as vegetation, insects and birdlife. The human influence regarding settlement and agriculture is again in many ways reflected by this underlying natural diversity.

A short history of nearly everything – In Gea Norvegica Geopark, takes you on an exciting journey. We will dive into ancient geological worlds, kilometres down in the earths crust where the old Precambrian basement were formed, into the tropical sea teeming with life, to a volcanic landscape where the popular ornamental stone, Larvikite, solidified with beautiful blue crystals. And then to the last ice age which formed our country and gave us soils and landscape features.

But the story is not about rocks only. We will look at the interconnection between the bedrocks, the geological processes and the diverse vegetation and agricultural land. And not to forget, through history of man; Stoneage, Bronze Age, Iron Age and into Silica Age, people have lived and utilized the resources in this area.



# ASIA PACIFIC GEOPARKS: CHARACTERISTICS, STRATEGIC DEVELOPMENT AND CHALLENGES

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The development of geoparks in the Asia Pacific region was initiated by China in 2000. Through the national vision on regional sustainable development, the Ministry of Land and Resources with the cooperation of the Chinese Academy of Geological Sciences began to identify areas (territories) which were considered suitable to be developed as geoparks. When UNESCO introduced the Global Geoparks Network (GGN) in 2004, the Chinese Geoparks National Committee chose eight most developed geoparks to be evaluated as pioneer members of GGN. Since then, several national geoparks have been chosen to be upgraded as Global Geoparks yearly. Currently, China has 24 Global Geoparks and almost 200 National Geoparks, making it the most advanced country in the world with regards to geopark development. Other countries in the Asia Pacific region, on the other hand, have been relatively slow in developing their national geoparks. Iran was the first country outside China that developed a geopark. Qeshm Geopark in Iran was accepted as a GGN member in 2006. This was followed by Malaysia with Langkawi Geopark in 2007 and Australia with Kanawinka Geopark in 2008. Meanwhile, countries such as Japan, Korea, Vietnam and Indonesia began to make preparation to develop their geoparks. Three geoparks from Japan were accepted as members of GGN in 2009, and one each from Korea and Vietnam in 2010. Almost all the countries adopted the Chinese approach, i.e. through the establishment of a national committee or a network to drive the development of geoparks. Even though, at the beginning, the initiatives started from the top (national) level, ultimately, it is the region or local leadership that made the development of geoparks succeed. This presentation will highlight some of the characteristics and the strategic development approach of APG and conclude by presenting some of the challenges faced by the respective countries in their pursuit of geopark development.

Keywords: Asia Pacific region, geopark development, geopark characteristics.

# Landscape: Experience and Empathy

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The lecture builds on my doctorate concerning the experience of the landscape through field work on Jomfruland, one of the excursions on Monday. Guiding in the landscape and dissemination of the values in a landscape has a stronger effect if activities are built on familiarity about how people experience this particular landscape. Each of the senses contributes to a complex, but unified experience of the whole landscape. Hearing tells about movements and activities in the landscape, for example about the rhythm when the waves hit the pebbles on the beach on the sea side of Jomfruland. The smells are directly connected to the centers in the brain for memory and feelings. They awaken associations. The sense of touch contributes to attention to the body's contact with the landscape. Sight gives both a panorama and opens for focus on details, but the experience is insufficient without the connection with the other senses. The sense impressions work together with the physical skills in use of the landscape, and this is a clear finding in the dissertation that use of the landscape is decisive for what is apprehended as meaningful in the landscape. Skills in the use of the landscape are central to development of identity, whether it is hobbies, recreation, everyday activities or profession. Earlier experience and social and cultural background create both reminiscences and attitudes to what is right and important or what is wrong and bad behavior in the landscape. The social and cultural background varies between different groups.

In conveying information, in research, in media and also in everyday life there is a tendency to consider the landscape as a visual panorama and to forget that the body is our possibility and you frame to "root" ourselves and create meaning in the landscape. The relationship to the landscape is not primarily mental, but (also) physical. In a world which becomes constantly more visually oriented and less connected to necessary use of the surroundings the possibility for building an identity to the landscape is weakened. Overgrowth in the outer landscape corresponds to an inner overgrowth or chaos and, unfortunately for many, problems of identity and belonging.

In this context the question arises on how we should disseminate values of the landscape and knowledge about the landscape. How can we use the senses and development of skills to motivate acquisition of knowledge? Empathy and connection to the landscape usually builds on a playing together of sense perception, bodily experience, feelings and thoughts. This requires a conscious organization of the way into understanding the landscape, whether it occurs through activities, possibility of activities, guided narratives or signposts.

# GLOBAL GEOPARKS AND SUSTAINABLE DEVELOPMENT

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**Abstract:** The Global Network of National Geoparks was founded in 2004, following the model successfully established by the European Geoparks Network in 2000. It now comprises 77 members in 26 nations across the world. The aim of the Global Geoparks Network is to protect and conserve the geological heritage of our planet but to do so in way where local communities can take ownership of these special places and where they can get some sustainable economic benefit from them. Sustainable development is so fundamental to the global geopark concept that even if an area has world-famous geological heritage of outstanding universal value it cannot be a Global Geopark unless the area also has a plan for the sustainable development of the people who live there. This development may take the form of sustainable tourism through, for example, the development of walking or cycling trails, training of local people to act as guides, encouraging tourism and accommodation providers to follow international best practise in environmental sustainability. But it can also be about simply engaging with local people and respecting their traditional way of life in a way that empowers them and respects their human rights and dignity. Unless a Global Geopark has the support of local people it will not succeed. This presentation presents examples of sustainable development from across the Global Geoparks Network and, for the first time, presents new data on the economic benefit of the geopark brand to members of the GGN.

# Geotourism in the Arctic – Svalbard as an example

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The Svalbard archipelago in the Arctic comprises the islands from 74° to 81°N, and from 10° to 35°E and are under Norwegian sovereignty. The Svalbard area displays a more or less complete stratigraphical succession ranging from the late Precambrian through to the Palaeogene. The natural environment in Svalbard is high arctic and vulnerable and 65 % of the land area is protected as national parks. Activities in these areas are subject to special regulations. The settlements in Svalbard (pop. ca. 2000 Norwegians) were initially based on coal mining activities and today Norwegian mines are in operation in Longyearbyen and Svea, whereas the only Russian mine operates in Barentsburg (pop. ca. 500 Russians and Ukrainians). Mineral exploration plays a minor role. Ongoing geomorphological processes have an important part in this high arctic landscape especially linked to the many glaciers, glacier rivers and periglacial conditions.

Since 2004 a group of scientists, students and volunteers organized from the Natural History Museum (NHM), University of Oslo, has undertaken field work in the Isfjorden area exploring for Jurassic marine reptiles. The findings have caused international scientific and media interest and the Upper Jurassic black shales containing these fossils might be considered a Lagerstätten of high scientific value. The field group has been sponsored by a local tourism agency which in return has transported tourists into the field area. The visitors, incl. visiting school teachers and local guides have met the scientists, they have learnt how scientific work is carried out, and they have been able to find fossils. Some work is done in co-operation with Svalbard Museum and UNIS (University Studies in Svalbard).

Svalbard attracts an increasing number of tourists every year, and there are organized day, week and longer trips. The tourists are offered year-round activities like kayak and boat trips, glacier and mountain trekking, ice cave climbing, ski expeditions, dog sledge trips, snow mobile trips, and fossil collecting. “Hotel-nights” in Longyearbyen increased from 23 000 in 1993 to more than 82 000 in 2010. “Landed” tourists from cruise ships: 40 000 in 1996; >100 000 in 2010.

Discussions on erecting a national geopark in the Longyearbyen area started in 2010. An initial note involving participants from NINA (Norwegian Institute for Nature Research) and NHM (Oslo) discussed some aspects of such a geopark:

- A geopark’s contribution to tourism, business and economic life in Svalbard
- Longyearbyen’s geological, landscape and cultural history qualities
- Local geology based industry
- Sustainability?
- Problems related to collecting and selling fossils

These and other aspects on experiences and challenges in this remote part of the world will be discussed in the lecture.

# UNESCO Geopark activities and global cooperation

## Margarete Patzak

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UNESCO, the United Nations Educational, Scientific and Cultural Organization was founded after the war in November 1945 with the mandate to promote peace and human development through cooperation and communication. In the true spirit of this cooperation across all continents and country borders and following an increasing worldwide interest in geological heritage, the Earth sciences programmes of UNESCO support national Geopark initiatives since already ten years. The 'Global Network of National Geoparks' (in short 'Global Geoparks Network' GGN) was launched in 2004 by the 1<sup>st</sup> International Geoparks Conference in Beijing, China with the support of UNESCO and is a means to realize this work across all continents. UNESCO helps to disseminate the innovative idea of the Geoparks and stimulates the sharing and exchange of knowledge, while supporting countries to build their human and institutional capacities in Geoparks. The three cross-border Geoparks of the GGN involving six different countries are an example of this work. In total, the GGN, as of April 2011, has 78 members in 26 countries. While the GGN is already very active in Europe and Asia where most of the members are located, today the new aspiring Geoparks in Africa, the Arab world, Latin America and the Caribbean are of special priority. Bearing this in mind the General Conference of UNESCO will discuss in October 2011 further implication in Geoparks development.

Participation in the GGN is voluntary and represents a seal of quality, where its applicants and members respect the terms of the GGN guidelines. Independent experts will refer to these guidelines when assessing proposals for membership. Before submitting a dossier, the aspiring Geopark candidate must already be in place and functioning as a *de facto* Geopark, being already familiar with the philosophy of the Geoparks concept. It helps a lot if applying Geopark areas already in the preparation phase be in contact with the GGN and its members, experts, and the Secretariat, and participate at international meetings and workshops, sharing already the discussions and exchange with the network. A Geopark candidate can request advice from the GGN Secretariat during this preparation phase and ask for the help of a GGN expert. Following the new procedure guidelines, proposals for membership are sent between October 1 and December 1. The applications are checked and processed with the support of external Geopark advisors as well as by geological experts from the International Union of Geological Sciences.

# GLOBAL GEOPARKS NETWORK: APPLICATION GUIDELINES, REVALIDATION PROCEDURES AND REGIONAL NETWORKING

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**Abstract:** The Global Network of National Geoparks was founded in 2004, following the model successfully established by the European Geoparks Network in 2000. It now comprises 77 members in 26 nations across the world. The aim of the Global Geoparks Network is to protect and conserve the geological heritage of our planet but to do so in way where local communities can take ownership of these special places and where they can get some sustainable economic benefit from them. As an initiative of UNESCO, Global Geoparks are expected to reflect the highest quality in terms of the services they provide and the brand they represent. To ensure this, the GGN operates a formal and detailed application procedure, operating to a fixed timetable annually. This procedure involves an independent desktop assessment of the international value of the applying territory's geological heritage as well as an on-the-spot evaluation mission. Membership of the GGN is valid for four years only after which a further membership revalidation exercise is undertaken. The GGN formally meets once every two years but it aims to function primarily through regional networks such as the European Geoparks Network. This presentation details the application and revalidation procedures of the GGN and gives examples of networking and cooperation from the European Geoparks Network.

# Oral presentations





# Volcanic Features in the around Lake Van in the Eastern Anatolia Region of Turkey as a suggested geopark

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The aim of this paper is suggested a new geopark area in the near of the Van Lake in the Eastern Anatolia Region. Turkey has geological and geographical heritages; hence, it is important to determine varieties and interesting morphological features as geopark area. The Van Lake and its surroundings, the main subject of this investigation, is one of the most significant volcanic areas of Turkey. In these areas, there are famous for its well-known youthful volcanic features like Nemrut, Süphan and Tendürek mountains, the Van Lake and the Erçek volcanic lakes, and especially The Nemrut Caldera, which is one of the largest calderas in the world. This area has all the necessary criteria including scientific value, geotourism appeal, educational, historical, cultural, spiritual, and social values, international significance, and link to biodiversity, aesthetic value and sustainability for geoparks; however, there are important problems as the lack of legal arrangement to protect these areas and to announce as geopark.

In this study, we suggested volcanic features in the around Lake Van as a potential geopark site, discussed the problems of this area, and finally provided geoconservation of these features and additional sources of income for local people.

## References

- Aguirre, P. (2000). Les Sites D'Interet Geologique (SIG). Rapport de la convention relative a`la conservation de la vie sauvage et du milieu naturel de l'Europe, Strasbourg.
- Akbulut, G. (2009). Suggested Geoparks in Turkey: Volcanic Mountains: New Challenges with Geotourism Proceedings of The VIII European Geoparks Conference, pp.264-269.
- Akbulut, G., (2009), "The Main Geotourism Resources of Turkey", *Celebrating Geographical Diversity: a HERODOT Conference*, 28-31 May 2009, Ayvalık.
- Akbulut, G.& Gülüm, K., (2010), "A Suggested Geopark Site: Kapodokya" *9 th European Geoparks Conference* (1-5 October 2010), Lesvos Island-Greece.
- Akbulut, G. (2010), "A Suggested Geopark Site: Gypsum Karst Topography between Sivas-Zara" *GEOMED 2010* (2-5 June 2010), Antalya.
- Atalay, İ., (2002), "Türkiye'deki Dağlık Alanların Oluşumu, Yapısal ve Ekolojik Özellikleri, Türkiye Dağları" *I. Ulusal Sempozyumu (25-27 Haziran 2002)*, Orman Bakanlığı Yayınları No: 183, s. 12-23.

- Aydar, E. & Gourgaud, A. & Ulusoy, I. & Dignonnet, F. & Labazuy, P. & Sen, E. & Bayhan, H. & Kurttaş, H. & Tolluoglu, A.Ü., (2003), "Morphological analysis of active Mount Nemrut stratovolcano, eastern Turkey: evidences and possible impact areas of future eruption", *Journal of Volcanology and Geothermal Research*, 123, pp. 301–312.
- Doğanay, H. (2000). Türkiye’de Az Tanınan Üç Doğa Harikası Tomara-Sırakayalar ve Muradiye Çağlayanları: Doğu Coğrafya Derg., Sayı: 3, pp. 1-25.
- Gürbüz, O., (1995), "Turizm Coğrafyası Açısından Nemrut Kalderası", *Türk Coğrafya Dergisi*, Sayı: 30, ss. 255-265.
- Martini, G. & Zouros, N. (2001). European Geoparks: Geological Heritage & European Identity–Cooperation for a Common Future, *in* Frey, M-L., ed.; European Geoparks Magazine. Issue 1, 4.
- McKeever, P.J.Mc. ve Zouros N. (2005). Geoparks: Celebrating Earth Heritage Sustaining Local Communities: Episodes, Vol: 28, No: 4, pp. 274-278.
- Somuncu M.& İnaner H. & Çiçek İ., (2004), "An example of geological and geomorphological heritage to be protected: Gölcük caldera (Isparta-southwestern Turkey)", *5th International Symposium on Eastern Mediterranean Geology*, Thessaloniki, Greece, 14-20 April 2004, 427-429.
- Wartiti, M. & Malaki, A. & Zahraoui, M. & Ghannouchi, A. & Gregorio, F. (2007). Geosites inventory of the northwestern Tabular Middle Atlas of Morocco: *Environment Geology*, p.1-7.
- Zouros, N. & Martini, G. (2003). Introduction to the European Geoparks Network, In: Zouros, N., Martini, G., & Frey, M.-L. (Eds.), *Proceedings of the 2nd European Geoparks Network Meeting*, Lesvos, Natural History Museum of the Lesvos Petrified Forest, 17-21.
- Zouros, N. (2004). European Geoparks Network: Geoconservation, Promotion, Education and Local Development: *5th International Symposium on Eastern Mediterranean Geology*, Thessaloniki: Greece, 14-20. April 2004.

## **Education and Research on plants for slope stability and traditional handicrafts in the Cilento Geopark.**

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The contribution of plants to slope stability is linked to many above and below-ground features. Some of such features are also relevant for ethno-botanical uses of plants for handicrafts. *Ampelodesmos mauritanicus* (Poir.) Dur. & Schinz), a widespread Mediterranean herbaceous perennial is traditionally used in the Cilento Geopark for specific handicrafts linked to cereal post-harvest processing, and manufacturing ropes for special use in water such as for mussel farming in coastal areas. This species turns out to play a key role in erosion control. A research was conducted with the aim of studying the mechanical properties of plant organs linked to both uses and results were used for both scientific purposes and for educational programs within the park. A special section of the MIDA Integrated Environment Museums within the Cilento Geopark was set up for displaying the importance of *Ampelodesmos mauritanicus* for the environment, for keeping the memory of its ethnic uses in the Cilento and Vallo di Diano area and for unraveling the biophysical bases of its extraordinary properties. Programs with local schools are being conducted in order to increase the awareness of local resources and their potential for environmental preservation and sustainable development.

## **The MIDA Junior Scientific Council : an incubator for future generations of geopark conservationists**

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A project has been set up in the Cilento Geopark with the aim of involving school children in the setup of displays on geopark resources, processes and conservation and in writing a guidebook on their Geopark for children of their age group. A Junior Scientific Council has been started within the framework of the activities of the MIDA (Integrated Environmental Museum). The group involves 40 children from the Cilento Geopark and “ambassadors” from other areas in Italy and is presently working at setting up a section of the MIDA Environmental museum. A Junior Scientific Council representative met the UNESCO Geopark inspectors visiting the area. The project objectives, progress and outcomes are presented along with proposals for the development of an international collaboration on the issue.

## **Multifunctional agriculture and sustainability in the Cilento Geopark. A case study.**

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Agriculture in Southern Italy is characterized by a wealth of local varieties of horticultural crops and very small farm size. Sustainability of farming is linked to a fragile equilibrium where multifunctionality of plant species and agricultural practices is important for preserving both the environment and the farmers' income. Tourism linked to geosites may play a key role in conserving agro-biodiversity and stimulating new market channels for aware consumers. The case study of research on a traditional local variety of artichoke (Carciofo bianco di Pertosa) in the Cilento Geopark is presented. The variety differs genetically from other cultivated artichokes and is closer to the *Thistle* genus. Research on non-food properties of this variety has allowed devising new products connected to touristic market channels based on traditional uses which were lost due to the lack of awareness and to abandonment of orchards after a major earthquake in the area. Issues relevant to sustainability of the Geopark are discussed.

# Enhancing geological heritage in the Apuan Alps aspiring geopark (Italy)

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The Apuan Alps, a mountain range in the Tuscany Region of Italy, are a 500 km<sup>2</sup> area subject to environmental protection under the jurisdiction of the Nature Park of the Apuan Alps (hereinafter Park Authority). The Apuan Alps are characterized by outstanding examples of geodiversity (rocks, minerals, tectonic structures, karst caves, geomorphology, etc.). Other remarkable expressions of the geological heritage are the archaeological finds and the historical-cultural emergencies related to quarrying and mining.

The Apuan Alps area has also a rich environmental and cultural heritage: natural habitats of European Community interest with endemic plants and animals are present as well as traditional villages and monuments, whereas residual activities, such as sheep-farming and chestnut cultivation, are still active.

Enhancing geological, naturalistic and cultural heritage has been identified by the Park Authority as one of its most important tasks and many actions for developing tourism in the protected area have been undertaken. The participation of local communities in the decision-making process is a fundamental prerequisite able to generate support, cooperation and a widespread sense of responsibility for upholding the geological heritage and cultural traditions. Therefore the Park Authority has involved local inhabitants, associations and other public authorities in the decision-making process, including decisions regarding sites of geological interest.

The most important results of this policy are the Corchia Underground project, a concrete example of management of geosites based on the direct involvement of the local community. This system integrates a network of equipped geosites (old quicksilver mines and underground marble quarries) and two museums with the Speleological Trail of the Corchia cave complex, the largest Italian karst complex which develops for more than 50 km. Opened in 2001, this underground trail allows to the general public the safe access to 1024 m of natural galleries.

Based on this background, the Nature Park of the Apuan Alps decided to start the path to become a member of the European and Global Geoparks Network, under the auspices of UNESCO. In accordance with the procedure, the Park Authority submitted the application dossier in November 2010. The will of local communities of supporting the initiative is stated by the formal act, approved on April 27, 2010, by the Park Community, the advisory body which assembles municipalities, provinces and mountain communities belonging to the protected area.

## **Naturtejo Geopark signage project: the structure of the touring offer in a large territory**

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In just few years Naturtejo Geopark became a vehicle for local development in a wide territory, with tourist innovative experiences, attracting visitors from all the country and abroad. Recently, Naturtejo applied for a signage project to cover the whole 4616km<sup>2</sup> which was 100% funded by the Institute of Tourism of Portugal.

All the 16 geomonuments, the main geopark attractions, which tell the geological history of the territory for the last 600 million years, were integrated with arriving directions and site interpretative panels. These unique places not only present the main geological features of the geopark as some of them are truly tourist attractions for the natural and cultural landscape.

The arriving directions are located in the main accesses to the geosites, creating visitation axis, with the geomonument names, all with the same layout, also common for plates and panels, which now differentiates Naturtejo Geopark from other Portuguese tourism destinations.

The goal of the site panels are the geological interpretation and tourist information of the geomonuments. Some are located in viewpoints, others in walking trails, and most of them have parking facilities nearby. As the target audience is very heterogeneous, comprising tourists, students, teachers, families (with young children), the interpretation of the geological phenomena and processes must be very clear and very basic. Each panel has a main theme presented with a photo, schemes of geological structures or processes and paleoenvironments and a brief explanation. On the other side of the panel there is the geopark map, with all the geomonuments encouraging visitors to travel by the territory, with tourist information (lodging, restaurants, tourism offices, active tourism companies) of all the partners from the geopark. It is also suggested the best walking or bike trail, and sometimes even driving scenic roads, to discover the geosites.

This project also includes a digital version, available at the Naturtejo Geopark website ([www.naturtejo.com](http://www.naturtejo.com)), where visitor can prepare its tour, with geographic information and also photos, videos and geological interpretation to download for free.

All the information is available in Portuguese, Spanish and English languages, promoting natural heritage raising awareness, improving tourist information for holidays planning and after arrival to destination, and contributing for geoparks concept dissemination.

# “The first mycological garden of Europe”. Sierras Subbéticas Geopark

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Andalusia represents one of the regions with highest mycological diversity of Europe. The Kingdom of Fungi has always attracted man: the beauty and great variety of shapes and colours, their fine and special flavour among all foods in nature, the mystery of their lethal toxins, their fundamental medical applications, or their essential role in recycling organic material, representing a transition world between rocks and complex life.

Aware of the importance of fungi and the great potential of development they offer, the Andalusian Regional Government of Environment develops since 2001 a Plan for Conservation and Sustainable Use of Mushrooms and Truffles in Andalucía (CUSSTA).

In this direction, a Mycological Garden (and the Andalusian Centre of Mycology) has been projected, representing the first of its kind in Europe.

For its location, a rural area rich in natural resources has been chosen: Sierras Subbéticas Natural Park and Geopark.

Situated in the small village of Zagrilla, in the heart of La Subbética district, an innovative centre focused to Mycology, “La Trufa” (The Truffle), has been opened to the public in January 2011.

“La Trufa”, with more than 14,000 m<sup>2</sup> consists of two main areas

## **1. Mycological Garden:**

This is an open air museum, the Mycological Garden proper, where some of the most representative ecosystems of Andalusia have been recreated. In each of them, the most common mushrooms and truffles have been cultivated. In this area it is evidenced the importance of the nature of geological substrate in the above developing life.

## **2. Andalusian Centre of Mycology:**

### -Public Use Module:

Exhibition Rooms, with magnificent interactive interpretation  
Microclimatic room of living mushrooms  
Audio-visual room, for 150 people  
Laboratory for environmental education activities.



-Technical Module:

Library and meeting room  
Mycological Herbarium

-Production Module:

In this area different substrates (soil, trunks, leaves, excrements, etc.) are inoculated and the resulting fungi are used to supply the microclimatic room and the Mycological Garden with living mushrooms.

The Mycological Garden supposes an additional and marvellous incentive to visit Sierras Subbéticas Natural Park and Geopark. It is expected that this will increase the number of visitors in the whole district and in Córdoba province. It will contribute to promote knowledge of mycology, enhance mycological activities and mycotourism, develop environmental education and contribute to conservation of andalusian mycological resources.

# “Geological Interpretation in Sierras Subbéticas Geopark”

Baldomero Moreno Arroyo<sup>1</sup> and Alicia Serna Barquero<sup>2</sup>,

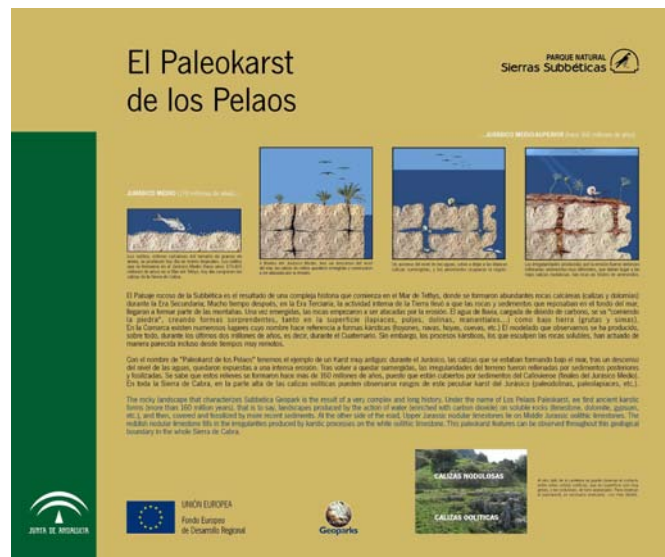
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The Andalusian Ministry of Environment, through its department of Public Use and Facilities has ended the first edition of the project “New tracks in Andalusian Natural Parks”.

This initiative, carried out by a multidisciplinary team, stands as the first step in order to homologate the existing tracks with the Andalusian Mountaineering Federation with the objective of promoting this public equipments and spreading its reach to an international level.

In the case of Andalusian Geoparks the EGN logo was included and, also in both areas, the close collaboration with the science staff allowed to update and enhance the geological heritage of these unique natural areas. Twenty one tracks have been updated in the Geoparks (15 in Cabo de Gata-Níjar and 6 in Sierras Subbéticas).

In Sierras Subbéticas, two new geological trails will see the light at the end of this year. Several interpretive panels focused on Geological Heritage, written in two languages, are being installed along these trails. Through very clear texts and drawings, people will be able to understand the essential features of the Geology of the Park.



As novelty, this publication includes a revised and improved map of each track, extended information relative on how to reach the track, available services, as public transport, parking, nearby tracks, etc.

## **New interpretation centre for the English Riviera Global Geopark**

**Melanie Border**

**Emma Reece, Nigel Smallbones**

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The English Riviera Global Geopark, situated in Torbay, South Devon, UK, joined the European and Global Geopark network in September 2007 and is active and dynamic in all areas of its work. The Geopark has a strong urban characteristic with a population of 134,000 in an area of 62km<sup>2</sup> and 42km<sup>2</sup> of sea.

Following months of work to develop excellent new interpretation and visitor facilities, the new visitor centre and café at Berry Head National Nature Reserve opened in March 2010. The development at the site was part of a 3-year £1.8m programme designed to completely rejuvenate the headland's spectacular heritage and the way people experience it.

Holding an impressive list of designations all of which reflect the sites national and international significance for nature conservation and heritage, Berry Head (managed by Geopark partner Torbay Coast and Countryside Trust) guards the bay's southern approaches and dominates the landscape. Of course, the new interpretation needed to enhance the visibility of our Geopark status; however the wealth and diversity of the tangible and intangible heritage present created a challenge when considering how to communicate this special sites stories. With so many important aspects, what messages and information should take priority? Should the interpretation centre focus on the incredible 400 million years geological history or the fragile, rare limestone grasslands and colony of protected Greater Horseshoe bats, the South coast's largest Guillemot colony, it's fascinating military history or 300 years of quarrying? To add further complication, it was decided the old visitor centre building was no longer fit for purpose and the new visitor centre was to be sited within a listed building which forms part of the sites designation as a Scheduled Ancient Monument.

A considerable challenge for all involved but one that has led to the development of an excellent visitor centre which now provides a superb recreational and learning experience for the local community and tourists alike.

## **North America's First Geopark – Educating through Marketing & Experience Development**

*Stonehammer Geopark, New Brunswick, Canada*

**Gail Bremner, Program & Marketing Manager, Stonehammer Geopark**

**Jane Fullerton, Board Member, Stonehammer & CEO, New Brunswick Museum**

**Dr. Randall Miller, Board Member, Stonehammer & Head, Geology and Palaeontology Section, New Brunswick Museum**

**Joan Pearce, Board Member, Stonehammer**

The Stonehammer Geopark, located in Southern New Brunswick, Canada has a complex geology exposed along rugged ocean and rivers shorelines, on sparsely vegetated landscapes and on roadways. The scenic landscape has resulted in a rich mosaic of parks scattered through the region that are highly dependent on geology for their beauty. It incorporates more than 60 significant geological and fossil locales, including more than 15 publicly accessible sites. Stonehammer Geopark is a community-supported organization comprised of site owners, tourism operators, members of the community and other stakeholders. The geopark encompass 2500 square kilometers. During its initial year, Stonehammer Geopark worked on a number of strategies to build community awareness, educate and provide opportunities for sustainable economic development. Partnerships with media outlets were established which resulted in a ten week campaign that built awareness about the geopark while also providing opportunities for learning through colouring contests, trivia questions with answers available on the Stonehammer Facebook page, and weekly articles about the various experiences available within the geopark. Resources were invested in creating quality and engaging experiences with product providers such as; interpretive walks, kayaking, boat cruises, meals, snowshoeing and exhibits. Additionally, an education subcommittee was formed with their first task being to establish a pilot project at a local high school so needs could be determined. This has resulted in a Stonehammer Geopark course being designed for 2011/2012 implementation. Finally a comprehensive marketing plan was developed and implemented to address the needs of visitors to the area that worked in conjunction with the tourism materials available for the region. Stonehammer Geopark continues to be a “grass roots” organization ensuring efforts have a positive, sustainable impact on the community whether it is through education, providing quality experiences, sustainable economic development or preservation.

# **The Mountain Tour: organizing tourism resources and offer at Naturtejo Geopark**

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Maps are used since ancient times to organize and simplify spatial information. Naturtejo Geopark and Oleiros developed a tourism map of this municipality to organize the territorial resources and the available tourism offer under the frame of one major subject – the Mountains Tour. In a mostly peneplained territory developed in the last 150 million years the mountainous region of Oleiros, as evidence of “recent” orogenic pulses, important source for many rivers, land of extensive forests where “living” fossils still persists, and orographic obstacle preserving a characteristic culture, became a curiosity of Naturtejo Geopark only opened to tourism in very recent times. Thus, the tourism strategy for this region of the Geopark must embrace the mountain landscape, biodiversity and culture. The 100 km-long road tour invites the visitor to organize his time according to own interests, presenting in the map only the best experiences and available services in the municipality (accommodation, restaurants, information points, health care and fuel stations). By providing the location of the geomonuments, viewpoints, native forests, fluvial beaches, monuments and hiking trails, indicating also where to find the handcrafters and presenting the local products (mountain products), the visitor may stay longer and spend money in a wider context of the region. For the purposes of marketing, the communication image was centered in the human figure of a local hero, António de Andrade, a Jesuit priest that climbed Himalaya in 1624 to reach the kingdoms of Tibet. His descriptions gained a notorious impact in the Europe of that time. The slogan used for the Mountain Tour is “The evasion from the sameness”. Four local products are also being used with remarkable success to promote Oleiros: the roasted lamb and the historical wine “Calum” (unique in Portugal), the strawberry-tree and chestnut fruits (products of the native forest). These products of the mountain are the basis for thematic fairs and gastronomy weeks that became part of the cultural calendar of Oleiros fostering local economy.

The Mountain Tour is the first stage of a more ambitious project which is structural for the whole Centre Region of Portugal – the Mountain Museum.

# **Green Tourism and Web 2.0. The network of sustainable tourism in Tuscan Maremma and Tuscan Mining Geopark.**

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Maremma is an area located in southern Tuscany (Italy) and, this territory coincides with the Province of Grosseto. In the northern part of Maremma there is Tuscan Maremma Mining Geopark (in the EGN - 2010). Maremma is characterized by low human activity with a poor industrial development and then with a beautiful natural environment (sea coast, forests, farmland) (inhabitants 228.000/ kmq 4.500 / population density inhab./kmq 50).

This area is being developed mainly in the tertiary sector, as the production of wine and agricultural products - oil – honey, in the alternative tourism (as Agro tourism), that complements coastal tourism, in the manufacturing of hand-made goods, and quality foods, and in the management of the cultural, geological and environmental heritage. In Maremma people come for the preservation of the environment (so says the 43% of respondents in the survey of customer satisfaction in August 2010). This is a great starting point to experience a new way to promote tourism based primarily on listening and new technologies through web 2.0 (that is built thanks to the interactive web user generated content). The Fondazione Sistema Toscana, which is responsible for the Tuscan Region, to build on-line communication and BTO Educational, a foundation established for the research on touristic web marketing, in cooperation with the Official Tourism Board of Grosseto and Tuscan Mining Geopark are launching "Sustainable Maremma", through TOSCANALAB, a laboratory dedicated to digital communications, according to the campaign of advertising "internet better life".

The project involves the creation of a network between all those stakeholders (public and private) for the correct and responsible flow of information, listening to the needs of tourists with the aim of improving services in general and the system institutional communication.

Fondazione Sistema Toscana Maremma and Official Tourist Board have created, in fact, a very innovative digital platform oriented social media marketing. The use of new technologies and new forms of communication, such as the Social Forum, will thus make a significant contribution towards a greener and sustainable tourism.

# New technologies and valorization of the geoheritage:

## A project combining social networking, treasure hunting and adventurous game in interpretation of the geoheritage

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This presentation proposes the first results of the French partners of a program gathering four Europeans territories in a Leader and transnational Cooperation project called: ***Heritage Interpretation through new technologies (HINT)***. The laboratory EDYTEM (Environnement, dynamiques et territoires de montagne) associated to the aspiring Chablais Geopark try to develop new tools for geosite interpretation.

A review of the digital technologies used for the valorization of the geoheritage into the geoparks network proposes a typology of the realized or current projects. The aim is to rank tools and technologies used but also the objectives pursued by these realizations (interactivity, cartography, 3D-reconstitution, geo-catching, augmented reality, smartphone applications, web 2.0 interfaces ...) for *in situ* or *ex-situ* experiments. Geoparks and aspiring Geoparks territories aim to use their geological resource sustainability for the economic benefit of their locality, largely through supporting tourism in the region. This study tries to analyse if the geoparks territories can be considered as an innovative milieu for the development of the digital technologies applied to the e-tourism.

Each partner of HINT project investigates the implementation of a practical pilot project in interpreting geoheritage.

By combining new technologies such as digital nomadism, social networking, augmented reality and gaming (e.g. treasure hunting) we want to design completely new geotouristic products mixing serious and adventurous games into fieldtrip educational supports (Cayla, 2010).

The objective is to prolong the tourist experience beyond the visit and to allow during the time of a geotouristic adventure to create a community which from the virtuality of the web can take shape into the real world. For that, a web platform combining various services in a mash-up dedicated to the creation of a virtual community during the time of the adventure will be created. The mash-up will integrate a webmap, social networking interfaces, augmented reality tags, rich media contents...

The scenario of the treasure hunt will contain various stages:

Creation of a virtual community by the solving of a geological enigma giving the departure point of the adventure.

Meeting of the community at the departure point of the adventure.

A pedestrian rally through the Chablais searching signs thanks to the indications supplied by geolocalised augmented reality via smartphones.

At end, a meeting point where all the geological information gathered during the adventure will take sense for the reconstitution of a part of the geological history of the Chablais.

This pilot and innovative project will be developed for summer 2012 in order to test new experience products and services for geotourism (Scherrieb, 2005).

#### References

Cayla Nathalie, 2010. Les nouvelles technologies au service de la médiation des géosciences sur le terrain, Réunion des Sciences de la Terre, Bordeaux 2010.

Scherrieb Heinz-Rico, 2005, Ways to manage the emotional experience: how can we make the tourism experience unforgettable? Abstracts of the seventh tourism summit – Chamonix 2005. (<http://www.sommets-tourisme.org/e/sommetsG/septieme-sommet/actes/scherrieb/scherrieb.html>)



# **The legacy of mining - archaeological, environmental and social impact - at Parys Mountain, Anglesey.**

**Dr John S Conway<sup>1</sup> & Dr Margaret Wood<sup>2</sup>**

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GeoMôn is a partner in the Metal Links INTERREG project which seeks to research the legacy of mining in two areas of Wales and two in the Republic of Ireland. Located within our Geopark, Parys Mountain is believed to have been an active mining site since the early Bronze Age and is still the locus of continued exploration with the latest phase of exploratory drilling in 200X. Prior to 'industrial' scale exploitation in the 18th Century, this was a quiet agricultural community with a small fishing inlet.

This paper outlines our plans to investigate the development of the mining community, its impact on the local economy, and the current geotourism potential of the mine and surrounding area. Our Geopark centre is located within the harbour constructed for the export of copper concentrate, which is developing its own identity as a heritage area separate to the mine site itself. A shipbuilding industry developed here and the harbour saw its last phase of reconstruction as recently as the 1980s for the oil industry. All is currently disused, but the impact on the local community of this long running 'boom and bust' economy will be part of our research project over the next three years.

GeoMôn will deliver a series of geotrails, both in print form and electronic, to highlight the geology, industrial archaeology, the environmental impacts, social history [a town trail], the processing plant and harbour, as well as the local landscape setting.

Our partners will be doing the same, in a lead mining setting in mid-Wales, and at two copper mining areas in Eire; this collaborative project offers the start of a network of cross-border mining-related geoheritage areas.

## References

**Beggs, T. & Wood, M 2011 'The view from the Watch House, Porth Amlwch' (GeoMôn).**

**Conway, J. 2010. A walkers' guide to the coastal footpath around Anglesey. (GeoMôn / Seabury Salmon).**

**Rowlands, J. 1981 Copper Mountain. (Anglesey Antiquarian Society)**

# The potential of Victoria Falls as a cross-border Geopark

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The Zambian government's policy (1998) classifies tourism as an economic activity to be developed by the private sector to provide foreign exchange earnings for the nation, employment and income for local communities and as a catalyst for sustainable development. The mission statement specifically refers to "quality product developments that are consistent with the conservation of the unique natural and cultural heritage". The policy demands that all tourism developments are in keeping with the National Environment Action Plan and do not compete with local communities for scarce resources. Recently (2010) the Minister for Tourism has proposed developing new activities that involve a greater appreciation of the environment of the Falls.

These policy aims are directly consistent with the aims of the Global Geopark Network, and the purpose of this research is to explore the potential development of quality products around the Victoria Falls area to enhance the visitor appreciation of the geological origin and setting of the Falls and the five gorges, and the cultural significance of the site to the local people.

The name Victoria Falls was given by Dr. David Livingstone in honour of Queen Victoria but Kololo People in Zambia refer to it as **Mosi-ao-tunya** (The smoke that Thunders) and the Nambya people on the Zimbabwean side call it **Chinotimba** (The place that Thunders). The present waterfall is higher than Niagara and Iquazu, wider than Niagara. The Zambezi has cut 7 successive gorges as it fall over the Jurassic flood basalts and is visited by approximately 140,000 people each year who participate in a range of water sports, helicopter and light aircraft flights and stay in expensive hotels. There is currently little tourist offering in any ecological or environmental sense, though there are opportunities to explore the gorges at low flows which open up the possibility of greater understanding of the geology and landscape development. This research project has used the experience of developing a Geopark in Anglesey to investigate the potential for such development and makes a number of initial recommendations

- Zambia needs to develop and implement programmes that will enhance understanding of the geology and geomorphology of the Victoria Falls area.
- The Local community needs to be involved in the management of the Victoria Falls if the area is to be developed sustainably.
- Tourists need to be made aware of the other geological and environmental aspects of the area beyond the waterfalls only
- Tourists need to be made aware of the culture of the local community, their music, craft, stories,
- There is need for an holistic joint management approach for both Zambia and Zimbabwe to achieve the sustainability of the Victoria falls which would best be achieved by achieving Global Geopark status

## References:

Republic of Zambia, 1998. Tourism policy for Zambia

Mabvuto-Ngwira, Percy 2011 "Geotourism Potential of Victoria Falls". IRD Conference, Royal Agricultural College, March 2011

## Managing the aspiring Azores Geopark

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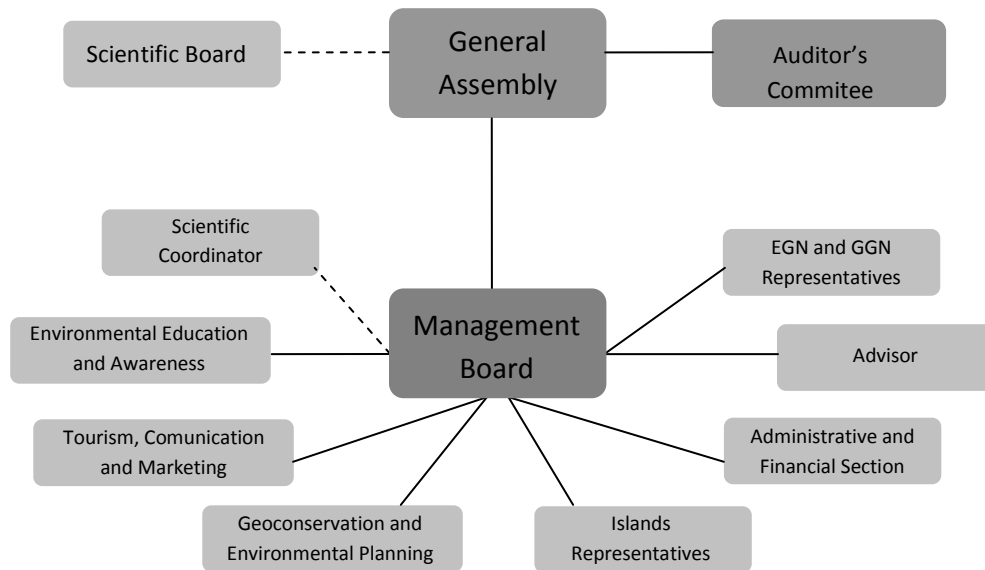
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The aspiring Azores Geopark is a territory that combines the protection and promotion of its geological heritage with the sustainable development of its populations. So the geosites that reports the memory of the geological history of the islands are part of an integrated concept of geoconservation, education and economic development.

With the motto "9 Islands - 1 Geopark", this new approach to nature conservation is based on a regional network of geosites with common strategies of preservation and promotion and a decentralized management structure with support in each island.

Its managing structure is the GEOAÇORES - Azores Geopark Association, a non-profit association created by public act on 19 May 2010 with headquarters in the city of Horta (Faial Island), Azores. The association founding members are the Azores Regional Government (through the Environment and the Sea Secretariat) and the four Azorean associations of local and regional development (ADELIAÇOR, ARDE, ASDEPR and GRATER). According to the GEOAÇORES Association statutes, any collective or singular person that accepts its statutes, share their mission and goals and is accepted by the founding members may join the association.

The board of the association includes the General Assembly, the Management Board and the Auditor's Committee, being represented on its organizational structure in accordance to the following chart.



The Azores Geopark management is also achieved through the close cooperation with several partners, creating important synergies and bringing together common efforts. Thus, the GEOAÇORES Association has established cooperation protocols with several entities that ensure, participate and support the activities of the aspiring Azores Geopark. Among these are:

- the Association of the Azorean Municipalities (AMRAA), for the local development;
- the AZORINA (Society of Environmental Management and Nature Conservation), for the educational programs and interpretation and visitors centers;
- the Regional Tourism Associations (ATA and ART), for the marketing and geotourism;
- the Regional Network of Cultural and Science Centers, for cultural, environmental and scientific public awareness and geotourism;
- the Regional Center for Handicrafts, the “Azorean Houses” (regional association of rural tourism) and several nature tourism companies, for the local development and geotourism.

The whole process of creation and implementation of the aspiring Azores Geopark has always earned the cooperation and support of the Portuguese geoparks (the Arouca Geopark and the Geopark Naturtejo), as well as the Portuguese National Commission for UNESCO and the PROGEO-Portugal (European Association for the Conservation of Geological Heritage).

## **Database for geological heritage – A tool in the management of nature diversity**

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In Norway, protection of geological deposits *sensu stricto* has been more or less neglected in the nature management for decades. In the 1970s, however, several surveys were carried out in order to determine and assess geological deposits worth protecting. Inventories on national, regional and local levels were presented. Alas, they were in general not followed up by the authorities. Instead, issues concerning the protection of biodiversity were prioritized. Geological issues fell into oblivion.

The launch of the Nature Diversity Act of 2009, however, offers new possibilities. The purpose of the act is to protect biological, geological and landscape diversity as well as ecological processes through conservation and sustainable use. In order to implement this act, the authorities need a clear notion of geological diversity as a concept. The old inventories can thus be of interest. In order to support decision-makers on local, regional as well as national level, the Geological Survey of Norway is systematically gathering information from former geological heritage assessments. The acquisition started in 2010. Our aim is to present the material in a database and Web Map Service (WMS), useful for government agencies, land-use planners and nature managers. In addition, the base will serve as a tool for identifying potential locations for nature-based tourism, recreation and education.

As of April 1<sup>st</sup> 2011, approximately 1.300 areas of significance are registered, described and assessed. Still, much work needs to be done before an operable, consistent and systematic database of geological heritage is available. Nevertheless, the base will provide a starting point for future discussions on management of geological diversity. The current status of the work with the base will be presented in the lecture.

# Events in the Iron Mountains Geopark, Czech Republic

**Jan Doucek**

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The formation of the Iron Mountains Geopark is connected with the Vodní zdroje Chrudim company. The town of Chrudim is a centre and a gateway to the Geopark. This town has 23 thousand inhabitants and is located in the Pardubice region; about 110 km east of the capital city of Prague.

Despite the average altitude about 500 m.a.s.l., the territory of the Geopark is distinctly visible from a distance, because it rises from the flat lowlands of the river Elbe.

In the past the geological potential of the area was primarily used in the commercial sector (quarrying and mining of minerals). A number of geological and geomorphological sites are completed by unique biological, archaeological and cultural-historical sites. The use of this potential is changing, the main trend being the development of the tourism. In the last five years a number of significant geological projects have been realized such as the interactive exhibition of the history of the local stone industry in the town of Skuteč or the exhibition of the limestone quarrying in Berla's limeworks in the town of Třemošnice. Furthermore, new geological nature trails originated; they were completed by information boards and a number of publications with geoscientific issues.

Thanks to their nature the Iron Mountains are an attractive destination for hiking, biking, horse riding and for other sports. The whole area has a dense network of information centers.

The educational and popularizing activities of the Vodní zdroje Chrudim company have a more than twenty-year-old tradition and are originated towards the general public, schools but also specialists. In the exhibition hall of the company have been arranged more than 130 exhibitions from the field of science, travel, history, local history and art in the last thirteen years. The exhibitions have attracted more than 25 thousand visitors during that time. The company has realized a number of the touring exhibitions with geological topics. The educational activities focus on the organization of tours and lectures for primary and secondary schools. Three or five geological trips and about ten educational events with geological topics are regularly organised every year.

In the geopark there is an active cooperation with a number of municipalities, state organisations (such as the management of protected regions), nongovernmental and even private organisations.

# **Enhancing Sustainable Development through Quality Management – Experience and Lessons Learned in the Global Geopark Bergstrasse -Odenwald**

**Claudia Eckhardt**

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The Geo-Naturpark Bergstrasse-Odenwald is located in the south of Germany between the two European Metropolitan Areas Frankfurt Rhein-Main and Rhein-Neckar. The territory offers a wide variety of locations of geological and cultural importance, highlighted by three UNESCO World Heritage Sites. The Geo-Naturpark has been a member of the European Geoparks Network (EGN) since 2002, and part of the Global Geoparks Network (GGN), assisted by UNESCO since 2004.

As an active member of the GGN, the Geo-Naturpark is committed to implement the message and underlying concept of the GGN by the communication of geological and cultural heritage to the general public and through the provision of contributions to sustainable regional development, embedded in a broad participatory process.

The Geo-Naturpark maintains a multi-tiered system of infrastructure and visitor service, which requires adequate and efficient management tools. Furthermore, the management approach aims to enhance the overall participation of local residents in the Geopark's development and - operation. Currently, the Geo-Naturpark administration, is implementing the internationally recognized quality management standard ISO EN 9001. Using the tools of ISO 9001, the Geo-Naturpark's management system is largely governed by the philosophy and the objectives of the Global Geoparks Network. Furthermore, as a recognized "Quality Nature Park" in Germany, we are considering the "Guidelines for Applying Protected Area Management Categories" published by the IUCN (2008).

The application of the requirements of ISO 9001 so far has proven to provide an efficient framework for the management of a complex participatory development process in a territory of about 3,500 m<sup>2</sup>. Stringent institutional quality management enhances the implementation of the GGN approach by providing a structured guideline for the development of an individual management framework. In addition, the application of modern quality techniques facilitates operation and maintenance by making day to day work more efficient. Participation as a key element of the GGN philosophy and at the same time an obligatory tool for sustainable development has been integrated into key management processes.

In the context of co-operation in the GGN, the exchange of experiences and lessons learned with regard to quality management in Geopark development could provide valuable inputs and contribute to the joint establishment of a Geopark quality management framework. The respective management tools then would be tailored to the specific needs and requirements of sustainable regional development in Global Geoparks.

# **Geoparks and the Planet Earth Institute (PEI) – a new platform to promote Earth Sciences in Society in the follow-on of the IYPE**

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The “International Year of Planet Earth” (IYPE) has been particularly successful through its outreach and education programmes during its time span from 2007 to 2010. Numerous activities in the many countries with IYPE National Committees were monitored and registered under the (German) “Planet Earth”-logo including those aiming at the promotion and/or development of ‘Geoparks’, ‘Geotopes’ and ‘Geoheritage’.

In full compliance with IYPE Board decisions and resolutions a new Foundation “Planet Earth Institute” (PEI) has been created on 17 December 2010 in The Netherlands as a follow-on initiative of the UN-“International Year of Planet Earth” (IYPE), notably addressing outreach activities related to Earth Sciences.

In consultation with the Dutch Ministry of Economy, Agriculture and Innovation and the University & Research Centre in Wageningen, The Netherlands, Eduardo de Mulder together with Wolfgang Eder established the PEI as an international, non-governmental, non-profit foundation.

The objectives of the Foundation are: (a) to further increase the visibility of Earth Sciences by communicating with the general public the added value of Earth science information for society and the well-being of future generations; (b) to promote solutions based on science for problems Planet Earth faces; (c) to do all that which is connected with or may be conducive to the above objects, in the broadest sense of the word used.

The Planet Earth Institute (PEI) builds on the legacy of the IYPE that was created by the ‘International Union of Geological Sciences’ (IUGS) and UNESCO in order to promote sustainable development and the application of the Earth sciences in society.

This (mainly virtual) Foundation/Institute has been given as subtitle ‘Promoting knowledge for a better Planet’. Implementation will be realized along three channels: (a) through a wide variety of outreach activities (including activities related to sustainable marketing of ‘Geotopes’, ‘Geoparks’, ‘Geotrails’ or ‘Geoheritage’), (b) through establishing National and Regional Committees and (c) through setting up joint ventures with scientific national and international organizations, as well as (private) enterprise. Activities may include national and international relevant geo-projects, cooperating with the EGN and GGN with respect to the promotion of ‘Geoheritage’ through ‘Geoparks’, creation of Regional Centers, exposure through big screens in city centers, other training or capacity development activities, as well as cultural and artistic expressions or co-marketing projects.

As mentioned, National Committees shall constitute, too, the geographic backbone of the Planet Earth Institute. Former or current IYPE National Committees are invited to embark on the Planet Earth Institute to continue their (mainly outreach) activities. They will significantly benefit from revenues generated by international outreach activities. International Partners shall form the financial spine of the Planet Earth Institute.



The PEI is a call for action to further inform the public how knowledge of the Earth helps to make societies around the world healthier, safer and more prosperous and to excite young people about the Earth.

Thus, we invite all geoscientists and geosciences related groups or agencies to support the 'Foundation Planet Earth Institute'.

#### References

De Mulder, E. & Eder, W. (2011): The UN International Year of Planet Earth – Background, Legacy and Perspectives. – In: Gupta, H. (ed.): Encyclopedia of Solid Earth Geophysics; pp. 614-617, Heidelberg, Springer.

# European Charter for Sustainable Tourism in Geoparks: tangible results in Cabo de Gata-Níjar Geopark

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The European Charter for Sustainable Tourism (ECST), awarded by Europarc Federation, is based on a compromise and volunteer agreement between the Natural Protected Areas and local stakeholders involved with touristic development.

The implementation of the ECST in Cabo de Gata just ended last march 2011 its second phase with the accreditation of the enterprises to the Charter.

But, what actual improvements carry out such commitment for the Geopark and its management?

We find the answer at different scale, European and Geopark:

- European scale:
  - The obligation to follow the applicable legislation
  - It must develop its activities inside the Geopark
  - The activities must be compatible with development and sustainable tourism strategy of the Natural Protected Area
  - It must be part of the Sustainable Tourism Forum approved by EUROPARC Federation
  - The local enterprises must follow this agreement for a three years period
  - It must use adequately the Logo of the ECST
  - It must offer information and be willingness to allow inspections visits and evaluation procedures
- Geopark scale:

Among the obligations adopted, the enterprises must participate in the Sustainable Tourism Forum, remain open at least ten months a year and above all, develop a three years Action Program.

The Action Program consists in a group of activities included in the following categories:

- Enhancing the touristic offer and connectivity with the Natural Protected Area
- Improving the environmental behaviour
- Supporting local development and the conservation of the heritage

Some examples of these activities are:

.- Improving the touristic offer outside the touristic season, taking advantage of the Geopark assets.

.- Expanding the clients tipology: attract people interested in ornitology, geodiversity, etc.

.- Offering workshops and conferences related to traditional activities developed in the area (pottery, typical foods, ethnographical values, etc.)

.- Becoming an information point of the Geopark.

.- and so on, (each enterprise develop different activities)

This initiative is one of the best measures to support Natural Protected Areas management. These set of activities represents a standardized and regulated way to implement policies which, normally, are really difficult to apply. The consequences to implement this initiative are tangible results and real commitments for developing sustainable economy in Geoparks.

## **References**

Spain Europarc Federation Protocol

## HELLENIC GEOPARKS FORUM

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2. *Helmos - Vouraikos Geopark*
3. *Vikos - Aaos Geopark*
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5. *The Lesvos Petrified Forest Geopark*

Representatives from the four European Geoparks in Greece (The Lesvos Petrified Forest Geopark, Psiloritis Geopark, Helmos - Vouraikos Geopark and Vikos - Aaos Geopark) and national organizations the Greek National Commission for UNESCO, the National Geological Survey - IGME, the Geological Society of Greece – Commission on Geological Geomorphological Heritage and the Geotechnical Chamber of Greece which gathers all the scientific associations that deal with Earth Sciences in Greece; decided to create the Hellenic Geoparks Forum, in Athens.

Main aims of the Forum are:

- to coordinate Geopark promotional activities and cooperation among the GGN/EGN Geoparks in Greece;
- to promote the development of new Geoparks in Greece;
- to integrate Geoparks and geo-conservation in National nature conservation policy;
- to provide information and promote the Global and the European Geopark Networks through various communication tools (website, magazine, newsletters, newspapers, etc);
- to create new opportunity of integration between the many national activities direct to the growing of geological heritage's policy and to the development of geotourism;
- to provide a technical and scientific support to the territories who want to submit to the EGN/GGN;
- to organize an annual workshop in order to exchange best practice and to popularize the various projects and activities of the Geoparks, the geological heritage conservation and the realization of virtuous actions for the sustainable development.

The Hellenic Geoparks Forum founding declaration was signed and the Forum operation rules were decided as well as the procedure for new members and observers.

One of the first goals of the Hellenic Geoparks Forum was the legal recognition of Geoparks in the new law on Biodiversity and Protected areas in Greece.

The Forum inaugurated a website <http://www.hellenicgeoparks.gr/> and first open event of the Forum will be organized during 2011.

# Involvement of geoparks in raising children earthquake awareness: RACCE project

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Recent earthquake tragedies have shown that preparedness and prevention are key tools to minimize the impact in human and economical resources of such disasters. Geoparks, aiming in promoting the geological heritage and educating people on natural phenomena can play key role in disseminating information and good practices to minimize the effect of such disasters. Three European Geoparks, namely Psiloritis Natural Park, through the Natural History Museum of Crete which is the coordinator, Lesvos Petrified Forest and Reserve Geologique de Haute Provence, together with the Greek National Earthquake Planning and Protection Organisation, the Vesuvius Observatory of Italy and two Educational organizations, Villa Montesca from Italy and CEI from Bulgaria have been granted by EC, Civil Protection Instrument, to implement a project titled “Raising earthquake Awareness and Coping Children’s Emotions –RACCE”. The project is addressed to children, aiming to palliate the emotional burden and help them cope in case of a serious natural hazard (primarily seismic and secondary volcanic) by raising awareness, improving knowledge on earthquakes and simultaneously, educating relative groups (teachers, parents etc.) on the best practices and state of the art responses. The objectives of the project are: 1) to identify, share and implement best practices and methodologies gained from previous EU projects and partners’ activities; 2) to study and analyse the needs in each participating country; 3) to develop and realize innovative initiatives and actions aiming to raise awareness and increase knowledge of pupils on earthquake and volcanic hazards; 4) to train teachers, parents or other relative groups to be able to contribute to children palliation in case of seismic hazard; and 5) to disseminate and share project’s results and outcomes to potential beneficiaries and broader audience on a constant base. Main deliverables of the project would be the development of a Needs Analyses and Guidelines for the identification of unexpected children emotions or behaviors and palliation responses to children’s depression through edutainment activities, the elaboration of an innovative and mobile experiential Educational Project connected with school curricula and a Travelling Exhibition, the implementation of special workshops and training activities, as well as the dissemination of results through publications, web-site and other activities. Project is expected to contribute in sharing information related to earthquake phenomena, in raising awareness and minimizing the impact of such disasters and finally, in the establishment of a voluntary network of operators and beneficiaries in the areas involved to constantly share, discuss and apply the outcomes.

# Implementation of a georoute in the aspiring Chablais Geopark.

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The Chablais region lies on the southern shores of Lake Geneva (Lac Léman) in the French district of the Haute Savoie. The Chablais set up a project in order to become a Geopark. The Chablais Prealps are characterised by a thrust stack clearly visible in the landscape (Schardt 1893) and by remarkable glacial deposits mostly composed by tills and glacio-lacustrine sediments which can exceed 400m of thickness in the Evian area (Blavoux 1965).

The Intercommunal Syndicate for the Development of the Chablais ("SIAC") has drawn up a list of 23 geosites which are remarkable, complementary and emblematic of geological history of the territory. In order to decide how to valorize these sites, an original process of participatory project has been built to develop a "geological route".

The plan is mobilizing all the actors who all have their own vision, their own objectives and all are very attached to their territory. All along the setting up of the project, it will be important to find the best approach to combine the diverse expectations of the actors and their will to transmit, enhance and show all it is possible to discover on their territory.

Which are the territorial stakes concerning these sites? How is it possible to transform a site considered as remarkable by the geoscientists into a geotouristic site for the general public? How is it possible to propose enhancements and explanations which are best suited to scientists, local public, people working in the field of tourism and also local authorities?

First public meetings already show how different are the expectations of each part of the territory confirming the importance of a down-up process all along this setting up.

All these questions are increased by the structuring and transverse aspect of the geological route. This innovative project has never been realized and will pave the way for the others. Furthermore, the SIAC has decided to set up a huge participatory approach integrating all the steps of the plan, from the selection of the sites to the contents of the enhancements.

During our presentation, we will develop all these points and also the setting up of the participatory approach as a possible answer to these questions.

## References

Blavoux, B. (1965). Les sources minérales d'Evian. Etude climatologique, hydrologique et hydrochimique des formations fluvio-glaciaires quaternaires du Bas-Chablais. Centre de Recherche Géodynamiques de Thonon. Paris, Université de Paris: 366.

Schardt, H. (1893). "Sur l'Origine des Préalpes romandes." Arch. Sci. Phys. Nat. Genève **3**: 570-583.

# Observations on sympathy character use in geoparks and at world heritage sites to transfer earth science topics

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Already in the oldest cave paintings we can see that human beings like pictures to explain facts like hunting animals which are important in their life. They also like to be told stories by figures bringing fun and joy into their life like e.g. Micky Mouse, a cartoon first published in 1928 and having his 60<sup>th</sup> birthday as star of the printed magazine. However there are not only criminal stories which can fascinate people.

Layers of earth history tell very exciting stories about processes and stories of life in past times up to today. Since the 1980's geologists have increased activities to promote earth history and geological heritage in a first step, across so called geological trails. Since the year 2000 by the European Geoparks Network and 2004 by the Global Geoparks Network the philosophy of geoparks to transfer this heritage is being realised across a holistic concept "The geoparks" in which the transfer of scientific topics to the general public plays a main role.

In the 47 certified European Geoparks a high creativity exists in interpretation activities on geological heritage, in the context of landscape morphology, rocks, geodiversity, culture, flora and fauna. Another field beside the so called education products/programmes are offers for visitors from tourism e.g. offers for children and families. Within the 47 geoparks there is a remarkable approach to use sympathy characters and too at world heritage sites to transfer earth scientific topics by integrating them into the scientific facts and or for the different types of tourism activities e.g. tracking, enjoying food etc.. These are e.g:

"Cruziana" Team & Ródão - Naturtejo Geopark, Portugal

Femoline – GEO Park Harz Braunschweiger Land Ostfalen, Germany

"Steinfamilien" – Gea Norwegica Geopark, Norway

Hong Kong Geology Characters, China

Zeitreisen-Crew – UNESCO-World Heritage Site Messel Pit, Germany

Willi Basalt - Vulkaneifel-Familie – Geopark Gerolstein / Vulkaneifel, Germany

Leopoldia – La petite ammonite – Réserve Géologique de Haute Provence, France

This presentation focuses upon the use of these characters and their relationship toward geological topics.

## References

Butenuth, C. (2002): A report on an "educational experiment" at Imperial College London, UK.- First Steps Ltd. London

- Carvalho, C. (2010): Ródão – The most fantatic travel of a sand grain.- Naturtejo Geopark, Portugal.
- Frey, M.-L. (1995): Willi Basalt in der Welt des Sprudelwassers – Eine GEO-Park Geschichte.- Geopark VG Gerolstein, 11 Seiten, Verbandsgemeinde Gerolstein / Vulkaneifel, Germany
- Frey, M.-L. (1996): Anforderungen, Grundlagen und Methoden für eine geowissenschaftliche Umweltbildung. Zbl. Geol. Pal. Teil 1 Heft 7/8, Januar 1995. pp. 703-712
- Frey, M.-L. (1998): Erfahrungen beim Aufbau eines „GEO-Parks“.- Aachener Geowissenschaftliche Beiträge (AGB), Bd. 21: 52-66
- Frey, M.-L. (1998). Geologie-Geo-Tourismus-Umweltbildung Themen, Themen und Tätigkeitsbereiche im Spannungsfeld Ökonomie und Nachhaltige Entwicklung. Terra Nostra Schriften der Alfred Wegener Stiftung. 98/3, V85 Abstract
- Frey, M.-L. (2000). Geotourism – a new perspective for public awareness on geology. Case study Geopark Gerolstein & Geo-centre Volcanoeifel Germany. Proceedings pp. 156-157 Abstract Volume AGSO Record 1999/47
- Frey, M.-L. (2001). Geopark Vulkaneifel: Geo-potential, touristic valorization and sustainable development. 2<sup>nd</sup> European Geoparks Network Meeting: Sigri-Lesvos, Proceedings of the Intern. Symposium on geological heritage protection and local development, 3- October, Greece, pp29-44.
- Frey, M.-L. & A. Bauer (2001): European Geoparks – Geowissen, Tourismus, Ökonomie und nachhaltige Entwicklung.- LEADERforum, Jg. 4, 1/2001: 10-11, Frankfurt/Main
- Frey, M.-L., Schäfer, K. & G. Büchel (2002). Geologische Öffentlichkeitsarbeit – eine Option für die Zukunft. Scriptum. Nr. 9 pp. 17-39. Geologischer Dienst NRW. Geotopschutz im Ballungsgebiet, Germany, 16-18th may 2001
- Frey, M.-L., Schäfer, K., Büchel, G. & M. Patzak (2006). Geoparks – a regional european and global policy. Eds. Dowling, R. & D. Newsome. Geotourism. Pp. 95-117. Elsevier, Amsterdam, Boston, Tokyo. 260 p.
- Frey, M.-L. (2008). UNESCO-World Heritage Site Messel Pit: About the challenge, chance and benefit to use tourism for promoting earth heritage. 3<sup>rd</sup> Intern. UNESCO-Conference on Geoparks in Osnabrück, 22.-26.06.2008, Germany, pp. 42
- Frey, M.-L. (2009). The World Heritage Site Messel Pit – Connecting geotourism and education for the general public. Taishan Conference, China, Proceedings
- Grauvogel, B. (1994): Tourismuspädagogik.- Trierer Tourismus Bibliographien, Band 5, Geographische Gesellschaft Trier, 150 Seiten
- Job, H. & P. Maier et al (1994): Informations- und Öffentlichkeitsarbeit in Natur und Landschaft: von der Theorie zur Praxis. - Schriftenreihe des Informationszentrums Naturpark Altmühltal, Heft 6
- Krüss, J. (1983): Meyer's Buch vom Menschen und von seiner Erde.- Bibliographisches Institut, Mannheim, Meyers Jugendbuchverlag, 161 Seiten
- Rangnes, K.(2009?) "Steinfamilien" – web-Information: GeaNorwegica Geopark, Norway
- Tourtellot Jonathan (2003), Geotourism: The New Trend in Travel, 2003, US Travel Assiciation Editor
- Zellmer, H. (2011): Wie viel "Gestein" darf es sein? – Oral Presentation, Geotop 2011-Conference, Rieskrater Geopark, Germany.



Zouros, N & G. Martini (2001): Introduction to the European Geoparks Network.- 2nd European Geoparks Network Meeting, Sigri-Lesvos, 3rd-7th October 2001, Proceed. Int. Symp. On geological heritage protection and local development Lesvos Island, Greece, Proceedings/Lesvos 2003, p. 17-21

Zouros, N., Martini, G., & Frey, M-L., (Ed) 2003. Proceedings of the 2<sup>nd</sup> European Geoparks Network Meeting: Lesvos, Natural History Museum of the Lesvos Petrified Forest, pp. 17-21.

Young, K.M (2009): Oral Presentation, Taishan Conference, China.

# Wide choice of Geotraverses and Geoparks founding in Georgia

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The Caucasus represents complicated polycyclic geological structure involving mountain fold systems of the Greater and Lesser Caucasus and intermountain depression. For geological study it represents real “natural laboratory”, where on the surface crop out sedimentary, metamorphic and magmatic rocks with the age from the NeoProterozoic up to the Quaternary. Because of abundance and diversity of geological monuments several geotraverses and geoparks can be distinguished on the territory of Georgia. Among them can be shortly characterized:

**Geotraverse along the Georgian Military Road (Tbilisi-Stefantsminda; 120 km).** Along the section one can be familiarized with the geology of the Lesser Caucasus folded zone, Transcaucasian intermountain molassic depression and the Greater Caucasian folded system. The latter is represented by very interesting geological section of Meso-Cenozoic sedimentary rocks, which are intensively folded, fractured and form several large nappe plates with the total displacement to the south up to 70 km.

This section is ending by Paleozoic metamorphic and magmatic complex, on which Pleistocene-Holocene **Kazbegi volcanic region** is formed and which represents fine area for geopark founding. The region is constructed by numerous volcanic centers and subaerial lava flows of andesite-dacite composition. Kazbegi volcano (5033 m) is central structure, which is covered by everlasting snow and glaciers and owing to its beauty is named “bride” of the Greater Caucasus. The greatest eruption by carbon method is dated as 6000 years, but historical sources indicate that the last eruption took place in 700 B.C.

In west Georgia, in Sataplia area, in Lower Cretaceous limestones 107 footprints of dinosaurs are discovered. They crop out at two stratigraphical levels. At the first level footprints of predatory dinosaurs are printed but stratigraphically 1.5 metres above- of herbivorous. At the distance of 500 m from these footprints are magnificent karst cave with total length of 900 m, maximum height 10 m. More so this area is covered by beautiful box forest. All this together forms good condition for founding **Sataplia dinosaur footprints and karst cave geopark.**

It should be noted, that within and near the described geological objects there are many ancient historical settlements and monuments, that much more increases the social and cultural- educational significance of these objects.

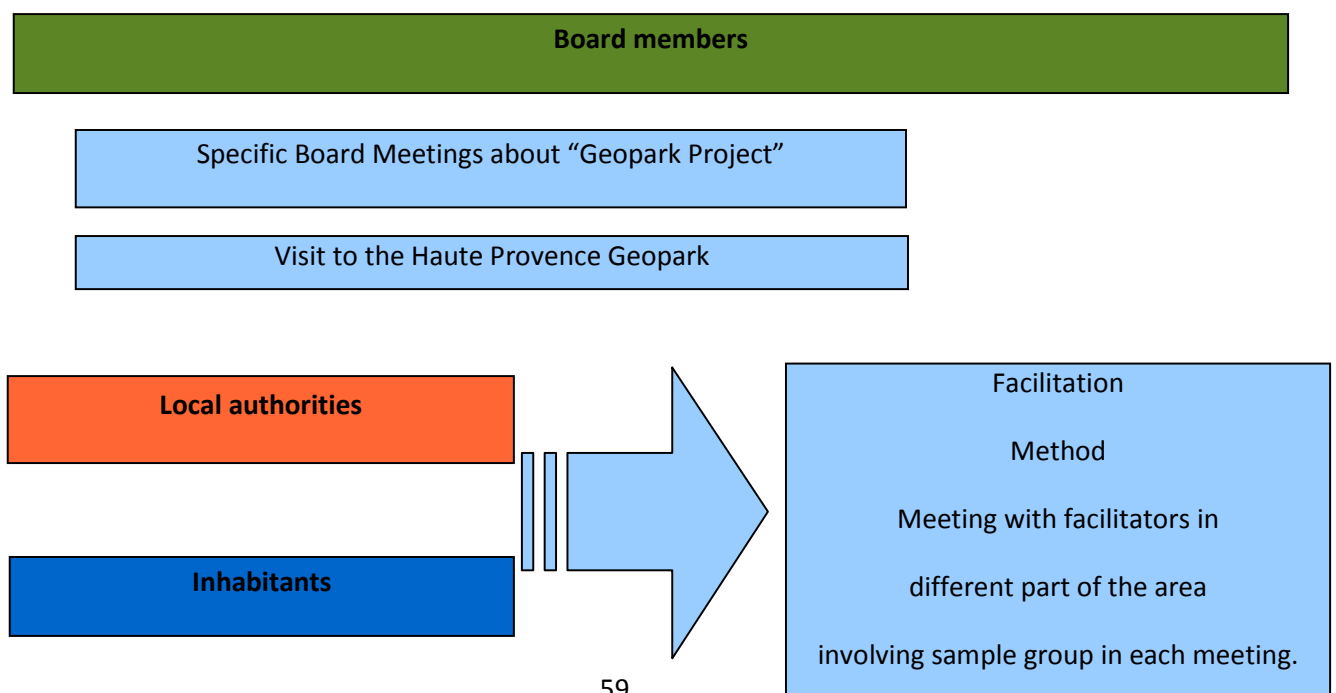
# A new way to communicate inside the Appennino Geopark's Project

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Since two years ago, during past Leader program, Gal BolognAppennino found out that a Geopark project must be a new idea to promote the area from the geological and cultural point of view. After two years, we have been developing the first Appennino Geopark's project through lot of difficulties: communicating the project to all the stakeholders represents the main one. We know that Geopark have to involve all the inhabitants and all the partners of the area into the discussion from the beginning, to give them the possibility to take active part in the process. This is the only way to guarantee the success of the project, if we want a Geopark made by the people living in the area.

We will introduce three levels of communication and a special process will be used for representative of local institutions and inhabitants. First level is addressing the board and use of several specific meetings arranged with members. It will also be developed a study-visit to Haute Provence Geopark with all delegation because we think that spending some time in an existing Geopark will be the best way to share the Geopark's value to politicians. Second and third level are connected with the facilitation method. This is a new methodology that aim to deeply involve the participants to all the project's steps with the use of special techniques and the help of a team composed by experts that manage to resume all the ideas into graphics schemes and obtain Geopark logo and the awareness for participants to live in a special area that can be UNESCO place. The goal is to create a communication strategy plan, a pilot project that could be shared with other Geoparks. It will be a cycle of specific meeting inside the area addressed to develop the consciousness of the local heritage and the geopark's values to people. Each meeting will be composed by local politicians, accommodation's local managers and inhabitants. The project in the end will involve one hundred people.



# **The geotouristic values of the Sierra Norte of Seville Geopark Candidate**

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Sierra Norte of Seville Nature Park covers a singular wealth on geology, landscape and biodiversity, with several marked tracks and specific points of geotouristic interest, and fauna and flora viewpoints. Most of the Sierra Norte of Seville Nature Park is located on the Spanish Hesperian Massif, although there are a few outcrops of recent deposits from the Guadalquivir River Depression.

Since some years ago this Nature Park has been working on the geotourism sector, in the framework of the Andalusian Strategy for Geodiversity Integrated Management. At the same time Sierra Norte has applied to be member of the European Geoparks Network, in the application dossier only 15 points of geological and tourism interest were described but the large area of the Nature Park and its geological and mining values, have made possible to find 25 geotouristic sites and several geotouristic routes.

These geotouristic sites and routes include the most important geological values of the Nature Park: Proterozoic and Palaeozoic materials of the Ossa-Morena Zone and Sudportuguese Zone that compose its main structure; the abundance of basic and acid igneous rocks and their particular geomorphology; the amphibolites of Beja -Acebuches, which are interpreted as the remains of an ancient ocean floor, which would indicate the existence of an old suture zone between tectonic plates; the materials of Permian and Triassic age represent the filling of the post-orogenic continental basins of San Nicolás del Puerto and Viar River, with abundant fossil flora, which include the existence of several fossil logs; and the ancient and varied miner and quarries.

This presentation contains three main contents: a brief summary of the geology of the Sierra Norte Nature Park, the geotouristic values and geological routes and geo-tourism development in the region.

# **A new Geopark in Kozjansko, an idea born from the "DEDI" online Encyclopaedia**

**Mateja Golež, Tomaž Majcen**

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The project DEDI II, which was terminated last year, created an online encyclopaedia of natural and cultural heritage in Slovenia. This database can be accessed through the webpage [www.dedi.si](http://www.dedi.si) and contains numerous descriptions of geological natural treasures and sites of Slovenian cultural heritage.

The interdisciplinary project successfully networked experts from the backgrounds of natural, technical as well as human sciences and the outcomes of the common work are currently in the form of 434 written contributions in the fields of tangible and intangible culture as well as natural heritage.

Looking at natural and cultural heritage in the region of Kozjansko (Eastern Slovenia) enlisted in the DEDI online encyclopaedia; the experts discovered a possibility of engagement in activities which would lead to a creation of a new Geopark in Slovenia.

A part of the Kozjansko region is already under protection as the regional park and the entire area is a composite part of the newly established biosphere reserve Kozjansko and Obsotelje in the framework of UNESCO's World Network of Biosphere Reserves 'Man and Biosphere (MAB)'.

The whole of Kozjansko geological area is characterised by the sediments with diverse fossil fauna, numerous springs of thermal and mineral water as well as a rich history of mining. The region's cultural heritage is embodied in many medieval castles and a common history with the Counts of Celje. Furthermore, Kozjansko ethnographic heritage is manifested through the area's traditional architecture in addition to the handicrafts still practiced by the local population.

The proposed scheme for the new Geopark in Kozjansko is based on the sample project in the village of Padež. In the vicinity of a local farm, close to which an ancient mine of lead and silver has been discovered, a forest nature trail will be traced out. The inhabitants of the farm will be qualified for guiding visitors through the almost five hundred years old mining shafts as well as educating children on their way through the forest.

The described geo-location of Padež is only the first in the line of numerous geological natural jewels, cultural heritage points of interest, ethnographic particularities and touristic attractions which will be introduced and presented to the visitors of Kozjansko through active cooperation with the local population and represents the starting point for the region's new Geopark.

# **The Geopark concept in Latin America and the Caribbean: towards a sustainable development strategy**

**Denise Gorfinkiel and Paula Santos**

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In the last year, the work of the Earth Sciences Programme of the Regional Bureau for Science of UNESCO in Latin America and the Caribbean has focused on the creation of a Geoparks Network in Latin America and the Caribbean. As a first stage, efforts have been made towards depicting a basic mapping of the universe of potential Geoparks in the Region from two approaches: geological and institutional, having as baseline concepts "integrated management" and "socio-economic sustainable development".

The concept of "integrated management" seeks to balance environmental, economic, social, cultural and recreational objectives, all within the limits set by the ecosystem and its natural dynamics. The concept behind this idea is sustainable development and refers to the integration of all relevant policy areas, sectors, stakeholders and levels of administration. The contribution of Geoparks towards sustainable development needs to be better appreciated as they are part of an integrated concept of protection, education and sustainable economic development where citizens, public managers, private sector, conservation groups and scientific organizations work together. In this sense, a Geopark requires a sustainable development strategy.

The Latin American and Caribbean landscape has its particularities. These refer to the fact that they are mainly developing countries which base their development strategies in different economic activities. One main obstacle for LAC countries to implement Geoparks could be conflicting interests based in the lack of understanding of what a Geopark is and the lack of integrated management.

Having these aspects in mind, a preliminary general listing of sites was produced, as well as of Geopark-related national institutional structures. It was found that there are areas already calling themselves a Geopark.

Within this context, drilling on the prevailing concept of Geopark in Latin America and the Caribbean has been considered essential for better understanding potential partners. Analysis of results in relation to UNESCO Geoparks integrated management and sustainable development criteria could also be decisive for mutual understanding between UNESCO and stakeholders.

This work will present the preliminary results of an exercise of characterization of the Geopark concept in Latin America and the Caribbean through content analysis of secondary information sources available for Latin American sites calling themselves as Geoparks.

The goal is to empirically contribute to building up of a UNESCO Geopark paradigm in the Region that arise from its own actors having as guiding principles those of integrated management and sustainable development, which are essential to the UNESCO Geopark concept.

## **Open and international competition for architects..... Jøssingfjord – the heart of Magma Geopark**

### **Bess Grastveit**

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A science- and documentation center in Jøssingfjord will be the heart of Magma Geopark. The geopark-administration will have their offices there, and the center in Jøssingfjord will function as coordinator for the different activities the geopark initiates.

We are planning to build a modern science-center, where visitors can experience, see and hear our region's geology, history, industry, culture and nature. Visitors in the center will be pupils, students, tourists, companies on team-building, organization and our own population as a whole.

Jøssingfjord is chosen as location for the center because of the fjords spectacular nature, its long tradition as harbor for the mining industry, the industrial activities that still go on here, and its mining- electricity- and war history. The center will have a strong connection to the industry in the region, and contribute to more knowledge about our business life in general – with a special focus on our strong mining-traditions.

The department of culture in Norway advice us to arrange an open, international architect-competition for the new center. We listened to that advice, and the program for the competition was ready December 2010. The program was written in Norwegian, but when the time limit was reached, we saw that also architects in English-speaking countries have participated. The architects are asked to draw the building, suggest what kind of materials that ought to be used, and how the rooms and facilities inside should look like. As this abstract is being written, the jury is going through 136 drawings of the center. This makes our competition one of the 5 most popular in Norway – ever!

When we arrive in Langesund in September 2011, we will know who won the competition – and we will show how the center will look like. The new science-center in Jøssingfjord will be of great importance for Magma Geopark, for the museum in the region, for all the schools – and for the whole population of our region. We will also use this center to promote European Geopark Network and the other Geoparks in the network.

# Interpretation, education and community involvement – the people behind the projects

## Brian Gregson & Robina Barton

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We all recognize the importance of our geological heritage, and the potential it has to benefit our communities in multiple ways. As Geoparks we want to interpret our geology for the public, encouraging people to get out and explore, and providing information to help them when they do. This has the double benefit of helping local residents to appreciate what is on their doorstep, and encouraging people from outside the area to come and take a look.

At Geopark Shetland, we have worked on a series of interpretive projects over the past three years, resulting in a series of end products, ranging from geo-art exhibits, to interpretive panels and promotional posters. In themselves these products benefit our Geopark, by adding to the range of visitor information and attractions we can boast.

However, it is not just the end-product, which is important, it is the process by which it is achieved. We have tried to ensure that our projects are inclusive throughout. By involving different individuals and groups within the Shetland community, we have been able to benefit from their expertise and enthusiasm, while offering them an educational experience in return. By this two way process we are fostering community interest and ownership of the Geopark.

In this presentation we would like to highlight the ways in which people in Shetland have been involved in Geopark projects, and acknowledge the many and invaluable contributions that they have made.



# Linking Geodiversity and Biodiversity in the Hateg country dinosaurs Geopark (Romania)

Dan Grigorescu

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Geopark means not only geological sites and geomorphologic landscapes (= Geodiversity) of a region but also the living plants and animals (= Biodiversity), as well as the cultural and historical places of that region and this complex understanding and integration makes the specificity and oneness of a Geopark among the other types of protected areas. However the Nature represents the main concern of a Geopark which is followed through measures and activities for the Nature protection, conservancy and valorization. Therefore, the approach of the interrelation between the two essential parts of the Nature, the inanimated and animated ones should represent a major aspect in the Geopark activities. Normally, the concrete measures and actions related to this aspect differ within various groups of activities developed in a Geopark.

The paper presents how this subject is tackled in the Hateg country dinosaurs Geopark (HcdG) in the three major fields of action: tourism, education and scientific research. Both Geodiversity and Biodiversity are well represented in the HcdG, which holds numerous sites attractive for the visitors, relevant for ecoeducation, and inciting for scientific researches. Organization of tourist georoutes in which selected geological sites alternates with ones relevant for the biodiversity of the region, focus on Paleontology, as an interface between the Biodiversity of the past and the actual one, in educational activities in the schools of the region, scientific searches on the fossil ecosystems and the actual one based on holistic approach of the Geodiversity and Biodiversity, are among the adopted measures for linking the two Nature components in the Hateg Geopark.

An important impulse in developing searches on the Geodiversity and Biodiversity, with concrete addresses to the sustainable development within the HcdG gives the recently created Center of studies on Geodiversity and Biodiversity of the Hateg-Retezat region, located near outstanding paleontological sites with dinosaur egg nests. The creation of the Center benefited of a major financial contribution of the Norwegian government to whom we take also this opportunity for addressing cordially thanks. Already the Center produced a series of volumes on the Geodiversity and Biodiversity of the region which highlight the role that the integrated approach to Geodiversity and Biodiversity can have in sustaining the social and economic development of the region.

## **The NEED Project – an innovative educational initiative in the Burren and Cliffs of Moher Geopark, West of Ireland**

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7. The Burren Centre
8. Clare Farm Heritage Tours Co-op Ltd
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The Northern Environmental Education Development (NEED) Project is a transnational cooperation between partners in Finland, Ireland, Norway and Iceland. The project was part-funded under the EU Northern Periphery Programme over a 3-year period up to the end of 2010. Using the geoscientific knowledge for key nature sites (e.g. national parks, nature parks, Geoparks) in each country, the project partners set out to develop innovative, operational educational tools for the benefit of local communities, businesses, schools and visitors. A wide range of study modules and educational materials were produced which focussed on themes such as climate change, elements of geology, geological teaching materials, landscape evolution and natural hazards (see [www.geoneed.org](http://www.geoneed.org)). In Ireland, the protected iconic karst landscapes of the Burren and the spectacular coastal seascapes of the Cliffs of Moher in County Clare, on Ireland's western Atlantic coast, were chosen as an inspiring outdoor learning environment in a Geopark setting as part of the NEED Project. The resources developed under NEED are perfectly aligned with the educational and geotourism ethos of a Geopark and will represent a significant enhancement of the Geopark experience for both locals and visitors alike.

A series of educational resources (*Stone, Water and Ice* series) were developed and distributed to schools, visitor centres and businesses throughout the region. The resources include an illustrated A5 booklet on the geology of the Burren, a teaching information and worksheet pack, a pocket fold-out information and map brochure (Z-Card), large map panels, and a scientific review of geological research in the region. In addition, a series of interactive Google Earth maps, models and photo tours of the region were developed and are available on the GeoNeed.org website. Visitor centre staff, and nature guide training was provided by the Geopark staff to assist in intergrating the resources in ongoing educational and tourism initiatives. Additional support was provided to members of the Clare Heritage Farm Tours Co-op, and the Burren Ecotourism Network. The *Stone, Water and Ice* educational resources have been incorporated into an ongoing primary schools (My Burren Heritage) schools programme, and an evening community geology course that takes place in spring. The resources are also provided to visiting third-level geological, environmental and archaeological research groups from Ireland, Europe and North America.

## **“Hybrid research” and participatory science experiments in the aspiring Bauges Subalpine Geopark (France)**

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The concept of "hybrid research" indicates a brand of scientific research which simultaneously serves and associates the expectations of both the fundamental geosciences, and the promoters of geotourism and “geoeducation” (Hoblea et al., 2010).

This concept results in tools and methodologies conceived for this dual purpose, which we call "monitors". Since 2010, such tools are being tested in the aspiring Bauges Subalpine Geopark (French Subalps). Two examples of “monitors” experimented in the Bauges Massif are presented: “GeoVision” and the “Multifunctional Participatory Dye Tracing”.

- “GeoVision” consists of developing visualization and measuring tool for processes relative to external geodynamics. The aim is to increase the knowledge of these phenomena while making them visible to the general public. This tool is a development and an adaptation of the process HymageTIP: an optical sensor connected with specific software for image processing, initially conceived for hydrometric applications. So with the GeoVision concept, the scientific instrument also becomes a tool for the development of geotourism and for educational use. A GeoVision prototype is currently being tested for the measurement and visualization of the big floods which affect the Prerouge spring and cave, one of the most important karstic springs of the Bauges Massif.
- The concept of “Multifunctional Participatory Dye Tracing (MPDT)” refers to dye tracing experiments carried out in order to: (i) increase the knowledge about the functioning and the boundaries of a karst system, (ii) give useful data for the management and the protection of the karst aquifer and springs, (iii) involve relevant parties (scholar, local stakeholders, farmers...) and raise their awareness about the underground water vulnerability. The first experiment took place in June 2010 in a karstic mountain in the heart of the Bauges massif, in association with the cavers and the pupils of the local middle school, within the framework of their curriculum in Earth sciences and environmental education. The pupils were able to participate actively in the experiment which reached the three goals explained above. A second experiment is programmed in May 2011 in the northern part of the Bauges Massif, also involving local farmers.

In the two “monitors” presented, “Geovision” and “MPDT”, the participatory dimension is very important. Participatory science is particularly suitable for applying Sustainable Development in

territories such as Geoparks. It allows to actively associating the local populations to the management of local natural resources in order to develop a better governance of the territories.

#### References

Hoblea F., Cayla N., Denimal S., Renau P. (2010). When the promotion of the geoheritage helps geosciences and vice-versa: The concept of Hybrid Research applied to the geoheritage of the Bauges Massif (French Prealps). In Rodrigues M.L. and Freire M.E. (Eds): Proceedings of the International Conference on Geoheritage and Geotourism, Lisbon, 92 p., 37-38.

## **“Park Quality” project: the agro-alimentary sector**

**Rigatti Ilaria** <sup>(1)</sup>

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The quality of tourism enterprises is indispensable goal to compete with other tourism resorts, to attract new tourism demand and to build customer loyalty. Quality may be seen under at least two approaches: as tourist trend, i.e. measure of quality perceived by tourists, made through surveys with tourism operators, in order to become aware of the needs of the guests and in consequence to revise one's policies and ways of acting; as improvement of environmental and service performance, as well as sensitising and informing on these themes. In Summer 2003, also for this reasons the “Qualità Parco” project was started. This is the quality label awarded to accommodation structures such as hotels, garni, campsites, to typical structures and to the agro-alimentary sector. The Park believes that the project is an important chance of local economy growth and of stimulus to the diffusion of a new environmental awareness. For these reasons it want to use its label as territorial marketing tool, able to help a sustainable tourism and enhance local identity. The structures involved in the project contribute actively to maintain the ecological integrity and natural processes of intact natural landscapes, to fight pollution, and to lower their own pollution outputs. A survey done some years ago by the Autonomuos Province of Trento on the “Trentino gastronomy” demonstrated that 50,7% of tourists wish to taste the typical regional cuisine and that 74,3% deems rather of very useful the introduction of the product mark. The need of niche products is therefore very strong with the tourists. The Park prides itself of many typical products and therefore it approved a list of 14 typical and traditional products to be provisionally considered the “Products of the Adamello Brenta Nature Park”. The list includes the typical, traditional products with high environmental value, that are part of the Official List, produced only or prevalently within the boundaries of the Park and that contain in their name a clear reference to the Park's area. This way they become clear expression of ties with the territory of the protected area and show unequivocally their provenance from the Park. For all this reason in 2008 the “Qualities Parco” project was extended to the agro-business; in particular, agreement protocols was be prepared by the experts of the Park and Det Norske Veritas Society, concentrating on the dairy and honey pilot sectors. A “Basket of Park products” has recently been created that includes 14 typical products from the protected area.

# “THE CARPATHIAN PERȘANI GEOPARK” INITIATIVE

## Soós Ildikó

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Situated in the center of Romania, North – East of Brasov Metropolitan Area (one of Romania's largest cities), The Carpathian Persani Geopark Initiative (with a surface of approximately 1100 km<sup>2</sup>) is composed of 15 communities and 14 existing natural protected areas.

Today the natural heritage of the future geopark, is preserved in 14 existing protected areas. With a surface of almost 305 km<sup>2</sup> and 28% of the territory of the geopark, these natural reserves are divided into 10 geosites and 4 biodiversity sites.

The 10 geosites are as follows:

- **Racoș Geological Complex** including **Racoș Basalt Columns**, which is a declared natural monument;
- **Hoghiz Basalt Micro – Canyon**;
- **The Basalt Columns from Piatra Cioplită** – natural monument;
- **Rupea Basaltic Cliff** with its fortress(historical monument of national importance);
- **Carhaga Fossil Site**;
- **Ormeniș Fossil Site**;
- **The Mud Volcanoes from Băile Homorod**;
- **Dopca Gorge**;
- **Comana Cave**;
- **„Bârlogul Ursului”(Bear's Den) Cave.**

Also on the territory of the future geopark there are a number of unprotected places of geological importance such as: **Olistoliths**, **Fossil Sites**, **The Seashells Cave** or **The Geological Paths** on Comana and Veneția Valleys (approximately 1 billion years old rocks).

Besides the above mentioned geosites in the area there are a number of biodiversity protected areas such as: **Dealurile Homoroadelor Natura2000 Site**, **Cotul Turzunului Birds&Fauna Natural Reserve**, **Pădurea Bogata (Bogata Forest)**.

**Natura2000 Site** for habitats and bird protection, **Dumbrăvița and Rotbav Sites** part of a larger Natura2000 site for birds&fauna protection – it is worth mentioning that Dumbrăvița is also a Ramsar site, also known as **The Carpathian Delta**. All the natural reserves for biodiversity conservation are situated on one of Romania's most important bird migratory routes (the 5<sup>th</sup>).

The territory of the future **Carpathian Perșani Geopark** is also known for its large number of historical landmarks important for the history of the local Romanian, Saxon and Hungarian communities. Worth mentioning are: **Archeological Sites** such as the Dacian Fortress from Tipia Ormenișului, the Roman Fort from Hoghiz or Paleolithic and Neolithic settlements; **Medieval Fortresses and Castles** such as Rupea Fortress, Feldioara Fortress – built by The Teutonic Knights,

Heldenburg Fortress, The Bethlen Castle from Racoş, The Kalnoky and Haller Castles from Hoghiz; **Evangelic Fortified Churches** from Drăuşeni, Caţa, Homorod, Ungra, Măieruş or Rotbav.

Our organization (Geopark Perşani NGO) is active in environmental protection and its main goal is the sustainable development of the Northern and Central areas of Perşani Mountains. To date our organization is the custodian of 8 protected natural areas (6 geosites and 2 biodiversity sites – for which at the moment we are in the process of elaborating statutes and environmental management plans) with an approximate surface of 15000 hectares. Besides our efforts in environmental protection as custodians we are involved in several programmes with the aim of improving the conservation of the natural areas of the future geopark, such as:

- founding member of the L.A.G. -Braşov-North Transylvanian Association;
- the on-going project called Assessment and Improvement of Biodiversity in the Northern and Central areas of the Perşani Mountains, financed through the U.N.D.P. programme;
- the on-going project titled The Re-ecologisation and Revegetation of Racoş Basalt Columns Site and Initiating *The Racoş Geodrome*.

For 2011, our organization aims to accomplish the following goals:

- to finalize the documentation for adhering to EGN;
- further development of the partnerships with the Geology Faculties of Bucharest University and Babeş – Bolyai University from Cluj-Napoca with the goal of establishing annual geology camps in Racoş and creating a local geological museum;
- publishing a geo-tourism guide of the area; developing a geo-tourism infrastructure with specific routes and paths with a length exceeding 200 km.

## Promoting social values: a strategic tool for geoparks

**Cristina Iturriagoitia**

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The Basque Coast Geopark aims to be a vehicle to promote social values as a strategic tool to face the future social, economic and environmental challenges of this region. After an exhaustive study, we have identified the key values to extol: integrity, respect, entrepreneurship and cooperation-collaboration. In order to put these into practice, we have identified the following lines of action:

- Zabalduz (awareness): To raise awareness among the public and social agents on the importance of values to develop a sustainable and competitive region, and on the key values of the Geopark.
- Saiatuz (project development): To put into practice and share among the public and social organizations the key values by developing projects that contribute to disseminating and strengthening the aims of the Geopark. Elkarlanduz (alliances): To boost participation and collaboration among all the social organizations of the Geopark in order to promote the key values.
- Aztertuz (research): To monitor and evaluate the action plan and the project in general.



# Sidestepping Geo-tourism

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As widely indicated in much of the literature concerning geoparks, geotourism is recognised as one of the key pillars that hold the concept together. However, just a cursory search through a range of resources on the internet will reveal a confusing array of definitions and origins to the term. The principle battle ground is set between the National Geographic Society on the one side, who are eager to espouse a definition which revolves around the **geographical** character of a place. Whilst on the other side, figures from within the geological community and in particular the geoparks network are keen to point out that earlier definitions have stressed that geotourism should be understood as focusing on the **geological** and geomorphological features of a locality.

But initial findings from interviews with residents and tourists alike in a number of European geoparks, indicate that whichever version is adopted, there is a low level of awareness as to what geotourism means. This suggests that the tug of war over definition may be something of a red herring and a distraction when it comes to actually delivering successful and sustainable development through tourism. As the EGN website highlights,

“Geoparks adopt a holistic approach to their heritage and promote all aspects of their region’s natural and cultural heritage”.

This paper therefore reflects on whether it may not be more beneficial for geoparks to concentrate efforts on developing a range of tourism products and strategies that stress the broadest relationships between the geological and cultural landscapes of a territory, rather than limit themselves to a target audience of niche tourists that are directly motivated to visiting sites principally for their geological values. As emphasised at a number of EGN and GGN platforms, the essence of the geoparks movement is to make the public aware of the linkages between Earth and humanity and for territories to benefit from those links in a sustainable manner. To achieve such developmental goals, it would seem to be most beneficial to utilise an approach to tourism that introduces a melting pot of elements from the earth sciences, to ecology, archaeology, social anthropology and history, and in so doing provide a whole range of motivations for tourists to visit geoparks and find out more about the bridges that exist between our Earth and the humanity that has populated it.

## **Geoaesthetic Indicators**

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Landscapes, according to the diversity of values have attracted different groups of experts to ordinary people from the past so far. The aesthetic and landscapes aesthetic have been discussed, at least since Socrates, by Subject philosophers and artists. Recently a large range of environmental planners and manager's have joined the same discussion. Understanding and assessment of landscape aesthetics, a subject that is interdisciplinary research framework of different sciences such as geography, landscape architecture, psychology and philosophy goes beyond. One of the elements of effective aestathic natural landscapes is geodiversity. Moreover, Geodiversity, is an independent factor in aesthetic assessment, have a great impact on biodiversity aesthetic also. From the past, two major objective and subjective approaches has been used for natural landscapes aesthetic assessment. In objective approach, mainly physical factors such as colour and colors contrasts, the special and unique of strange phenomena, active processes and a distinct smell of geosites will be assessed. In this paper, geo- aesthetic (geology and geomorphological) factors are discussed.

# The Maragheh Geosite, A Key Geopark From Iran

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The end of the second millennium and the beginning of the third is characterized by the increased interest to nature over the world. This is an index of that the artificial landscape is not enough to satisfying men who is a part of nature thus he quartered to tourism and link to nature becomes more and more attraction, sometimes a necessity. The increasing amount of tourists, who vacate in natural environments, increases the pressure on some parts of earth. Geosites as unique and non-renewable resource of earth are very attractive for tourists; they are vulnerable phenomenon as well. It is clear that usage and utilization of them, on relevant legal elements, detailed studies and elaboration of usage can prevent problems due to unsuitable usage and promotes sustainability. The Fossiliferous Geosite of Maragheh in Azerbaijan at northwest of Iran, with a lot of outcrops and unique mammal's fossils is one of the most unique geosites whose remains can answer to important questions about mammals evolution. Investigations revealed that the Maragheh fauna at least consists of 15 family, 37 genera and 37 species of mammals . With respect to fossils related to Hipparion horses for example "*Hipparion gettyi*, *Hipparion koeingswaladi*, *Hipparion primigenium*, *Hipparion dietrichi*, *Cremohhipparion mediterraneum* +*Hipparion prostylum*, *Hipparion Campbellei*" and their special correlation with those of so called Pontian mammals communities( 30-40 altitude), it is pragmatism that the Maragheh fauna belongs to late Miocene and early Pliocene (Campbel et al,1980 & Sohraby Hashjin,2008). In addition occurrence some species of Hyena, Rodenta as *Pliohyrax kruppi* and *Pliohyrax graec* and two new species of Rhino *Chilotherian persia* and *Iranoterrium* (Representation of speciation in Iran), the site seems more significant. Based on types and abundance of yielded fossils, there are three kinds of fossils in Maragheh geosite:

- 1) Fossils that a plenty of them occur in the region include: hipparion
- 2) Rare Fossils that remove them, reduce their scientific value
- 3) Rare fossils that are yielded (carnivorous, primate)

In addition, it seems to be a suitable site for establishing a fossiliferous geopark to serve several goals, teaching and researching Earth science and geotourism's multipurpose. Its findings can be used to modeling climate changes, environmental alternations and Earth science teaching though. This survey by reviewing documents, collecting field information and analyzing them, attempt to illustrate feasibilities and opportunities of this site to establish a geopark and its role in global geoparks network and geotourism's purposes.

## References

- Amrykazemii ,A.2009. The Atlas of potential of geopark and Geoturism of Iran. Geological survey of Iran
- Bernor, R.1986.Mamalian Biostratigraphy, Geochronology, and Zoogeographic Relationships of the Late Miocene MaraghehFauna, Iran. Jurnal of Vertebrate Paleontology 6:95-76, March 1986

Pickford. M.2009.New Neogene Hyracoid Specimens from the Peri-Tethys Region and East Africa. Paleontol Res 13(3):265-278.

Pur-Abrishami. Z et al. 2005. Vertebrate fossil study and exploration of Maragheh formation .Journal of Earth science .no.67

Şevket ŞEN 2008.KÜÇÜKÇEKMECE (İstanbul) A late Miocene mammalian fauna, and its environment.Muséum National d'Histoire Naturelle – CNRS

ŞEN Ş. Et al 2008.Taxonomy and Evolutionary Pattern in the Fossil Hyaenidae of Europe .Elsivier.com/relrie

Sohraby hashjin, A.(2005) . Evolutional procedure of horses' of varzagan and thier phylogenic with other horses of Greek, Afganestan , Pakistan and India pontian region. theses for MS. Shahid Beheshty University

8-Tadao Kamei et al. A General Report of Geologicl and Paleontological Survey in Maragheh Area, North – West Iran, 1973. Memories of the Faculty of Science, Kyoto University, Series of Geol & Mineral

9- Zare g.2010. Maragheh Bon Beds Late Miocene Rhinos. 27<sup>th</sup> Earth science conference of Iran. 20-22<sup>th</sup> Feb. Tehran

# Value and Necessity of Gangwon DMZ Geopark

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The DMZ in Gangwon-do is possessed of geomorphological and geological resources which have been formed from time immemorial. In addition, DMZ has been formed in history of Korea, and possessed cultures unique to DMZ. In addition, DMZ has eco-resources that have still remained intact and unexplored. The purpose of this project is to make efforts to make geomorphological, and geological resources exceptional in its academic and scenic value of the bordering district in Gangwon DMZ and the history, culture, and eco-resources unique to this district into UNESCO-certified World Geopark, and to promote the sustainable development of its bordering district. This area is possessed of geomorphological and geological resources such as Basalt Landscape-Granite and Metamorphic Rocks Landscape and Coastal Landscape. These resources formed the major geosite of Gangwon DMZ Geopark that Basalt Valley of Cheolwon Daegyo Stream, Hwacheon Yangguidae, Yanggu Dutayeon, Inje Daeamsan Dragon Swamp and Goseong Hwajinpo. This project, in cooperation with Gangwon-do, and five local autonomous entities such as Cheolwon-gun, Hwacheon-gun, Yanggu-gun, Inje-gun, and Goseong-gun, will greatly contribute to the securing of international competitiveness of DMZ and its adjacent districts, and revival of the local economy of the bordering districts.

## References

The Business Plan of Geopark Agency of Gangwon DMZ

Chang-Hwan Kim, 2007, A Study of the Spatial Rang of DMZ,

Chang-Hwan Kim, 2009, Geomorphological Landscapes Research and Utilization of DMZ and Borderland

## **Rokua Geopark – Developing business activities in the tourism sector**

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Rokua Geopark was accepted into the Global and European Geoparks Networks in October 2010 during the 9th EGN Conference in Lesvos, Greece. Rokua is situated in Northern Finland, about 200 km south of the Arctic Circle between the cities of Oulu and Kajaani.

One of the most important tasks of Rokua Geopark is to develop business activities in the area, especially in the tourism sector. The obligation comes with the fact that most of our basic funding comes from the local municipalities and businesses which are expecting to see a positive change in the area's economy. The Geopark brings together the municipality officials, business owners, and organizations involved in marketing and developing regional tourism.

For the most part Rokua Geopark is situated in sparsely populated countryside which has suffered from population migration to the bigger cities. Traditional livelihoods like agriculture and forestry offer jobs to fewer people. The area has some strong companies in the tourism sector, but more and better services are required in order to provide more jobs for the local people and better quality services for the tourists.

Some results have already been accomplished. We've been able to get a privately owned company to take care of the information services in our main information center, we've gathered the businesses and municipalities under the Rokua Geopark visibility in tourism fairs, we've received some very good media attention, and for example we had a short article about the Geopark in The Air Baltics inflight magazine. We've also reached a new type of tourist; in the summer of 2011 we will receive the first cruise ship tourists to the Geopark. In general the visibility and significance of our area has risen.

For the future we still have many of challenges in making our area more attractive and better known among tourists from Finland and abroad. One of the most important questions is the long term commitment of the small and medium sized businesses to the Rokua Geopark project.

The Geopark has made an agreement to do a follow-up study with the Oulu University on the changes the Geopark affects in the area. The study will be made in two phases; the first phase is a pre-Geopark study on the impacts of tourism and the second phase will occur after four years of functioning as a Geopark.

# **Interpretation: how to communicate complex or scientific geological information to audiences in geosites?**

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Interpretation is widely used in places attractive to visitors, be it historical monuments, religious sites, arts and cultural institutions or natural/outdoor areas. When implemented effectively, interpretation not only greatly aids the successful management of the site, but also heightens visitors' experience and enhances their appreciation and knowledge of the site. Interpretation may be considered as a form of communication between the site managing authority and the visitors. As in all forms of communication, it is necessary that both message sender and message receiver (or audience) "speak the same language", or it is highly probable that there will be a communication breakdown. In the context of tourism, interpretation is an educational activity, but the audiences are usually non-captive and may have different motivations of visiting the site, diverse interests, varying degree of prior knowledge and they are likely to lose their concentration or attention if they do not find the interpretation materials or messages of use to them. Thus, it is imperative for site managing authorities of tourism destinations, including geoparks, to understand their visitors' demographics and motivations of visit in order to offer interpretation that is interesting, relevant and understandable. Sites of geological significance are often popular tourist destinations. These sites may include the formation of landscapes and geo-features, as well as ecological resources such as vegetation and wildlife. Although many visitors may have basic knowledge of geology, it may be insufficient to grasp interpretative information if the latter is overly complex or written with too much jargon. In addition, geology is little taught in curriculums at school level in many countries. In other words, visitors' prior knowledge in geo-sciences and related jargon may be limited. Nevertheless, this is not to say that visitors have deficiency in understanding complex or scientific messages. The issue is how site managing authorities compose interpretation using simple languages without compromising scientific integrity whilst integrating interpretation into the overall site management strategy. This exploratory paper aims to identify how and why interpretation in geologically significant sites should be formulated and communicated to visitors in order to complement the management of the geosites.

# **A participatory approach to local resources investigation and community-based tourism planning for protected landscape conservation: a case study of Taiwan, Chinese Taipei**

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In 2005, both cultural and natural landscapes have been introduced into the newly amended Cultural Heritage Preservation Law as new legal items of heritage conservation in Taiwan. Unlike traditional protected areas, protected landscape is a new concept to Taiwan which emphasizes interaction of people and the land. Therefore, how to plan and implement cultural and natural landscape conservation is a question of concern for the lack of experience. In order to help stakeholders of governmental authorities and local communities to apply this new item, this research explores some community-based participatory approaches to enhance partnership and capacity-building among them.

The research especially learnt from ideas and the operational guidelines of IUCN protected area category V and UNESCO geoparks. A pilot study area of the Fun-nan village in Hualien County was selected as a potential protected landscape site to figure out a suitable participatory mechanism for implementing protected landscape conservation as well as community-based tourism development. A participatory action research was employed in the case study area to explore the stewardship issues between the local authorities, community, school and their surrounding protected landscape. The findings show that the 'school-community partnership platforms' are like new bridges connecting local communities and their schools. Through the discussion and working on the platforms, both members of communities and schools figured out a common ground of their interests and draw up proper community projects for investigating protected landscape collectively. The platforms prove to be a genuine assistance to carry out local resources investigation and community-based tourism planning.

**Keywords:** protected landscape, operational guidelines, community-based tourism, collaborative planning, school-community partnership



# **TERRA.vista – a new way to impart geological knowledge from lookout points**

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Lookout points and observation towers are ideal opportunities for a Geopark to inform visitors about geology and the history of landscapes. By giving them the chance to get an all over view on a different scale, it is in many cases far easier to explain geological facts in a bigger context. Many geological fieldtrips start on lookout points, for they are the best places to give an introduction. On guided tours it is easy for the tour guide to give all the necessary information to a small group. But what about people, who visit the lookout points or observation towers on their own? In these cases, panels with pictures and written information about the panorama are the classical way of interpretation. These installations often face problems involving vandalism, lack of space on tower-platforms, high costs if contents have to be changed and other technical details. TERRA.vita therefore decided to try a new way of giving information, based on the fact, that nearly everybody is carrying a mobile phone today. The system is based on short texts and dialogues that are read out to visitors, who call a toll-free number at the lookout. The texts and dialogues tell the visitor, what he or she can see from up there in an interesting and amusing way. As in any other case, information on geology, earth history and cultural history are combined in the content.

The advantage of this kind of edutainment on one side is that the hardware that has to be installed at the platform is minimized to a little panel with just two sentences for explanation and a phone number. In some cases an additional compass rose has to be installed. On the other hand, contents can be changed easily by uploading a new or reworked audio file.

In the case of TERRA.vita , information-audios have been produced and installed for 10 observation-towers and two lookout platforms in a first step. Across a monitoring system it is possible to count the calls to find out if the system works successfully.

## **The historical-cultural identification in Araripe Geopark's geosites**

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Located in the southern state of Ceara, the Araripe Geopark is part of a special region called Cariri amid the semi-arid Northeast of Brazil. The area is characterized by numerous springs of clear waters that gush from the foot of the Araripe Plateau, springs which are producing a humid and mild weather. This natural condition attracted in the past many indigenous peoples who settled in this region, followed by an extensive colonization and the emergence of the first villages and towns of the first Caririenses. The miscegenation of various peoples (indigenous, European and African) and the relative isolation of Cariri in relation to major capitals, has given the place a distinct cultural identity which now can be seen performed in various folkloric dances, singing, religious and artistic expressions. Before that, the area of Cariri passed to be known nationally as a "Cultural Caldron" that maintains lives their ancestors' traditions. Since the establishment of the Araripe Geopark this historic and cultural heritage has been published, valued and promoted as a major component of the identity of the region. Because of this regional importance, the Araripe has invested heavily in the enhancement of this heritage also associated to the geosites. The main geosites of the Geopark have, in addition to its exceptional geological interest / paleontological, a high historical and cultural relationship with the local population, thus favoring its dissemination, integration and maintenance. Also, this strategy has encouraged a sense of ownership of geosites by the community, bringing them more and more to the expectations of a geopark. With this experience, the Araripe Geopark main link of the future Latin American and Caribbean Geopark's Network , hopes to serve as examples to supply the need of inclusion of historic and cultural heritage as a major guiding elements of activities and actions of geoparks, instead that the LAC also have a strong identity as a particular historical-cultural communities.

# Introduction of Taiwan, Chinese Taipei, Geopark Network

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Following the guideline of Global Geopark Networks, Taiwan Geopark Network was launched from 2011. The purpose of Taiwan Geopark Network is trying to (1) establish a national network for promoting the concept of geopark; (2) exchange the experience of management of the sites; (3) educate visitors to protect the landscape for the purpose of sustainable development during using or visiting the geological/ geomorphological/ ecological and cultural heritage; to promote the local economic activities through geopark activities.

This presentation is trying to explain the progress and experience of geopark industry in Taiwan. According to the management plan, education plan, landscape resource evaluation of potential sites evaluation and local involvement, four national geoparks was designed at first face. All of the four Taiwan geoparks have different landscape characters.

The concepts of landscape conservation, geoheritage, geodiversity, geohazards and geotourism are introduced. The geopark network involved national scenic area, nature reserve, and national protected area and national park authorities. It is at the beginning stage of geopark affairs. However the geomorphological, cultural and ecological resources should be studied in more details. From this study, some conclusion should be stressed as below:

1. Specific landscape heritage is the basic requirement for a geopark.
2. Supporting from government, local people and all stake holders are essential.
3. Local involvement and local industry could be benefited from geopark activities.
4. Education program for all visitors and local people could introduce the concept of environmental education, enjoying landscapes and promoting local geoheritage.
5. Management plan could help for managing sites in a good way for sustainable development.

The national geopark network program is a link and supporting system to all the geoparks in Taiwan. It is hoped that through time, these geoparks can play an important role for environmental education, and sustainable development in Taiwan.

# New geopark, new website: objectives and challenges

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The **Basque Coast Geopark**, became a member of the EGN and GGN in 2010, is the result of a series of initiatives carried out within its boundaries, including the geotourism itinerary known as the **Coastal Flysch Route**. This thematic route has had its own website since 2008 ([www.flysch.com](http://www.flysch.com)), and this site received over 25,000 hits in 2010 alone. Among other things, it publicises guided tours and enables visitors to buy tickets for them online. It also allows people all over the world to learn about the area and has served as a tool for the development of the geopark's initiative in the municipalities of Zumaia, Deba and Mutriku.

At present, around 2,000 million people world-wide are using the Internet. This number is constantly rising and will soon reach 1/3 of the world population. The Internet is a great ally for carrying out innovative projects such as the creation of a geopark and the promotion of its strategies. More specifically, the Internet could prove to be the perfect tool for developing local tourism, rural tourism, nature tourism, and geotourism.

For 2011, the Basque Coast Geopark is developing a new website. This is a new challenge, with specific objectives, directly linked to those of the geopark, such as increasing the profits generated by geotourism, improving the prestige of the area, involving the local population in the development of the geopark, and raising the awareness of the local population and visitors.

In short, the development of a website not only represents a challenge, but also offers a unique opportunity to test a geopark's success.

# Geo- and Ecotourism developmental projects in the Novohrad – Nógrád Geopark

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There were a lot of developmental projects in the Novohrad – Nógrád Geopark since we connected to the European - and Global Geopark Networks. Based on the attraction inventory and the strategy of our geopark we formulated concrete aims. The four main directions of this are the: geo-, equestrian-, walking- and cycling tourism.

Since our connection we solved a lot of question about “how to organize a transboundary geopark” – both in the management and in the scientific sides. We conducted several Hungarian, Slovakian and transboundary projects in infrastructure-development and education, and evolve a good partnership with the Salgótarján Local -, and the Nógrád Area Tourism Destination Management.

In our presentation we want to show our work since we connect to the European -, and Global Geopark Networks.

## **Molina and Alto Tajo proposed geopark: main geological, environmental values and development project**

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The territory of Molina de Aragón and Alto Tajo, proposed for inclusion in the European Geoparks Network, spreads over the area known as Castilian branch of the Iberian Range in central eastern Iberian Peninsula.

Geographically, the region of Molina is part of the Iberian southern plateau, and divides the basins of two rivers, the Ebro (north) and the Tagus (south), which is the longest river in the Iberian Peninsula. The rivers that cross this region determine its physiography, and also influence its landscape, flora, fauna, and human settlement. The region's geology is characterized by a great geodiversity, derived from its location at an average altitude of over 1000 meters above sea level. This high altitude provoked intense erosion in river beds, which created valleys and canyons of astonishing beauty. This is singular scenery where a low population density and the absence of major infrastructures have helped to preserve a wide variety of lithological, geomorphological and tectonic elements which offer extraordinary conditions for the scientific study of the stratigraphy.

Thanks to its unique characteristics, the region has long been considered a classic area for paleontological studies. Indeed, the fossils from this region were the subject of the first Spanish treatise on Paleontology, published by José Torrubia in 1754. Numerous national and European universities have worked in this area since then. As a result of this work, more than 20 sections of archetypical geological formations with regional and national relevance have been located, with the Global Boundary Stratotype Section and Point of the Toarcian-Aalenian boundary of Fuentelsaz as the most relevant among them.

Botanically, the region is a mix of anthropized agricultural lands and extensive natural areas of autochthon vegetation. Natural areas support a rich biodiversity, with a wide range of microhabitats, where climatic and geographic elements are combined with relict and endangered species, and with a growing variety of wildlife populations.

Archeologically, this is an area occupied since ancient times, where we can find important samples of Paleolithic rock art, and also various Celtiberian castros that have provided valuable information about the Celtiberian culture.

In recent years, the preservation and divulgation effort made by institutions such as the Alto Tajo Natural Park and the Rural Development Association of the District has facilitated the settlement of local population and has increased the number of visitors. Integration in the EGN would be a definitive boost for the sustainable development of the region.

# **International cooperation for the strategic development of Dong Van Geopark (Vietnam)**

## **- GGN Bureau support mission 2011**

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At the end of 2010, on the request of Ha Giang Government (Vietnam) a GGN Bureau support mission is organized around the new Dong Van Global Geopark. This long-term mission is set up in cooperation with Hanoi University, the Vietnam Center on Karst and Geoheritage and participation of GGN experts.

The aims of this mission is to provide analysis of the situation and of the project, development and investment infrastructure urgent recommendations, development and orientation strategy for the establishment of an integrated development plan of Van Dong Geopark.

This communication will show the results of the mission and the bases for the new Dong Van Geopark strategy able to provide an integrated sustainable development for its territory.

## **Geoparks and indigenous population**

### **Example of the « Araripe Declaration » (Brasil,2010) and the « Melipeuco Declaration » (Chile, 2011)**

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During the first meeting of Geoparks in Latin America and Caribbean (Brazil, November 2010) it was adopted an international declaration, « Araripe Declaration », constitutive conceptual base for the future Regional Geopark network.

This declaration is giving, in the continental context, a special focus to indigenous population inside a Geopark project process.

Following this initiative, another declaration is adopted during the 1 symposium for Geoparks in Chile (Melipeuco, April 2011). This « Melipeuco declaration » follows the general orientation of the previous declaration but gives a new step by associating strongly the local Indians Mapuche community to the future management and orientations of the Geopark. Declaration which was officially firm by the Mapuche community and by the different National and Regional institutions involved in the project.

The Latin-American Geoparks are thus opening a new positive and strong line building new bridges with others UNESCO programs (intangible heritage, LINKS initiative, etc) and giving coherence with UN and international fundamental declarations (Declaration 13.9.2007, OIT 169,..)



# **Geo-schools: a commitment to education in the territory of the Geopark Villuercas Ibores Jara' project**

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Geo-schools is an educational intervention project involving all the centers in the territory that aims to improve environmental education in a framework of sustainability.

Geo-schools project is a joint initiative of the Regional Ministry of Education (Extremadura Region), the Local Development Department of the Provincial Council of Cáceres and the University of Extremadura. The main objective of the project is to improve the geo-environmental awareness in schools through active participation.

Educational institutions committed to participate in the project are as follows: four rural schools, six elementary schools, three primary schools, four high schools, as well as adult education classes and centers for teacher's training.

Geo-schools' project considers the Geopark as an experimental outdoor classroom. Educational materials are designed and provided by the University in collaboration with teachers based on the territory. The material covers diverse subjects as geology, biology, geography, history and other related elements as artistic and body expression.

The educational and scientific team prepares materials and resources that are provided to teachers and schools. They also conduct a program of technical and pedagogical advice, exchange of experiences, evaluation and other cooperation actions between the schools.

Each participant adopts a plan of action that involves the whole school community and expresses the commitment to the territory as a strategic key to preserve its future.

# **An environmental education project in Adamello Brenta Geopark: “Park Quality”**

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For the Adamello Brenta Nature Park quality is a philosophy, a method which guides all its actions and communications. To give concrete form to this philosophy, in 2001 the Park became the first European park to obtain environmental certification in accordance with the international ISO 14001 standard and in 2006 it received European Community EMAS registration. The certification has been a potent stimulus to improve management through programmes established year by year. Even more important strategically has been the aim of involving local businesses, administrations and moreover schools in the certification logic. This was the start of the “Park Quality” project.

The Park through this project rewards companies (local businesses and residents, tourist service providers, food and agricultural companies, typical holiday accommodation and schools) who satisfy the requisites of safeguarding the environment and close links with the local area and who share in the culture of the Park by granting them use of the "Park Quality" brand.

Regarding the school sector, an important objective is that of spreading out the environmental quality philosophy throughout a permanent project of environmental education called “Park Quality”.

The strategic value of this project in fact consists in spreading out a series of activities inspired at the best environmental practices through pupils.

The pupils, helped by the teachers, have to fulfil some obligatory and facultative requirements. According to the requirements act they can become aware about the problems linked to the environment and at the same time they can enhance their environmental consciousness.

Among the criterions for the brand’s awarding there are those one related to the structure’s management which have to be fulfilled by the environmental responsible of the school, those one related to the environmental education and the pupils’ involvement, and those one related to the relationship between the Park and the school.

Through the adherence to the project the school gages to the awarding of the brand but moreover to its maintenance throughout the years thanks to a proper “modus operandi”. The educational value of this project consists in fact in the continuance and the environmental improvement linked to the brand’s renewal.

The project is addressed to all the 59 schools of the Park. Currently the number of schools awarded “Park quality” is 19.



A moment of the awarding ceremony with the pupils of a primary school of the Adamello Brenta Nature park who proudly show the Park's cap and the exercise book which gained after a full year of commitment into the fulfilment of environmental best practice.



The "Park quality" brand.

# Larvikite, Norway's National Rock, as a Gea Norvegica Geopark Asset.

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This Geopark incorporates a special coarse-grained igneous rock, the syenite **larvikite**, exported world-wide as ornamental facing stone, etc.

## 1. Larvikite's commercial exploitation.

The larvikitic magma of the main (southern) intrusive complex (Tønsberg- Sandefjord- Larvik- Langesundsford) cooled / crystallised slowly beneath the surface, mostly as feldspar, whose blue 'reflection' is the prime reason for the rock's strong commercial status.

Study of the individual feldspar crystals in larvikite reveals that only one crystallographic plane in this mineral's 3D atomic structure displays the special blue colouration. However, on commercially cut and polished slabs a large percentage of the individual feldspar crystals show this, so these must have 'docked' in the same planar orientation from the cooling magma. This planar 'fabric' (inclination  $45^{\circ}$ - $90^{\circ}$ ): is seen in larvikite outcrops and in quarries: it formed by the feldspar crystals, whose shape appears 'flattened' in one direction, having been 'plastered' onto the solid walls ( and floors?) of the cooling larvikite bodies by downward flowing (convecting) magma. Thus larvikites are essentially sidewall accumulations of feldspar crystals, layer after layer, so they belong to the **cumulate** category of igneous rocks, i.e. those typical of **layered intrusions**. Larvikite's value has thus been enhanced by its feldspar-defined **igneous lamination**, stoneworkers having always known to work along this to obtain surfaces displaying 'maximum blue'.

## 2. Larvikite crystallisation beneath a Kilimanjaro-type volcano?

If the magmas of the main (Larvik) area had crystallised in isolation beneath the surface, then, with the crystal accumulation process operative, larvikite should **grade** into syenitic rocks of different mineralogy/composition. A likely explanation of why this is **not** so, is that the main larvikite complex was **subvolcanic**, having fed eruptions of an overlying volcano (now eroded away) as a result of periodic replenishment by syenite magma from the deep crust. There is field evidence in the larvikites for multiple injection (magmatic pulses), and interestingly the large, E. African Rift- related, central volcano Kilimanjaro ( which has 3 volcanic centres) and the southern larvikite body of the Oslo Rift are of similar dimensions.

On this scenario Norway's two Geoparks exhibit contrasting layered intrusions as in Greenland (gabbroic Skaergaard and syenitic Igaliko/Nunarssuit), Magma Geopark having gabbroic cumulates in contrast to the larvikitic ones. Thus, educationally, Gea Norvegica provides excellent scope for introducing 3D geological thinking regarding larvikite's commercial status and for geological interpretations including a huge trachytic central volcano above the main larvikite area of S. Norway.

# **Administration and Planning of the Tourism in Araripe Geopark: the creation of the operational manual of Geotourism, Ecotourism and Cultural Tourism**

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In 2010 the Araripe Geopark developed a set of management actions with the network of partners from the private sector with focus on implementation of regional development policy. The main actions were directed toward to the planning and organization of tourism. The institutional articulation was under the responsibility of ARARIPE GEOPARK and of SEBRAE, an agency of private enterprise partnership with public, nationwide, aiming to support and strengthen micro and small enterprises. The lack of products for the local tourism led to creation of different strategies from the Geopark, for engagement and promotion of local stakeholders. The creation of itineraries encouraged entrepreneurs of the various sectors like hotel, gastronomy, receptive tourism, field conductors and public authorities. The methodology of workshops, field research and questionnaire application were adopted to accomplish the collection of data. The consolidation of the information was accomplished by SEBRAE/ARARIPE GEOPARK that elaborated a publication denominated OPERATIONAL "MANUAL, GEOTOURISM, ECOTOURISM AND CULTURAL TOURISM", arranged so, first chapter: information, concepts on Araripe Geopark and GGN, and a group of images of the main visitation points. Second chapter: it presents the suggested tourist itineraries and description of the calendar of the main events and parties in Araripe Geopark's territory. The third chapter describes a database with information of the main points of craft sale, restaurants of regional food, hotels and travel agencies accredited to the partners' of Araripe Geopark net. The public institutions responsible for local tourism are also referenced in the manual. This book supplies the lack of specialized information on the promotion and dissemination of tourism, but in essence, is an example of good management practice. This project involved approximately 80 people of the tourist trade and a group of 55 companies in Araripe Geopark's territory. Some of these companies have worked on to be partners and receive information and training in different areas. A network of partners from the private sector of the Araripe Geopark was formed. In March it was a renewal of the commitment to continue the ongoing process of regional sustainable development for tourism and plan actions of consolidation strategies and goals for 2011. The results were published in the regional press and the industry is optimistic about the future of their businesses.

**Connecting conservation and agricultural activities  
for a sustainable development.  
The “flowering meadows” experience  
in the aspiring Bauges Subalpine Geopark (France)**

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30% of the Regional Nature Park (RNP) of the Bauges Massif is occupied by grassland which presents a remarkable biodiversity. 450 livestock farms use it to feed their animals in one of the 4 Protected Designation of Origin. It is an important constituent part of its landscape and of its ecological value (5 Habitats of European interest). Furthermore, natural meadows rich in flora express the typical taste of cheeses and other local products.

The quality of the pastoral lands is being threatened by simplified exploitation systems that tend to intensify farming on lands propitious to mechanization. The RNP looked for solutions to preserve this grassland.

The Park's ecologists looked towards a German Institute for Agro-ecology's experience which showed that some flower species insure a good status of conservation on grassland habitats while permitting a more than acceptable agricultural output (Oppermann & Gujjer, 2003).

For the Park, sociological aspects and the question of local appropriation are important parts of the project. In this purpose, the Park started collaboration with the National Institute for Agricultural Research (INRA EcoDevelopment) which one worked on territorialized Agro-Environmental Measures.

The Park decided to use the professional excellency contest. So, the first “Flowering meadows contest” took place successfully in foothills of the Bauges Massif Park in June 2007. Through this competition, the breeders seized the project and co-built a measure with naturalists. Then the RNP suggested to the State that « Flowering meadows » « output based » contracts could be created and developed. Today, the contest is renewed every year and has a national dimension through 25 others natural parks. Since 2008 to date, over half the farms in the Bauges regional park adopted contracts on 3000 ha.

The RNP also put in relation the beekeepers and the farmers registered in an ecological approach and created trademark "Bauges Massif Honey" which gives evidence of a partnership between them.

This experience takes place in the particular governance which the PNR implements: collaboration and implication of all concerned parties.

The farmers are recognized in the Bauges Massif as producers of high quality products and high quality environmental space and landscape. They are now in a better position to make their products more profitable and to participate fruitfully in regional development.

The RNP can better justify its actions to protect the environment since it is able to show the connection between them and local development and legitimate agri-tourism. This approach should be a model for the management of the Bauges geosites and the involvement of farmers in the Geopark experience.

## References

**de Sainte Marie C., Chabert J-P., Géniaux G., Delfosse C., 2005.** Quelle articulation entre économie de l'élevage et économie de la biodiversité ? Propositions méthodologiques pour intégrer la qualité des écosystèmes herbagers dans la définition de la qualité des fromages pouvant être produits sur le territoire du PNR du massif des Bauges.

**de Sainte Marie C., Mestelan P., 2006.** Enquête sur la généalogie du programme « prairies riches en espèces » du Bade-Wurtemberg (Allemagne). Application possible dans le massif des Bauges du nouvel engagement « maintien de la richesse floristique des prairies » dans le cadre des MAE T à partir de 2007, 15p.

**Mestelan P., Lopez JF., de Sainte Marie C., 2007.** Application possible dans le massif des Bauges du nouvel engagement unitaire « maintien de la richesse floristique des prairies », rapport intermédiaire, Fédération Nationale des PNR et du PNR du Massif des Bauges, 22p.

**Oppermann R., Gujer H., 2003.** Artenreiches Grünland bewerten und fördern -MEKA und ÖQV in der Praxis, Stuttgart.

**Thevenet Carole, 2005.** Evaluation des conséquences de contrats à objectif de préservation de la biodiversité sur des exploitations agricoles des Alpes du Nord, rapport de stage Master INA PG, GIS Alpes du Nord, 84p.

# **The Campos Gerais aspiring Geopark in Brazil: focusing our strategies**

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The region of Campos Gerais, located in the State of Paraná (southern Brazil), has a special geodiversity, with geological heritage consisting of Devonian fossils of marine invertebrates, several stratotypes of the Paraná Basin and an excellent record of Permo-Carboniferous glaciation of Gondwana supercontinent. It also has a spectacular geomorphological heritage: canyons connected to a swarm of Cretaceous diabase dykes, related to the South Atlantic Ocean opening; escarpments up to hundreds of meters of elevation and waterfalls; and a karst landscape of world relevance developed on siliciclastic rocks, with ruiniform relief, sinkholes, caves, underground rivers, among others. Originally displaying a phytogeographical domain of grasslands, patches of “cerrado” (a kind of savanna formation) and forests with Araucaria pine trees, the region has a human presence of at least 10,000 years, as witnessed by the widespread presence of art rock. Between the eighteenth and nineteenth centuries, the region served as a trade and transportation route for mules, which led to the creation of small towns. Along the twentieth century extensive livestock grazing on natural grasslands was a key activity in this region, gradually being replaced by current high technology and productivity grain crops. Additionally, the Campos Gerais society was organized with the help of immigrants from ethnic groups such as Germans, Italians, Russians and Dutch. The didactic value of geodiversity for years has provided an outdoor laboratory for students of different levels of education. The aesthetic value of Vila Velha and Guartelá State Parks and other geosites sustains strong regional vocation on Geotourism. Since 2008 a group is working in the region in strengthening geoconservation activities and the dissemination of geotourism, aiming also the establishment of a geopark. The experience of this period includes the resistance of some sectors linked to agribusiness, mainly related to the previous processes of protected natural areas creation, and the more friendly reception of specific municipalities, where geotourism and geoeducation activities are performed in partnership with the authors’ institutions. Today we are directing the focus of action not for the whole area of Campos Gerais, but to the municipalities of Tibagi, Piraí do Sul, Castro, and the State Park of Vila Velha in Ponta Grossa.



# Natural mega-hazards and geoparks

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Huge tsunami which was generated by the Magnitude 9 earthquake, offshore of the Tohoku district, Japan, on March 11, 2011 washed the Pacific coast as long as 500 km, taking lives of around 30,000. National and Quasi-National Parks in the coastal areas and some potential areas of National Geoparks were seriously damaged. Tsunami also damaged the Fukushima-Daiichi Nuclear Power Plant together with many thermal plants along the coast. Radiation leakage from the plant resulted in evacuation of people living within the area 30 km from it. Power shortage due to damage of these plants is introducing serious problems on human life and economic activity in Japan.

A research on ancient tsunami deposits by researchers of Geological Survey had revealed the occurrence of tsunami with the similar scale about 1150 years ago. Unfortunately, attention was not paid even in the national committees for earthquake forecasting; of course, not in the Nuclear and Industry Safety Agency. However, it is not easy to consider very low-frequent happening and very high-risk geological event, which occurs one time for one thousand years or more (M 9-class earthquake, caldera eruption and so on), within various social designs.

It is clear that this mega-disaster was introduced by unbalanced development of human life and technology with our insufficient knowledge and understanding on real nature. Although our knowledge on natural phenomenon that causes mega-hazard is limited, the geological history shows the occurrence record like the above research of the tsunami deposit. We should promote researches to understand the geological phenomena and the potential hazards, and the system in which the result is spread to the society. It is important in Geoparks to educate tourists, young students and local community, based on the latest scientific understanding, through guide training, geotour and communication in various opportunities.

Geoparks are important platforms where we can learn the geological process including the phenomena that may generate mega-hazards (earthquake, volcanic eruption, landslide, lahar, climate change etc). And also provides the opportunities to learn how to defend ourselves from natural disasters and to protect environment surrounding geodiversities.

## Geoparks inspire the future.

### Creating a vision of development from the management plan

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**Key words:** geopark, stakeholder engagement, strategic planning, geotourism

Geoparks are territories dedicated to sustaining local development and democratic participation, but they are also sources of inspiration. And the more stakeholders are inspired greater is the success of the geopark. That's why we believe a key part of the management plan has to be the Tourism Vision that makes planning an inspiration for stakeholders.

The Tourism Vision is the interpretation of the geopark as local entity in synergy with its territory as a baseline for education, tourism and local identity.

The Tourism Vision is following the new approach of "showing people that you are an excellent fisherman instead of teaching people how to fish". The aims is to showcase the skills of the team not only in planning but also in interpreting the plans for the stakeholders.

The Hateg Country Tourism Vision has written down on paper all the knowledge, ideas and goals that define the Hateg Country Dinosaurs Geopark, concluding and supporting the new management plan.

# Geoparks and geotouristic educational trails

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Educational trails are the favourite tools of environmental education, cultivation and awareness, which can mediate the information, guidance and pastime for visitors. This study assesses the informational technologies used in geologically interesting places in Europe, Asia, Africa and America and Australia.

European geoparks are abundantly equipped with the educational trails. The so-called geotrails are designed so as to be not only interesting and instructive for laic and scholarly public, but also for local inhabitants. These inhabitants participate in interpretation of attractions on trails in the role of geoguides, suppliers, small entrepreneurs, producers of local goods etc. Their prosperity depends on quality of information that is offered on these trails, on its elaboration and way of its insertion in the terrain.

An assessment of trails' level in the geoparks and similar areas (protected areas etc.) enables further efficient development of informational technologies significant for the good prosperity of geoparks. Among the traditional types of informational panels predominate the different vertical and gently sloping boards made from natural materials as wood, stone and sometimes metal. The panels and similar structures from wood, stone, steel, polychrome metals and their alloys are used as load-bearing structures. Some of the informational panels are good at strong individual shape and those have a character of placards and attractions. Those are often associated with cognitive fun playing elements and objects because this kind of attractions is grateful objects for youngest child visitors.

In general, each informational panel inserted in the natural and semicultural landscape, is inorganic element, which somehow destroys landscape. The extent of disturbance depends on the expressiveness and placement of the panel and on its number in the area. The number of informational panels of new educational trails should be limited to a minimum number sufficient for their purpose. The implementation of informational panels, which are necessarily located in the significant landscape element or near the notable natural phenomena, should be rather modest (inexpressive), real and rather horizontal. Although the informational panels of educational trails are completely different from other orientation and promotional boards with their eye-catching design, their wrong vertical implementation predominates. Low, conterminal table and plinth implementations don't violate the landscape so much. A uniformity of design increases the identification of specific place with the geopark or other area. The implementation of informational panels should be without need for maintenance and with balanced lifespan of used materials. The constructions should be adequately long-term resistant for weather and mechanical damage.

## References

Pásková, Martina - Zelenka, Josef (2002): Dictionary of Tourism Terminology. Ministry for regional Development. Prague, 448 pp.

Kvaček, Jiří - Pásková, Martina (2006): Preparation of the Geopark Bohemia Centralis In: Proceedings of the 2nd International Conference on Geoparks, 17th – 21st November 2006 Belfast.

Řídkošil, Tomáš – Pásková, Martina (2006): The Bohemian Paradise Geopark - an open textbook of geology. In: Proceedings of the 2nd International Conference on Geoparks, 17th – 21st November 2006, Belfast.

Hozdecký - Pásková, Martina – Řídkošil, Tomáš – Šoltysová, Lenka – Suchý, Jiří (2006): Tourism in Bohemian Paradise Geopark. In: Proceedings of the 2nd International Conference on Geoparks, 17th – 21st November 2006, Belfast.

Opluštil, Libor – Pásková, Martina (2006): Formation of the Geopark Moravian Karst. In: Proceedings of the 2nd International Conference on Geoparks, 17th – 21st November 2006 Belfast.

Pásková, Martina (2010): Ecotourism and Geotourism as an Instrument of Biodiversity and Geodiversity Interpretation Case Study: Katako Kombe (Maniema Province). In: Proceedings of the 9th European Geoparks Conference 1st – 4th October 2010, Lesvos

# The “Creusates” peat bog geosite: linking science to (geo)tourism in the aspiring Bauges Subalpine Geopark (France)

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The Creusates geosite is part of the Aspiring Bauges Subalpine Geopark, located in the French Subalps. This site of high scientific, educational and aesthetic value provides a good example of a complete geosite where active science cohabits with innovative educational actions and tourism enhancement, under regulatory measures.

This peat bog is under the regulation of Biotop Decree - a departmental status of protection -, and a Natura 2000 status (PNRMB, 2009). The main actions undertaken by the aspiring Geopark in order to preserve this geosite are (1) to improve the hydrological management of the peat bog (Tourman, 2010), (2) to prevent the public from walking on the peat bog and (3) to raise awareness of its fragile balance.

The peat bog is the core of a scientific study lead by the Aspiring Geopark in partnership with Edytem. The core sampling which was carried out in April 2010 reached a depth of 13m, with 11.5m of organic sediments, proving the Creusates peat bog to be one of the deepest in the northern Alps. The pollen analysis in progress will allow the reconstruction of the history of climate and biodiversity over a period of 13000 years BP. Carbon-14 dating will also help to determine the major steps of its formation and past uses. This action is a good example of global management based on local involvement: the study closely involves the community concerned and the private landowners who were not initially aware of the richness and the vulnerability of their land.

The geosite is used for many educational actions. Among others, the local environmental education professionals - RePERE - developed a specific school outing, “The secondary boys and girls act for their territory”: Every first class of the local secondary schools can take part to a role play in which the pupils have to defend a (virtual) development project on the sensitive site or fragile ecosystem. This pedagogical action, which already involved over 300 children, raises awareness of the richness of the peat bog (biodiversity linked to geodiversity) and the importance of its preservation (management of endangered species and human uses). It was awarded with the Natura 2000 Award in 2010 (Higel, 2010). More specific pedagogical geotours have been regularly offered by local specialized guides (CalcEre) for over 10 years.

The trail around the geosite will include a boardwalk trail with interpretation panels. It will be instrumental in the development of a broader geotourism (families, school pupils, pleasure tourists), while fulfilling the protection goals.

## References

Document d'objectifs – Site Natura 2000 FR9201774 Tourbière des Creusates, Parc Naturel Régional du Massif des Bauges - 2009

Tourman A., 2010, "Etude hydro-géomorphologique et stratigraphique de la tourbière des Creusates" - rapport d'étude. Holocène Environnement, 46 p.

Higel J., 2010, "Les collégiens, acteurs de leur territoire" - rapport Grand Prix Natura 2000, Parc Naturel Régional du Massif des Bauges, 6 p.

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It is important to understand the distinctions between management objectives and economic values in the context of geoparks. This understanding can be achieved through analyses of historical and philosophical resources and through reviews of some issues relating to the foundations of a geopark's management, describing the distinction between preservation and conservation and their connections to ecocentrism, anthropocentrism and ecology. The most internationally recognized natural resources and environmental organizations have established a six-category system of protected areas to clarify the differences between various objectives for protected areas. Parks are assigned three primary management objectives with equal emphasis on each. These are the preservation of species and genetic diversity; the maintenance of environmental services; and tourism and recreation. Secondary objectives include scientific, educational, spiritual and aesthetic practices, which are compatible with the primary goals. However, it is often questioned whether the primary goals are able to coexist among themselves. For example, recreational uses are frequently in conflict with the preservation goals. The management objectives for National Parks can be rearranged into three components, preservation, conservation and public use. In the literature, the economic value of natural resources is often classified into direct use value, indirect use value, option value, bequest value and existence value. This value typology has introduced a widespread misconception that each individual economic value category contributes to the total economic value. In order to avoid this confusion, the economic value of parks is grouped into three categories. They are preservation value, conservation-based use value and development-based use value. This typology employs everyday speech and matches the international classification of national parks management objectives. More importantly, this classification clearly reveals that the economic value of national parks is not the product of the summation of the component values, because of the incompatibility that exists between the values pursued in the management of national parks. Multiple management objectives are increasingly being integrated within domestic legislation by a number of countries in the world. Today the management of geoparks need to assume a new role: beside the conservation, preservation and sustainability of the park, the management needs to identify and solicit new economic resources and funds, to provide the parks with an opportunity for long term economic and efficiency planning. National countries are going through budget cuts affecting environmental funding, and the only way for parks to survive the current situation is to be able to exploit their own resources to insure the quality of services to the environment and to the public.

# Millstones and restoring heritage in the Basque Coast Geopark (Gipuzkoa, Spain)

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We know that 500 years ago the manufacturing of millstones which used the conglomerates of siliceous rocks of the Albian age (Lower Cretaceous) was a thriving industry in Mutriku, one of the three municipalities which make up the Geopark. But as this activity was abandoned, dense plant dressing made it easy for these quarry locations to fade into oblivion. A research project initiated in 2008 by one of the authors (Castro), connected with *Aranzadi* Science Society (a Geopark associate), has enabled the discovery of two quarries containing millstones in different manufacturing stages.

The method followed in the research project, which combines archaeology, ethnography and geology, has brought a part of historical memory which was about to be lost come to the surface. The oral contributions of information from our elderly people were a key factor.

Supported by the Geopark, our intangible heritage can be combined with the dissemination of geology through the restoration of old trades and folklore connected to natural resources. This strategy facilitates the inhabitants' involvement in the conservation of their natural and cultural heritage. In addition, it opens up a range of possibilities for a making dynamic economy adapted to the Geopark.

## References

European millstone quarries (database). *Laboratoire de Recherche Historique Rhône-Alpes (LAHRA)*, CNRS, France, <http://meuliere.ish-lyon.cnrs.fr/index.htm>



# New English Riviera Geotourism Products

## Nick Powe

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As with all Global Geoparks the English Riviera Global Geopark is not simply about geological conservation, it is much more than this and the status should be seen as a strategic driver for community benefits, quality tourism, and sustainable economic regeneration. The Global Geopark offers an opportunity for us to use our rich geology, landscape, heritage and culture to promote a sense of belonging and a sense of civic pride amongst the residents, particularly the youth in the area. In addition, with wide support from the tourism sector the Geopark is now securely placed within the areas new tourism strategy. Seen as a new hook to reverse the gradual decline in visitor numbers and spending in the bay, the designation will be used to increase the value of tourism to the economy, and to reposition the English Riviera as a leading UK destination.

For many years the English Riviera has relied on its “bucket and spade” market however data shows this has long been in decline and English Riviera Tourism Company now needs to establish strong ties with younger consumers. To help counteract the decline, and aligned with the new strategy, 2011 has seen the Geopark used as an attack brand for the area in parallel with the development and trial of a number of new Geopark Products. Although it is possible that the products may appeal to all ages they are aimed at capturing the imagination of Generation X (born 1960 to 1980) and Generation Y (born 1981-1990) providing a new and exciting reason to visit and explore the Geopark. The new products appeal to younger creativity and developing eco-friendly attitudes whilst providing opportunities to experience and enjoy all the Geopark has to offer, enlivening all the senses and with a bit of adrenalin thrown in!

# **A story creates a trail linking the Geology, Landscapes and Cultural Heritage of south Wales and Fforest Fawr Geopark.**

**Tony Ramsay**

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The trail of the Twrch Trwyth, meaning noble boar in Welsh, links a variety of landscapes including coastal cliffs and platforms, estuarine salt marshes, river valleys and glaciated uplands. It traverses approximately 600 million years of Earth history involving two phases of mountain building, and evidence of ancient volcanoes and seas, a desert, Coal Measures deltas and swamps and ice ages <sup>1</sup>.

The Twrch Trwyth trail follows the story of Culhwch and Olwen, the first Arthurian “romance”<sup>2</sup> and the best known Welsh courtship story <sup>3</sup>. In order to marry the beautiful maiden Olwen, the hero Culhwch has to fulfil a number of tasks set by the bride’s father Ysbaddaden, a grotesque and cunning giant. The most challenging task is to obtain the comb, scissors and razor stuck between ears of a fierce boar, the Twrch Trwyth, to trim his beard in preparation for the wedding ceremony. In accomplishing the tasks and winning his bride, Culhwch is aided by King Arthur and his knights. Although the story is entitled Culhwch and Olwen, it really tells of the fantastic adventures accomplished by Arthur’s company including the bloody pursuit of the boar and his seven pigs along a trail which zigzags across the whole of south Wales <sup>4,5</sup>.

The trail begins at Porthclais Harbour in Pembrokeshire where the boar and his seven pigs land and are separated after swimming across the sea from Ireland. The harbour, a narrow tidal inlet, formed when the lower part of the River Alun was flooded and drowned as sea level rose at the end of the last Ice Age. Porthclais and the surrounding area is characterised by the fusion of prehistoric and early Christian monuments and by a profusion of flowers in early spring. The harbour, a favourite subject for artists, is overlooked by the granitic crag Clegyr-Boia, the site of an Iron Age hill-fort which was occupied in the 6<sup>th</sup> century by an Irish pirate Boia who, it is claimed, terrorised the neighbourhood before his conversion to Christianity by St. David, the patron saint of Wales <sup>6</sup>.

The trail continues via the Preseli Mountains, a ridge of Ordovician igneous rock (dolerite) and the source of the bluestones which form the inner ring of the iconic Stonehenge monument, to the village of Nevern. Here the boar confronted and killed several of Arthur’s knights. During the hunt which continued through south Wales the boar was reunited with his pigs and fled to the Black Mountain in the west of the Fforest Fawr Geopark noted for its Bronze Age cairns <sup>7</sup>. In the Black Mountain area the pigs were either killed or separated from the boar during a chase which crossed the valley of the River Twrch and ended at a lake known as Llyn y Fan Fawr. The Twrch Trwyth continued alone through the spectacular glaciated upland landscape of the Brecon Beacons <sup>8</sup> to the banks of the Severn Estuary, famous for its tidal bore. Here Arthur and his knights fought with the boar and removed the scissors and razor from between its ears. The hunt continued into Cornwall where they took the comb and chased the Twrch Trwyth into the sea.

Place names in Fforest Fawr Geopark keep the story of Culhwch and Olwen alive and highlight the significance of the Geopark in the early cultural history of Wales. Creating a trail which follows a story

provides an imaginative approach which caters for a variety of interests, both educational and recreational.

## References

1. Howells, M.F. 2007. *British Regional Geology: Wales*. Keyworth Nottingham: British geological Survey 230 pages.
2. Williams, G. A. 1994. *Excalibur. The Search for Arthur*. BBC Books, 224 pages.
3. Rees, Alwyn and Rees, Brinley. 1998. *Celtic Heritage*. Thames and Hudson, 427 pages.
4. Guest, Lady Charlotte, 1887. *The Mabinogion from The Welsh of Llyfr Coch Hergest*. For the Welsh Arthurian Tale *Kilhwch and Olwen or The Twrch Trwyth*. Bernard Quaritch, London 504 pages.
5. Davies, Sioned. 2007. *The Mabinogion*. For the Welsh Tale *How Culhwch won Olwen*. Oxford University Press 293 pages.
6. Conduit, B. 1998. *St David's, Porth Clais and Ramsey Sound*. In: *Pembrokeshire and Gower Walks*. Jarold Publishing and Ordnance Survey 96 pages.
7. Leighton, D. K. 1997. Mynydd Du and Fforest Fawr. The Evolution of an Upland Landscape in South Wales from the end of the last glaciation to the present day. *Royal Commission on Ancient and historical Monuments of Wales*, 196 pages.
8. Shakesby, R. A. 2002. *Classical Landforms of the Brecon Beacons*. Geographical Association, 48 pages.

# Geological and Cultural Heritage as drivers for Sustainable Economic Development in Fforest Fawr Geopark.

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The dark ages (c 383 – 1069) between the end of Roman rule and the Norman invasion coincided with the production of the first written records of folklore associated with the specific sites within the Fforest Fawr Geopark. One of these sites, Llyn y Fan Fach (lake of the small beacon-hill) occupies a magnificent ice sculpted cirque at the foot of the northern facing scarp of Mynydd Du (Black Mountain)<sup>1</sup>. The southern and western margins of the lake are bounded by dramatic, approximately 160 metre high, cliffs of Devonian Old Red Sandstone. The Bride of Llyn y Fan Fach, one of the oldest Welsh stories probably has pagan origins in the transition period between the Bronze and Iron ages. Later versions of the story combine pre-Christian (Otherworld figures) and Christian (a reference to a Christening) elements<sup>2,3</sup>. These tell how a young farmer Rhiwallon encounters a beautiful maiden rising from the lake. He woos her and her father provides a rich dowry but warns him that he will lose the maiden should he strike her three times without cause. The years pass happily and they have three sons but inevitably Rhiwallon strikes his wife and she returns to the lake together with her dowry. Later she appears to her eldest son and tells him that he and his brothers will become great healers. She gives him a book containing prescriptions and teaches her sons about herbs and plants with healing properties. The story mentions places and names which are still in existence today. Eventually the brothers, known as the Physicians of Myddfai, became the most skilled healers in Wales and their descendants developed links with healing centres in the Mediterranean area between the 10<sup>th</sup> and 13<sup>th</sup> centuries.

Carreg Cennen Castle is built on a spectacular crag of Carboniferous Limestone which rises approximately 90 metres above the bed of the Afon Cennen. The crag is bounded by faults associated with the Carreg Cennen disturbance<sup>4</sup>, a major NE – SW oriented fault system extending from Milford Haven to Church Stretton in Shropshire. The limestone crag is surrounded by and separated from the main outcrop of the Carboniferous Limestone to the south by rocks of Old Red Sandstone age and is natural defensive position.

The castle was probably built on the site of a much older Iron Age hill fort and had a turbulent history changing hands many times<sup>5</sup>. As a ruined castle it became a destination for tourists and landscape painters from the late 18<sup>th</sup> Century, a tradition which survives to the present day.

Both Llyn y fan Fach and Carreg Cennen are examples of the interplay between geology, human occupation and intangible cultural heritage which together form a solid foundation for sustainable economic development. The Myddfai community has used these assets to regenerate their village hall and develop products which reflect their association with the story of the Physicians of Myddfai. The owner of Carreg Cennen Castle has developed a tourism and heritage business which celebrates the geology and the castle to supplement his working farm which manages the surrounding land. Both of these projects are good examples of sustainable development which promote geological

understanding, landscape management, safeguard cultural traditions and contribute to the local economy.

### References

1. Shakesby, R. A. 2002. *Classical Landforms of the Brecon Beacons*. Geographical Association, 48 pages.
2. Ellis, P. B. 1998. *The Chronicles of the Celts: 22 Llyn-y-Fan Fach*. Robinson London 536 pages.
3. Isaac, M. 2008. *Lake Stories of Wales: Shadows in the Waters: The lady of Llyn-y-Fan Fach*. APECS Press Caerleon 77pages.
4. British Geological Survey.1977.1: *50,000 Series Ammanford Sheet 230 Solid Edition*.
5. Morris, M. 2008. *A Great and Terrible King. Edward I and the Forging of Britain* Hutchinson, 462 pages.

## **Presentation of sites in aspiring Idrija Geopark for tourists and experts**

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To present more fully the richness of the Idrija region, the local authorities have since 2007 put many efforts into the establishment of the Geopark. In 2008 and 2009, concrete steps were taken in connection with inventory, thematic trails, evaluation of geoheritage, educational programs, research thesis, etc. In 2010, activities were continued on the municipal level for collaboration with the Idrija Mercury Mine by defining the organisational structure of the future Geopark and organising presentations of some significant sites.

On level III of the open part of the ore deposit, 105 metres below the surface, we have arranged a 100 metre-long mine route for practical exercises in geological mapping. At present, this is the only opportunity for geology students to become acquainted with and train for underground geological mapping. The uniqueness of this training programme is that in their work, the participants have to consider a third dimension (space), which they are unable to become familiar with during normal surface mapping. At the same time, they learn about various rocks and mercury ores, and also come into contact with native mercury. Each year, students from the University of Ljubljana and their colleagues from Zagreb choose to undergo an underground geological mapping programme at our mine. This programme is also available to other mining secondary schools and universities.

One of the largest faults in the area of the Southern Alps is the Idrija Fault. It was formed by the collision of the Adriatic plate with the Eurasian plate. The Idrija earthquake of 1511 occurred in the area of the Idrija Fault and had a magnitude of 6.8. The »Anno Domini 1511« exhibition was set up on the 500th anniversary of the strongest earthquake in Slovenia. The exhibition responds to questions related to earthquakes and tectonic movements on our planet. Organised concurrently with the exhibition are various workshops, thematic lectures and tours of the exhibition.

A vast part of the Idrija region is dominated by karst terrain and natural karst phenomena. The most recognisable karst spring, Divje jezero (Wild Lake), has been proclaimed a natural monument. Divje jezero is a museum in nature whose geological and botanical particularities, as well as easy access, attract numerous visitors. We have set up information signs and an appropriate presentation, and are improving the existing access paths. This will ensure adequate protection of nature as well as the safety of visitors.

# **EDUCATIVE TRAILS IN SOBRARBE GEOPARK (PYRENEES, SPAIN): MAKING MOUNTAIN LANDSCAPES UNDERSTANDABLE**

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Sobrarbe Geopark lies in the heart of the Spanish Pyrenees. The geological frame is quite complex with a high degree of geodiversity. 550 million years are represented in its rocks, some of the main tectonic features of the Pyrenees and many morphogenetic processes still active can be found over the 2200 km<sup>2</sup> of the Geopark. The north is rich in peaks over 3000 m.a.s.l. with some of the last Spanish glaciers and an alpine landscape. However, the south shows a Mediterranean environment, plenty of small sierras and with some of the best European examples of fluviokarstic gorges.

This complete frame constitutes a good opportunity to visit in a short distance a wide number of examples of different processes showing Earth's past and present dynamics and making them accessible to pupils of different educational levels. Beside this, Sobrarbe Geopark holds a trail network up to 1000 km long. It is a major aim of the Geopark taking advantage of these trails to connect geology and education by using these trails.

Several trails have been developed to pupils aged 12 to 16. During this task, many questions must be taken into account like the physical effort required, the accessibility by bus or van, the best season to walk them and, of course, to fit the level of the activities proposed according to the contents of the official curriculum.

In this presentation we show some examples addressed to understand different geological different environments in the central Pyrenees. One trail is dedicated to karst processes, in a one-day visit to an infiltration area, a semi-active cave and one of the main springs of the Geopark. Another is about glacial landscapes, walking along one of the most outstanding glacial valleys of the Geopark. Slope processes and villages location are treated along a spectacular hanging path over the Cinca River. Finally, there is a trail about fluvial terraces, working on different terrace levels, comparing their deposits and linking them to climate changes and glacial activity in the Pyrenees.

All the trails have been previously tested with pupils in order to assess the convenience of the exercises proposed and the degree of physical effort required to complete them.

## Naturtejo Geopark school programme *Anim'a Rocha*: interpretative tool for the “Travel across the Earth bones”

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Under the scope of the annual school programme *Anim'a Rocha* for local schools, Naturtejo Geopark works closely with teachers and students promoting activities that reach the specific needs and interests of each school.

“Searching... what is ours” is an one-year project developed by 4 students from the 12<sup>th</sup> grade (17 years old) from Pedro da Fonseca High School (Proença-a-Nova) that aims to search for local legacy and their main goal is the study of the Geology and Biology of the region, namely the area of Portas de Almourão Geomonument. The final product is the interpretation for the existing “Travel across the Earth bones” geotourist trail, consisting of interpretative leaflet, thematic panels and an audio guide available online for download.

The project involves the school community, Naturtejo Geopark, Proença-a-Nova municipality and tourism office and the role of the Geopark was to provide scientific and logistic support in the creation of new interpretation tools. The trail has 18 km and medium difficulty, including viewpoints, and geosites, the main interests are the evolution of the landscape, fossils, ancient Roman gold and legendary iron mines, the Ocreza River gorge, *Ulex* (gorse), *Cistus ladanifer* (Gum Rockrose), *Arbutus unedo* (Strawberry Tree), *Paeonia broteroi* (an endemic species), *Juniperus* (junipers) and other more specialized quartzite-related flora.

With this project the group intends to develop interpretation for young visitors and raise public awareness for Geology, Biology and Nature conservation. The first step was to decipher the natural wonders of Talhadas mountain range with thematic fieldwork, accompanied by Naturtejo Geopark staff and local researchers, followed by documentation research in order to select panel’s location, audio guide themes and leaflet information. The audio guides allow an autonomous visit with visitor’s own timing, besides more detailed and comprehensive information.

There is no better perspective of the deep Almourão gorge and of the Portas do Almourão Geomonument than from this trail where quartzite shows up here as a powerful rock, with an ancient history that reveals the building of a mountain that Ocreza River ripped in its path, across time.

The presentation of the project resulted in a guided visit by the students, included in the European Geoparks Week and in the Proença-a-Nova monthly trails, for testing of the developed products.

*Anim'a Rocha* programme combines sustainable development practices, raising awareness for natural heritage by working closely with teachers and students for local people and tourists, to create new and own tools for Naturtejo territory.



# Geology and geomorphology of the Hondsrug, an aspiring Geopark

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In cooperation with the University of Utrecht, Department of Earth Sciences,

The Hondsrug is a linear till ridge of about 60 km in length, in the east of the province of Drenthe, the Netherlands. It reflects several geological and geomorphological features which record the region's history after the Saalian glaciation.

Remarkable is the NNW-SSE direction of the ridge, nearly perpendicular on the direction of the main Scandinavian ice flow. Locally the ridge crosses NE-SW ridges of an older glaciation stage. (Rappol, 1983, 2001).

A study started in 2008 gives new insights on the genesis of the Hondsrug. Probably during the Saalian a mass of dead ice was located to the west of the Hondsrug. Between this dead ice body and the main land ice a younger ice tongue has moved in the SSE direction, influenced by a geothermal hotspot and trickered by a breach in the Münster basin. The Hondsrug till ridges have been formed beneath this ice tongue.

The ridge exists of Saalian till, covered with Weichselian coversand. It is dotted with pingo remnants, dead ice depressions and erratics. Also we find push moraines, stream valleys and dry valleys. During the latest glaciation cover sand was blown-in, and during the Holocene high moor peat deposits and drift-sands were formed.

A very interesting geological feature is the Voorste Diep. This is a depression in the Hondsrug, which is formed on response to salt tectonics during different geological periods, a small Saalian ice-lobe and erosion and deposition in the Pleistocene and Holocene.

The regional landscape includes the stream valley of the Hunze and the brook system of the Drentsche Aa, as well as a large peat-reclamation area and remnants of the high moors.

In The Hondsrug-area different existing tourist attractions provide an ideal starting point to promote geotourism in the province of Drenthe.

## References

Bregman, E.P.H., Lüse, I, Stunda, A, Karpovics, A. and Randers, M. (in prep.) Clay minerals composition: a significant tool for glacial till studies and paleoreconstruction.

Clark, C.D. and Stokes, C.R. in Evans (2005): Paleo-ice stream landsystems (p. 204-227

Rappol, M. 1983 Glacigenic properties of till. PH-D thesis, UvA

Rappol, M. 2001. De landijsbedekking van Nederland in het Saalien. Geogr.Tijdschr. XXV, 4 (p. 371-383)

# Geoparks and UNESCO World Natural Heritage – Opposing or Complementary Approaches for Nature Conservation?

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The UNESCO World Heritage Centre seeks to encourage the identification, protection and preservation of the full spectrum of the world's cultural and natural treasures which are of outstanding universal value for humanity. This is based on the World Heritage Convention, adopted by UNESCO in 1972. As of August 2010, the World Heritage List includes 911 properties that represent 704 cultural, 180 natural, and 27 mixed sites within 151 [State Parties](#).

According to the Convention each State Party shall, among others, endeavor to take the appropriate legal, scientific, technical, administrative, and financial measures necessary for the identification, protection, conservation, presentation, and rehabilitation of this heritage; establish national or regional centres for training in the protection, conservation, and presentation of cultural and natural heritage; and encourage scientific research in these fields (<http://whc.unesco.org/en>).

In contrast to the idea of the UNESCO World Heritage Convention, a Geopark is a rather recently developed concept. According to the definition by the Global Geoparks Network it is a territory encompassing one or more sites of scientific importance, not only for geological reasons, but also by virtue of its archaeological, ecological, or cultural values. It aims to conserve a healthy environment and to enhance awareness about the Earth Sciences through educating the public and enhancing the value of sites with spectacular geological features and heritage. At the same time, each Geopark fosters creation of employment opportunities for local people and promotion of regional economic development through sustainable tourism, thus yielding regional economic benefits while demonstrating methods for conserving its territory and stimulating scientific research. Since its inception under the aegis of UNESCO in 2004, the Global Network of Geoparks has approved 77 high quality national Geoparks in 25 countries (<http://www.europeangeoparks.org>).

Thus, it seems, there are many synergies between the concept of a “Geopark assisted by UNESCO” and the “UNESCO World Natural Heritage”. In fact, the UNESCO Geopark Program works in synergy with UNESCO's World Heritage Centre and Man and the Biosphere (MAB) World Network of Biosphere Reserves.

There are, however, significant differences between an internationally recognized Geopark and a site inscribed in the UNESCO World Natural Heritage List. Nevertheless, both programs share a common goal, i.e., the long-term protection and conservation of nature.

The nomination and inscription of a certain UNESCO World Natural Heritage Site within the World Heritage List is regarded as recognition of its universal value for mankind. State Parties are responsible for the protection and conservation and guarantee a sustainable development by providing the necessary administrative measures and funds.

A Geopark, however, does not represent a distinct category of nature protection; instead it may be considered as a kind of “certification mark” or “trademark” for a certain period in accordance with strict requirements that are critically evaluated by a team of experts.

# Overcoming Natural Disasters and Pursuing Sustainable Development: For Muroto Geopark (Japan) to Contribute to the Global Geoparks Network

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Muroto Geopark is an aspiring geopark with disaster prevention and education as its key objectives. We aim to familiarize visitors with the earth's development and life in symbiosis with nature through firsthand experience. It is our declaration that we, learning from the relationship between disaster prevention and the geopark, intend to develop a mature community, which eventually should contribute to the geopark activities worldwide.

"Where the ocean and the land meet – the forefront for the birth of new land" is the concept that consolidates our geopark's characteristics. Local residents have lived with a harsh climate, appreciating nature's blessings. The earth which sustains the community has been formed by past climatic changes and land upheavals caused by earthquakes. The foundation of the local topography consists of the accretionary complex formed by plate tectonics.

Recently, the topic of "geoparks and disaster prevention" has been gaining increasing attention. In the seafloor off Muroto lies the hypocentral region of Nankai Earthquakes and the probability of one occurring within the next 30 years is as high as 60%.<sup>1</sup> This prediction is based on the detailed scientific research of the Nankai Trough which produces the said earthquakes. The scientific studies in Muroto Geopark have also contributed to the development of the earthquake recurrence model.

Accordingly, disaster prevention has been emphasized by the entire prefecture, including Muroto Geopark. Muroto Geopark Promotion Committee has been collaborating with schools to make continuous educational efforts in that field. One example is sending a guest instructor to give talks to educate students and community residents. Also at Muroto high school, a comprehensive "Geopark Course" has started to introduce students to local topography, geology, history and tourism.

To improve tourist satisfaction, we aim to train tour guides, incorporating the elements of interpretive nature guiding, to provide visitor-oriented "geotours" to re-vitalize the economy and the spirit of the community. Community residents who wished to become geopark's spokespeople have been trained to become "geopark masters." The concept of geopark has been incorporated into various programs, and infrastructure has been improved.

Muroto Geopark's efforts are centered on disaster prevention and education. The education is expected to foster the next generation to take initiative in geopark activities for its sustainable development. Someday children who learned about the geopark will rebuild Muroto after the expected major natural disasters. Therefore, our current efforts are crucial for a better future for our community.

## References

1. Headquarters for Earthquake Research Promotion, 2004

## **“Natural Resources for Sustainability” School Contest: a tool on Education for Sustainable Development”**

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In the framework of the United Nations Decade of Education for Sustainable Development - UNDESD (2005-2014), for which UNESCO is the lead agency and also in the framework of the International Year of Biodiversity – IYB (2010) and the International Year of Forests – IYF (2011), with the main goal to create awareness to the urgent need to significantly reduce the rate of biodiversity loss and also for the need to have a sustainable management, conservation and sustainable development of all types of forests, the Portuguese Commission for UNESCO and the Aspiring “Azores Geopark”, developed a school contest during 2010/2011 entitled “*Natural Resources for Sustainability*”. The main objectives of this school contest are to create awareness among students, teachers and local community about the importance of natural resources for our survival in Planet Earth and to increase the knowledge about that Portuguese Aspiring Geopark (Azores) and the European Geoparks Network and their contribution to the UNDESD. The awards of the referred contest will be distributed between different school levels, namely Preschool, Primary and Secondary level and the award ceremony will take place during the European Week of Geoparks (Faial Island, Azores, June, 2011). This activity in Azores follows the success of a similar school contests promoted by the Portuguese Commission for UNESCO, in a strong partnership with Arouca Geopark and Naturtejo Geopark, who also promoted the same school contest in their territories, giving this way growing visibility to the European Geoparks Network, at a national level.

### References

Portuguese Commission for UNESCO, 2006, UNDESD (2005-2014) – Contributions to its Implementation in Portugal, Online: <http://www.unesco.pt/>

UNESCO World Conference on Education for Sustainable Development – Proceedings (2009, Bonn, Germany), 2010, Online: [www.esd-world-conference-2009.org](http://www.esd-world-conference-2009.org)

UNESCO, Biodiversity in UNESCO, 2007, Online: <http://unesdoc.unesco.org/images/0015/001514/151402e.pdf>

# FIRST STEPS TOWARDS ESTABLISHMENT OF CROSS-BORDER GEOPARK BETWEEN SLOVENIA AND AUSTRIA

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In the past, for more than 350 years, many people of the region between Peca and Koschuta Mts., which is divided by the state border between Slovenia and Austria, lived of mining of lead and zinc ore. Today the outcrops of ore and its remains as well as wealth of minerals in old mines attract the attention of many visitors and scientists. Beside of representing rich cultural and natural heritage, some geological peculiarities of this area are of exceptional, even global scientific importance. Taking into account a very diverse geological structure and values of the area (lead and zinc ore, numerous and important fossil site, important tectonic structure – Periadriatic lineament, Peca thrust, Oligocene volcano Smrekovec and volcanic Korte glen, coal at Prevalje, Mežica and Holmec, Paleozoic stones with pegmatite and dravite, Eisenkapel magmatic zone, Obir caves, diabase rock from glen Ebriach, Mercury minerals in the area of Vellacher Kotschna, ...) the preparation of joint cross-border project showed itself as an exceptional opportunity, which not only means a notably higher geological value but can bring numerous benefits in other segments as well.

With activities initiated in the frame of the project "Establishment of a cross-border Geopark between Peca/Petzen and Koschuta/Košuta", financed by Objective 3 – European Territorial Cooperation, The Operational Programme Slovenia-Austria 2007-2013 we want to contribute to the acceleration of cross-border development, increase the geological reputation of the area, assure sustainable development and take care of protection of natural values in the whole future Geopark area. We plan to carry out activities which will enable the dissemination of geological knowledge and environmental concept to wider public. This will be achieved by the help of protected and already popularized geological natural values, with popularization of new geologically interesting and important points and objects, museums, information centres, marked pathways, guided tours, school excursions, popular literature, maps, education materials, exhibitions, seminars...And first steps towards establishment of cross-border geopark between Slovenia and Austria have already been done and the results are presented.

## References

Cilj 3 Evropsko teritorialno sodelovanje/ Ziel 3 Europäische Territoriale Zusammenarbeit; Operativni program Slovenija – Avstrija 2007-2010, Operationelles Programm Slowenien – Österreich 2007-2013: Vzpostavitev čezmejnega geoparka med Peco in Košuto/ Die Errichtung eines grenzüberschreitenden Geoparks zwischen der Petzen und der Koschuta

## **Katla Aspiring Geopark South Iceland**

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The preparation for Katla Geopark started early year 2008 with a project led by the South Iceland University Centre and later partly funded by the Growth Agreement project for the South region of Iceland.

The centre chose the most eastern and most rural part of the south area of Iceland as a target area and decided to put much focus and resources into building on the strengths in the area. From the start all three municipalities in the area participated in the project both by providing finance and lots of time. Moreover, companies, organisations and individuals have participated in the project from the start. The ultimate aim of the project was to create jobs for people with academic degrees to move back home after their studies.

After a thoughtful and full analysis and assessment of the situation it was obvious that the next logical move was to keep up the good cooperation between the municipalities and start the Geopark project. Since 2008 a working committee has met regularly in order to coordinate strategies of the municipalities and the vision for the area.

Katla Geopark project was formally established on the 19th of November 2010.

The KATLA geopark territory interest in joining the EGN is an attempt to answering the quest of the modern tourist. In well defined geological territory that has everything to offer in the sense of geology the area is working towards fulfilling the need of the visitor by offering local food and entertainment. A growing interest in accessible knowledge about our geology, geography, nature, habitation, population development and culture and as a result the three municipalities decided to join hands and work towards a holistic strategy for the area, following a grand plan that has resolved in the Geopark project.

We are shaping the Geopark so that it will present fresh opportunities for outdoor life and recreational activities, which we believe will have impact on the general welfare of the inhabitants. The expansion of the various Geopark activities will be in co-operation with a number of partners although in the not so distant future we believe that the park itself will provide well grounded edutainment programs of various sorts. We consider that our aims towards sustainable innovation and tourism would be considerably strengthened by membership of the European Geopark Network/ UNESCO Global Network of Geoparks

# Evolution Magma Geopark

## Pål Thjømøe

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Magma Geopark started as a 3-year Regional Development Project in 2006 with the regional council of Dalane and Dalane Regional Business Development Office, as the project owners and with economical and political support from the Counties Rogaland and Vest-Agder and the five municipalities; Bjerkreim, Eigersund, Flekkefjord, Lund and Sokndal. In 2009 Magma Geopark AS was founded with Rogaland County as the main shareholder together with Vest-Agder County, the municipalities; Bjerkreim, Eigersund, Lund and Sokndal and 17 private investors. The objective of this project and to create the company was to get the special geological area of Rogaland Anortositt Province, approved as a sustainable UNESCO supported Geopark, and a member of the European Geoparks Network (EGN) and the Global Geoparks Network (GGN). Also in 2009 all the involved Counties and municipalities promised future economical and political support for the next five years. Magma Geopark become the second approved EGN and GGN Geopark in Scandinavia March 2010. The Geopark sites created and facilitated are tourist attractions which offer exiting geology and nature, beautiful scenery, cultural experiences, all with educational values. The sites that are being developed have quality assured infrastructure with information posters and with brochures that presents the geology, landscape, nature, mining stories from the abandoned mines of the area and the local cultural history. Here you can walk, horse backing, paddle or ride a bike and enjoy the unique landscape as you learn something about the forces that created the landscape. The focus on Magma Geopark is expected to generate growth in the tourist industry with more restaurants, accommodations and local food and local products. The focus on Magma Geopark is also a commitment to give more knowledge to the locals and guests so Magma Geopark develops educational programs together with local schools.

## **Training the gastronomy providers in Araripe Geopark's territory for the sustainable development of the area.**

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On September 21, 2006, after submitting to the standard procedures of inspection and evaluation by the official commission of the GGN (under the auspices of UNESCO), the Araripe Geopark was officially recognised as a member of the Global Geoparks Network during the 2nd World Conference of Geoparks in Belfast, Northern Ireland in 2006. The Araripe Geopark is located in the southern state of Ceará in northeastern Brazil. From its inception the geopark included the municipal districts of the Barbalha, Crato, Juazeiro do Norte, Missão Velha, Nova Olinda and Santana Cariri, comprising an approximate area of 3,441 km<sup>2</sup> (GSE / FUNCEME, 2001) and involved the area corresponding to the Ceará's Araripe Sedimentary Basin. Owing to its rich geological, paleontological and cultural heritage, the geopark, and the nine geosites established in the municipal districts, attracts researchers from around the world and ecological and cultural tourism is expanding. Given this situation, the Araripe Geopark seeks to provide training in those industries that deal with visiting tourists and researchers, in particular the waiters in restaurants. For this reason, in 2010, the Araripe Geopark developed a partnership project with the restaurants of the area, the georestaurants, integrating that section into the project of Araripe Geopark's tourist trade. By observing that demand, the Geopark in partnership with SEBRAE developed a project called A Basic English Course for Waiters. This project had as its main objective to instruct and to qualify the employees of the restaurants that are part of the Araripe Geopark's partner's network to enable them to communicate with tourists and researchers from other countries that provide constant visitors to the territory of Geopark. It consists of a basic language course in the form of Instrumental English, to, at first address the lack of preparation in communicating with tourists or foreign researchers as well as developing skills in transcribing and reading existing texts in both languages.



## **“Costões and Lagoons”, The coast of Rio de Janeiro formed by lagoons and rocky shores.**

**Gisele Vasconcelos, Kátia Mansur, Crisogono Vasconcelos, Sylvia dos Anjos, Ismar Carvalho, Renata Schmitt, Denise Spiller**

Geologically, the surrounding rocky relief comprises metamorphic rocks whose history begins in the Paleoproterozoic and extends to the Cambrian with the final phase of Gondwana closure, coincident with the Búzios Orogeny. Mesozoic igneous rocks in the form of dykes and alkaline bodies are found along with Paleocene plutonic to subvolcanic rocks contribute to the landscape of cliffs.

Mineralogical rarities, such as pseudomorphs of pseudoleucite and coexistence of sillimanite and kyanite, can be found in the same rock formations. The formation of modern coastal lagoons, containing sediments of different ages, backgrounds and compositions, joins the shoreline with the more interior continental and shallow marine deposits of Mio-Pliocene age, as well as the Pleistocene to Holocene marine, riverine, Aeolian and paleolagoon deposits. In this context, we highlight these modern lagoonal systems with their unique physico-chemical, sedimentological and especially biological characteristics, where the presence of recent stromatolites and dolomite, produced by the action of cyanobacteria, turn these hypersaline water bodies into natural laboratories of international significance.

In the region, marks the division between the two main oil and gas producing basins in the country . There is a cold upwelling, which is responsible for the abundance of fish and the semi-arid conditions of the region. This facilitates the existence of a rich biodiversity and geodiversity in the adjoining countryside with unique characteristics. also in the Atlantic Forest, reefs, lagoons and dunes.

The presence of beaches, some of them with anomalous concentrations of pink garnet transported from the surrounding hills, help to form a coastal region with an internationally recognized geomorphological heritage. Hundreds of archaeological sites in the form of middens and ceramic deposits, ranging in age from 4500 years AP to the historical times, overlay the entire coastal area, two of which are designated with *in situ* museums. The establishment of the first settlements in Brazil and the passage of important naturalists, such as Charles Darwin and Saint-Hilaire, in the region. The stories of shipwrecks, historic buildings and heritage alluded to in the legends and myths told by the native population. The entire region is already well developed with 28 panels and marking sites of geological interest and other projects, such as the Geological Paths, as well as having a very strong network of

Environmental Education established with local schools, ONGs and a watershed committee

# Geotourism highlights along the Baltic coast

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The Scandinavian and Baltic countries, like the rest of the world, are currently developing eco- and nature oriented tourism but work is still scattered and in its infancy. As part of an EU-Interreg IVa funded project devoted to the promotion of our common, cross-border, geological heritage we are trying to influence the current situation by producing books and video films on thematic subjects and spreading it to the public. As an outcome of the project we have identified three important desires for the future. The first is a need and interest in the conservation of our geological heritage - on Gotland island in Sweden this refers for example to the famous "rauks", and on Saaremaa, in Estonia the Kaali meteorite craters can exemplify world famous and globally outstanding geological features. How can we promote these sites without exploiting them and how do we protect them for future generations? The second is education, which serves to communicate knowledge about our Earth and environmental concepts to the public. Almost everything that surrounds us, the houses we live in, the cars we drive and the computers we work with come in one way or another from something that we have taken from the ground below us. How can we increase public knowledge about earth sciences in general? The third desire is increased geotourism. Can the establishment of a geopark stimulate economic activity and sustainable development, or should we go down a different route?

With this presentation we want to encourage local politicians, businesses, museums and other stakeholders in especially Sweden and Estonia to become involved in, and recognize our unique geological and ecological heritage and its importance to both tourists and scientists.

# Starting the process of becoming the first Geopark in the Netherlands

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Within the Netherlands the Hondsrug area is a geological unique phenomenon. It is formed during the Saalien Ice age about 150.000 years ago. It is a system with several till ridges about 60 km in length. Thousands of years ago it was the only area in the Eastern part of the province of Drenthe where people could live because it was the only place where it was high and dry. There are many prehistoric remains in the area which proof that there was a busy life at that time. It went on till nowadays, it is a remarkable cultural heritage of 5500 years. The background for the long history of the area is strongly connected to the geological heritage.

For more than 40 years now the story of the area is forgotten. At the moment there is very little identity anymore in this area were 300.000 people are living. Two years ago more than 20 organizations in the area decided that they wanted to stimulate the regional development on basis of the regional geological and cultural heritage. It appeared that the aim of the organizations was almost the same as the philosophy of the Geopark network. This was the start of a project called Geopark the Hondsrug.

Since January this year a project bureau was formed with two people who have the target to develop the story of the geological and cultural heritage in a way that it can be used to economic development in the area. A program has been made in which local people, education and tourism are involved. It is a three year project in which many activities and products have to be made. At the same time a process of cooperation with the 20 organizations and five municipalities is going on.

Within two years we hope to be a fully functioning Geopark with the aim to become a partner in the European network of Geoparks. We would like to be an example for other areas in the Netherlands. This could also be the start of a network of Geoparks within the Netherlands.

## References

[www.geoparkdehondsrug.eu](http://www.geoparkdehondsrug.eu)

# Exploiting the Inherent Contrasts of the HK Geopark

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It is a gem in the hustle and bustle of the world's international financial centre. The geopark of Hong Kong Geopark boasts an area of 5,000 hectares, not a big size compared with many of its expansive counterparts elsewhere in the world. Yet it is within easy reach to the millions of residents and visitors in the city and from around the world.

It is a stone's throw away from the newest and tallest buildings in the world. Yet it houses some of the region's most unusual geological features in well-preserved form.

It is the quietest and most untouched part of Hong Kong. Yet residents, be it students, villagers and restaurateurs are up close to it and some have even made it part and parcel of their study and business.

This paper reviews the inherent contrasts in the Hong Kong Geopark and examines how Hong Kong has leveraged on such contrasts and turned them into opportunities in the promotion of itself as the "newest" geopark in the area.

# **Geodiversity enhancement a new tool towards sustainable local development - Lessons learned from the 10 years experience building the Lesvos Petrified Forest Geopark - Greece.**

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The Lesvos Petrified Forest Geopark, the very first Greek Geopark and a founder member of the European Geoparks Network, already counts one decade of successful operation. Located in the NE Aegean Sea, the island of Lesvos, the third largest Greek island, is dominated by Neogene volcanic rocks which form its characteristic landforms and landscapes. On its western side an entire ancient fossilized forest has been unearthed, the well-known “Petrified Forest of Lesvos”. This protected natural monument covers an area of 15.000 hectares.

In order to protect and efficiently manage the forest, the Natural History Museum of the Lesvos Petrified Forest was founded in 1994 as the management body of the Lesvos Petrified Forest Geopark. Next, a management plan for the sustainable development of the area was carried out in order to link the protection and promotion of geosites with the development of geotourism. Several biological or cultural aspects of the Petrified Forest protected area were identified and studied in collaboration with the University of the Aegean, research institutes and other scientists (i.e. birds, plants, wetlands, coastal and marine ecosystems, drystone constructions and agricultural landscape).

The Lesvos Petrified Forest Geopark applies certain management measures for the protection, conservation and promotion of the inventory of geosites present in the territory.

Geotourism has grown rapidly during the last decade due to the operation of the Lesvos Geopark. Besides the Museum and the three open-air Petrified Forest parks, one of the main infrastructures in the Lesvos Geopark is the “Lava Paths” which invite visitors to follow the ancient paths of the pyroclastic flows from the main volcanoes to the Petrified Forest.

Environmental educational activities lie at the core of the Geopark’s operations. Environmental education programmes organized for elementary and high school students at the Petrified Forest cover a broad range of activities.

The Lesvos Geopark also contributes significantly to the local economy by creating new jobs and establishing close collaborations with local tourist enterprises, artisans and women’s cooperatives producing local food and drinks.

Key words: Geopark, Petrified Forest, geoconservation, management plan, geotourism.



# Poster presentations





## ***Terrateca*: a set of experiences to enjoy the Maestrazgo Geopark geological resources**

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Once the preservation of the Geopark Heritage has been ensured, one of the aims of the stakeholders is to awaken public interest in order to create territorial development. Even with best intentions, natural and historical-artistic resources or traditions are in themselves unable to motivate geotourists, they must be provided with a much more diverse and attractive package.

The geological and cultural values of the Maestrazgo European and Global Geopark are abundant and varied. However, at the moment the possibilities of arranging organized visits have yet to be more intensely explored. To promote the area and to raise public awareness of the fundamentals of Earth Sciences the *Terrateca* – Earth library– program has been designed. *Terrateca* has in mind three outstanding geological aspects of the Maestrazgo Geopark which are of popular interest:

- the general attraction of dinosaurs (Palaeontology), focussed in Galve,
- the enigma of a folded landscape created by tectonic movements and earthquakes (Tectonics), explained in Aliaga,
- the fascinating subterranean cavities (Geomorphology), located in Molinos.

These areas share several particular features:

- they are ideal places to learn on the ground about basic and at the same time varied geological aspects,
- they are linked by a series of picturesque rural routes which facilitate their visit, and
- in the three villages there are local initiatives which offer new and emerging services –which should be consolidated– for the visitor.

To reinforce and promote visits to these places an entrepreneurial initiative with two specific objectives has been launched:

- Promoting the natural resources using entrepreneurial initiatives within Spanish important cities, where in general the concept of a “Geopark” (with its wild, rugged and captivating landscape situated in the province of Teruel), together with its scientific and cultural resources are as yet unknown. All the practical and logistic aspects will have been solved through direct coordination with the local agents before the start of a visit.

- Enhancing the visits with practical experiences such as field work offered by Geology professionals who would contribute with theoretical aspects and personalized research experiences for small groups of visitors. Thereby turning a visit to the Geopark into a true immersion in the fundamentals of the “Earth’s biography”.

The purpose of *Terrateca* is to provide visitors with updated information about each resource through two means: the local population (who introduce personal experiences and anecdotes) and experts in Geology (who provide an academic background and contextualize the different places visited). Also to learn and experience the scientific method and exploration on the ground developed by the professionals who reconstruct the History of Earth and Life.

# **The geological heritage of Cilento and Vallo di Diano Geoparks as key in the evolution of the central Mediterranean the last 200 M.y.**

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The Cilento and Vallo di Diano Geopark lies on the western side of the Italian peninsula that stretches out from Europe in the central Mediterranean. The reliefs of this peninsula, known as Apennines, represent one of the scars of the collision between the European and the African plates. Such collision, occurring in the Miocene, involved several domains. They were developed since the Triassic in the Tethys, an oceanic basin placed between the mentioned plates. In the territory of the Geopark the main successions of these domains are well exposed, as well as the earlier deformational phases are clearly documented. Moreover the post-collisional tectonic phases as well as the climatic changes show their signatures in the landscape of this Geopark. The objective of this institution, and therefore of this contribution is to tell the geologic history of the central Mediterranean, using the geological heritage spread out in more than 180.000 km<sup>2</sup>. In particular, a pelagic succession, heavily tectonised, largely outcropped in the coastal area (e.g. Ascea) and in the more incised valleys (e.g. Mingardo River Valley), referable to a former Mesozoic ocean. The same succession, near to the south-eastern border of the Geoparks, shows its substratum: upper Jurassic ophiolites. Remnants of these rocks are also placed in one of the olistostrome of the Geoparks (i.e. Centaurino M.). In the framework of southern Apennines, Mesozoic limestone and dolomite have a great importance as diffusion and thickness. Also in Cilento and Vallo di Diano Geoparks some of the most elevated mountain (e.g. Alburni Mts., Cervati Mts., etc.) are built up by shallow marine carbonatic successions (more than 3000 m in thickness). These latter correspond to carbonatic platform deposits, like the present Bahamas Isles, scatter in the margin of African plate at least up to the end of Cretaceous. On the previous domains, already deformed, a thrust-top basin was developed in the upper Miocene, as witness the turbiditic successions, impressive for exposition and variety (e.g. Stella M. and Gelbison M.). In fact, several kind of turbiditic deposits are represented, in order to recognize architecture of the deposition in the basin and also to define the factors controlling its development. At last, a regional uplift affected the chain in the Plio-Pleistocene time, as revealed some marine deposits rose up to 400 m or some fluvio-karstic gorges, and also the climate changed several times. So the glacial episodes and the sea-level rise left traces respectively on the mountain (i.e. glacial circus and moraine) and along the coast (i.e. sea notches, caves, etc.).

# The Plattenkalk-Type Fossil-lagerstätten in the Parco Nazionale del Cilento e Vallo di Diano Area (S-Italy): An Overview.

Sergio Bravi<sup>1</sup>, Antonello Bartiromo<sup>2</sup>, Aniello Aloia<sup>3</sup>.

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The researches carried out in the last 25 years in the "Parco Nazionale del Cilento e Vallo di Diano" carbonate platform sequences lead us to find some new Plattenkalk type fossil sites ranging in age from the Lower Cretaceous up to the Middle Eocene. The sites located in the Alburni Mountains are Petina (Albian) and Ottati (Lutetian-Priabonian); along the Monte Vesole-Chianello calcareous ridge are Magliano Vetere (Cenomanian) and Vesole (Campanian-Maastrichtian). The fossil fauna includes both "ganoid" and teleost fishes, and new genera and species of decapod crustaceans (e.g. *Palaemon vesolensis* Bravi et al. (1999) and *Alburnia petinensis* Bravi and Garassino (1998). All the Cretaceous fossil sites contain abundant land plant remains: in particular, in the Magliano Vetere locality (Bravi et al., 2004) they are the sole kind of fossil. The floral assemblage is represented by the conifers *Pagiophyllum* sp. and *Frenelopsis* sp. (Bartiromo et al., 2008), angiosperms as *Sapindopsis* sp. and *Sagaria cilentana* Bravi et al. (2010). These findings, together with those carried out in other Mesozoic Fossil-Lagerstätten located in the Campania Region [e.g. Pietraroja (BN), Cusano Mutri (BN), Profeti (CE)] are of interest. As a matter of fact, they furnish a relevant contribute for a new paleogeographic vision of the Mediterranean portion of the Tethys as previously thought (e.g. D'Argenio et al., 1973), and lead us to hypothesize the presence of emerged lands especially during the Cretaceous period.

## References

- Bartiromo, A., Barale, G., Barone Lumaga, M.R., Barattolo, F., Bravi, S., 2008. New Early Cretaceous Flora from Campania. *Terra Nostra* 2008 (2), 21. Abstract Volume of 12th International Palynological Congress (IPC-XII) and 8th International Organization of Paleobotany Conference (IOPC-XII), Bonn, Germany 2008.
- Bravi S., Barone Lumaga M.R., Mickle J.E., 2010. *Sagaria cilentana* gen. et sp. nov.- A New Angiosperm Fructification from the Middle Albian of Southern Italy. *Cretaceous Research* 31 (2010) 285–290.
- Bravi S., Garassino A., 1998. "Plattenkalk" of the Lower Cretaceous (Albian) of Petina, in the Alburni Mounts (Campania, S Italy), and its decapod crustacean assemblage. In: *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano* 138/1997 (I-II) 89–118.
- Bravi S., Civile D., Martino C., Barone Lumaga M.R., Nardi G., 2004. Osservazioni geologiche e paleontologiche su di un orizzonte a piante fossili nel Cenomaniano di Monte Chianello (Appennino meridionale). *Bollettino della Società Geologica Italiana*, 123, 19-38.
- D'Argenio B., Pescatore T., Scandone P., 1973. Schema geologico dell'Appennino meridionale (Campania e Lucania). in: "Moderne vedute sulla geologia dell'Appennino". *Accademia Nazionale dei Lincei, Quaderno* 183, 49-72.

# Stonehammer Geopark : Evolving Strategies for Communicating the Message

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Geoparks engage with their community and provide educational opportunities to enhance earth science literacy of their visitors. We currently live in a world that is rich in technology that offers a variety of tools to enhance communication and collaboration. Our research (Best, Buhay, & McGuire, 2010) of media and technology use of University of New Brunswick undergraduate students indicated that, although they spent on average of 10.06 hours a day using different types of media, for educational and personal reasons they most commonly used Facebook and texting/messaging. In 2011 (Buhay & Best, 2011) our research showed that students most frequently consulted their classmates, course readings, professors, and Google to complete their course assignments. In their everyday life these students primarily consulted friends, Google, classmates and social networks for information. We will report on a recent survey of university students and the general public and their specific knowledge of one of the most recent members of the Global Geoparks Network (Stonehammer). In this preliminary research we were specifically interested in which method/tool was most effective in communicating information about the geopark. Further studies will investigate the effectiveness of geological/earth science information transfer to the general public.

References (if any)

Best, L., Buhay, D., & McGuire, K. (2010). *Technology use in Millennial students: Are they obsessed or competent?* Poster presented at the annual meeting of the Canadian Network for Innovation in Education, Saint John, New Brunswick, Canada.

Buhay, D.N. & Best, L.A. (2011). *University students at the library.* Poster presented at the annual meeting of the Atlantic Provinces Library Association, St. John's, Newfoundland, Canada.

# The Beigua Geopark: a new challenge from the coast

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The Liguria Region is a summer holiday destination for tourists from Northern Italy and Europe. In the last years, the touristic offer of the whole Liguria region is shifting from that of a mere bathing area to that of a territory offering multiple activities and cultural happenings. Between them, biking, trekking, climbing, gastronomic and cultural activities can be carried out in locations far from the coast, which remains the main summer attractive. The territorial marketing challenge is to use the high summer tourist frequentation of the coast in order to drive tourists towards activities, locations and seasons (e.g. spring or winter, when the beach is less frequented) different from the simple beach “lifestyle”.

The Beigua Geopark comprises a coastal part of great geological and geomorphological value: the “passeggiata Europa”, located between Cogoleto and Varazze.

In the optic of taking the concepts of Geoheritage and Geoparks to a large possible number of users, in the last years the Beigua Geopark has carried out studies highlighting the features of this coastal tract, which have been concluded with the publication of a geomorphological map, which will be used as basis for a geo-touristic map.

The main geomorphological features surveyed, which can be used for popularization of scientific concepts related to landscape evolutions and climate and sea level changes, are:

1) The relic of a Pliocene paleo-landscape. 2) The Quaternary landscape, with several marine terraces. 3) A rocky band (gabbros and peridotite) preserving remains of terraced marine areas; 4) The coastal slope. 5) The coastal plains. 6) The Mizar marine cave. 7) The Plio-Quaternary vertical dislocations. 8) The disjunctive tectonics. All the landforms in this area, and particularly the hydrographic network, have been controlled by active Plio-Quaternary faults and fractures. 9) The valley cut. The main rivers of this area have a uniform and very high inclination in the lower part.

The challenge of appealing coastal tourist will pass through these nine key features. The sensibilization of summer tourists on these points will make easier their attraction towards the other locations of the Geopark. This will allow targeting a larger number of users with the messages of hearth heritage conservation and sustainable development that the Beigua Geopark has spread for over a decade.

# Geothermal Area of TUSCAN MINING GEOPARK. A “sustainable” geosite.

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Geothermal area of the Tuscan Mining Geopark is a complex landscape where there is a geological heritage of international significance and the remains of the first industrial production of electricity through the heat of the earth. A modern system of geothermal power plants allows the production of energy with low environmental impact and the creation of many agricultural activities that take advantage of this resource.

## Geothermal landscape

In this area there are important evidences of recent and present geothermal and hydrothermal activities occur. These evidences have created a unique and unrepeatable landscape, a distinctive feature of which are the pipelines for steam generated by geothermal activity, and the natural, endogenous manifestations of naturalistic and geological value, together with the ancient alum quarries. One of the most interesting is certainly the geological site of Biancane, which has a footpath network with information panels that allow reaching and observing the geological and naturalistic peculiarities of this area.

## Industrial Heritage

Geothermal area has also industrial relevance; in fact in this area for the first time in history boric acid was extracted from geothermal fluids. In 1777 Hoefler, director of the “*Farmacie granducali*”, discovered the presence of boric acid in waters of a thermal pool and carried out some experimentation to extract boric acid. Since 1818 the Count De Lardarel increased the industrial process for the production of boric acid by introducing extraction procedure. At present the signs of these activities for acid boric production are represented by the remains of some decantation pools built in early 19th century. In this area for the first time in the world the geothermal fluids were utilized to produce electrical energy.

## The sustainability

At present in the Geopark there are five geothermal power stations which cover 70% of the energy requirements of the Grosseto province. Close to the geothermal power station, some cheese factories use geothermal power to produce high quality cheese.

# The Iron Mountains Geopark

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The Iron Mountains are located in Eastern Bohemia and belong to the northwestern part of the Czech and Moravian Highlands. The western ridge is a landscape dominant feature and also an important bio-corridor. The average altitude is about 500 m.a.s.l. and the highest peak is Pešava with an altitude of 697 m.a.s.l.

In the central part of the Iron Mountains the Protected Region of the Iron Mountains was declared in 1991. This region has 284 square kilometers, the national nature reserve of Lichnice - the Kaňka Mountains, 12 nature reserves and 11 natural places of interest.

The Geopark area is a unique geological textbook with a wide range of geological and geomorphological phenomena in the area of 777.5 square kilometers. This area is a part of the Bohemian Massif, which is the largest relic of the Variscan orogen, and is made up of many geological units of the Proterozoic, Palaeozoic, Mesozoic to Quaternary age. Geologically belongs to the most varied regions in the Czech Republic. In the Geopark more than hundred types of rocks are described. Besides quarrying, in the past there was the mining of precious metals and other minerals there. The finds of fossils of various age (from stromatolites and trilobites to fauna and flora of the Cretaceous sea) are also unique.

The Iron Mountains Geopark project is instigated and carried out by the Vodní zdroje Chrudim Company. The largest town and the gateway to the Geopark is the town of Chrudim, which has about 23 thousand inhabitants and is situated in the Pardubice region (about 110 km east of Prague). In the other approximately 250 municipalities in the territory of the Geopark there are about 150 thousand inhabitants.



# ENVIRONMENTAL EDUCATION PROGRAM IN THE ARARIPE GEOPARK: THE REGION OF CARIRI CEARÁ / BRAZIL

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The project aims to develop a work with the communities surrounding the Geosites and educational activities, mainly, to train teachers of elementary education by creating, on these professionals, a mindset of conservation and environmental sustainability. The project involves people from Barbalha, Juazeiro, Crato, Santana do Cariri, Missão Velha and Nova Olinda in the region the Cariri Cearense, where are located the Geosites, operating units and it seeks to develop a sense of inclusion in the conservation and sustainable human development of the environment in the Araripe Geopark. The idea is to make continuing education and production, together with the neighboring community of the Geosites and with teachers, conducting environmental education workshops, puppetry, workshops replicas of fossils, educational games of environmental education and an interactive booklet. The methodology of this work is performed in several steps. The first is aimed at better understanding the communities and schools that participate in the Project. In the second step we make the mobilization and presentation of objectives and goals of the program. In the third conducted the training and rustle up the teaching materials. The results are evaluated by participants in together with the coordination and the texts published are socialized with the community in general. The ideas and suggestions are reviewed by members of the group along with engineers, teachers, students, during the journey. The main target is to work on the neighboring community, teachers, students and schools located near the areas adjacent to the Geosites, for their important and necessary the role they have in defending the preservation, environmental conservation and quality of life for everyone. This project is intended also to establish partnerships with the Education Departments of State departments of the municipalities, prefectures and integrates with the network of environmental educators in support of conservation, preservation of the geological value, paleontological one, scientific one, socio-economic and cultural heritage of the Cariri region.

## **Rokua geological outdoor map**

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The Geological Survey of Finland (GTK) has worked for many years with the clear aim of spreading knowledge about geological heritage to the public, to the tourism sector, and to places of education. The key task has also been to increase of geological knowledge in basic school education. Concurrent with geological work, the GTK has mapped geologically valuable natural sites. As a result of the mapping work, a geological outdoor map series has been developed for people interested in nature. On the maps, geological sites in the areas are shown and an explanation is given of their development and their effect on the existing nature and landscape. The maps have been made from the larger national park areas of Finland. Today the series contains nine outdoor maps. The field work for the newest map has been made from the Rokua Geopark area in northern Finland where geology is one of the most important themes. In this area, the GTK has worked in co-operation with Humanpolis Ltd and Metsähallitus - The National Forest and Park Service in mapping and making an inventory of geological sites. The first version of the map was published in spring 2011 and the final map until the end of this year. A very detailed elevation model that has been produced with the LiDAR (Light Detection and Ranging) technique will be used in the Rokua geological outdoor map.

# **The Karstic area of Itanos: A project for the development of an aspiring geopark in Crete, Greece**

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A transnational cooperation between Crete and Cyprus has been established under INTERREG IV “Greece-Cyprus” in order to develop initiatives for the promotion and sustainable management of geological heritage in two territories, the Itanos area in Crete and Troodos Mountains in Cyprus. Activities and initiatives in Crete aim to initiate an aspiring geopark at the easternmost side of Crete Island where a great variety of rocks and Karstic features occurs.

The suggested geopark territory, which is called **Itanos** because of the Minoan settlement existing there, coincides with the eastern part of the island of Crete, covering the eastern part of Sitia Mountains together with the coastal area. Geologically it consists in the mountainous area of carbonate rocks with great variety in lithologies (i.e. limestone, dolomites, multi colored marbles and conglomerates), whereas various metamorphic rocks (like purple schist and marbles) occur in the lowlands and coastal area. These geological conditions govern the erosion and water occurrence giving rise into a large number of cave systems as well as water appearances.

More specifically, the factors that justify the admittance that the area of Itanos is a vivid geological monument, which, on its turn, lead the local authorities in collaboration with the Natural History Museum of Crete to create a new Geopark, are the following:

- It gives a typical example of how the carbonate rock and especially the surface and underground karstic features determine the Hydrological function of a mountain. Here the mountain plateaus collect water and through the 4000 m cave system gives rise to large springs in the lowlands and coastal areas.
- All around Itanos’ plateau, as well as along the coast, various geological features like folds, faults and gorges present the complicated geological features that have formed the island of Crete in recent times. Outstanding marine terraces and gorges describe the intense uplift of the land and the sea level changes of Pleistocene times, whereas tectonic features the mountain building processes.

- The fossil record starts from Paleozoic time with plant fossils of Carboniferous era. However, the most outstanding findings are related with Miocene and Pleistocene fossils. In many terraces abundant fossils of Pleistocene mammals occur, like elephants, deers and hippos, whereas Miocene sediments host *Deinotherium gyganteum* and other marine fossils.
- Finally, the area is of great ecological, cultural and archaeological value. The Minoan Itanos settlement and Zakros' palace attract thousands of visitors every year, whereas the Vai palm forest is regarded as the most important in the eastern Mediterranean.

For all these reasons the local community strongly supports the creation of a geopark in order to promote this remote area and manage it in a sustainable way.