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GLOBAL GEOPARKS NETWORK

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Keynotes

GLOBAL GEOPARKS NETWORK: FROM THE VOLUNTARY NETWORK TO THE INTERNATIONAL ASSOCIATION

N. Zouros[1] M.-L. Frey[2,] Guy Martini[3] & K. Rangnes[4]

[1]University of the Aegean, Department of Geography, Mytilene, Hellas <nzour@aegean.gr>;
[2]Welterbe Grube Messel GmbH, Messel, Germany <frey@welterbe-grube-messel.de>;
[3]Global Geopark Haute Provence, Digne les Bains, France <guy.martini@gmail.com>;
[4]Gea Norvegica Global Geopark, Norway <kristin.rangnes@geanor.no>

Keywords*: Geoparks, Network, Association*

The Global Geoparks Network (GGN) established in 2004, under the umbrella of UNESCO, as an international network, which provides a platform of cooperation among Geoparks. The GGN brings together governmental agencies, local authorities, universities, research institutions, non-governmental organizations, scientists and experts from countries around the world.
The GGN consists a unique worldwide partnership including 111 Geoparks in 32 countries working to protect Geological heritage and promote local sustainable development.
The GGN mission is to influence, encourage and assist local societies all over the world to conserve the integrity and diversity of abiotic and biotic nature, to ensure that any use of natural resources is equitable and sustainable and to support economic and cultural development of local communities through the valorisation of their unique heritage and identity.
In 2014 after one decade of successful operation as a volunteer network the GGN was ready to gain legal personality. The GGN General Assembly during the 6th International Geoparks Conference in Stonehammer Global Geopark, Canada agreed to the new GGN Statutes and the GGN became an international non-profit association, operating under the French law.
Thus GGN will be able to participate in the procedures and become partner with UNESCO for the creation of the UNESCO Global Geoparks under the umbrella of the International Geosciences and Geoparks Programme (IGGP).
Thus the GGN, since September 2014, is a non-profit association subject to French legislation (the 1901 law on associations) and a non-governmental organisation maintaining formal relations with the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

Categories of Membership.

There are different categories of membership within GGN.

1. Institutional Members — Global Geoparks. Participation in GGN is obligatory for all territories nominated as Global Geoparks.
2. Individual Members – Global Geopark Professionals — Persons who have combined or proved professional experience in Global Geopark management.
3. Honorary Members — Persons who have rendered exceptional services to the international Global Geopark community or to the GGN.
4. Cooperating Members — International Organizations, institutions or persons providing substantial financial or other assistance to the EGN because of an interest in Global Geoparks and international co-operation between Global Geoparks.

Structure of the Global Geoparks Network
The GGN structure according to its statutes composed as follows:

1. General Assembly
2. Executive Board
    - President
    - Two Vice-Presidents

- Treasurer
- General Secretary
- Members

3.Advisory Committee
4.National Geopark Committees
5.International Committees / Task Forces / Working groups
6.International Conference on Geoparks
7.Regional Geopark Networks
8.Affiliated Organisations
9.Operational Secretariat

GGN Objectives

The objectives of the Global Geoparks Network (GGN) are:

(i) to promote the equitable geographical establishment, development and professional management of Global Geoparks,
(ii) to advance knowledge and understanding of the nature, function and role of Global Geoparks;
(iii) to assist local communities to value their natural and cultural heritage;
(iv) to preserve Earth heritage for present and future generations;
(v) to educate and teach the broad public about issues in geo-sciences and their relation with environmental matters and natural hazards.
(vi) to ensure sustainable socio-economic and cultural development on the natural (or geological) system
(vii) to foster multi-cultural links between heritage and conservation and the maintenance of geological and cultural diversity, using participatory schemes of partnership and management;
(viii) to stimulate research when appropriate;
(ix) to promote joint initiatives between Global Geoparks (e.g. communication, publications, exchange of information, twinning).

The GGN establishes ethical standards which must be adopted and respected by Global Geoparks and Global Geopark professionals.
The GGN organises co-operation and mutual assistance between Global Geoparks and between Global Geopark professionals.
The GGN initiates and co-ordinates Regional Geoparks Networks which will foster international co-operation and promotion of sustainable development.
The GGN represents, advances, and disseminates knowledge in Geodiversity management and other disciplines related to studies in Geo-conservation, Geo-tourism, Geo-education and/or the management and activities of Global Geoparks.

INTERNATIONAL GEOSCIENCE AND GEOPARKS PROGRAMME

P.J. Mc Keever[1*]

[1]UNESCO, Chief of Earth Science and Geohazard Risk Reduction Section, place de Fontenoy, 75732 Paris cedex 15, France
*Patrick Mc Keever (pj.mckeever@unesco.org)

Keywords: *UNESCO, Global, Geopark*

UNESCO is the only United Nations Organisation with a mandate in Earth Science and it promotes international cooperation between geoscientists through the International Geoscience Programme (a joint programme with the International Union of Geological Sciences) and international cooperation between local communities through the Global Geoparks Network.

The International Geoscience Programme (IGCP) has provided a platform to scientists from across the world to push the frontiers of knowledge forward through concrete project arranged under five thematic areas including Geohazards. The IGCP has always built bridges between disciplines and between scientists, including young ones, with the aim of stimulating cutting-edge research and sharing scientific knowledge for the benefit of all. UNESCO is the only United Nations organisation with a mandate to support research and capacity in geology and geophysics and the IGCP is our flagship.

A Global Geopark is a unified area with geological heritage of international significance. Global Geoparks use that heritage to promote awareness of key issues facing society in the context of the dynamic planet we all live on. Many Global Geoparks promote awareness of geological hazards including volcanoes, earthquakes and tsunamis and many help prepare disaster mitigation strategies among local communities. Presently there are 111 Global Geoparks spread across 32 countries on 5 continents.

Following the success of the Global Geoparks and their growing visibility across the world, UNESCO has for the last two years been exploring ways to formalize the link between the Organisation and the Global Geoparks. Currently there is a proposal to bring IGCP and Global Geopark activities together under a new programme. This new “International Geoscience and Geoparks Programme” will not only bring together the IGCP science projects and Global Geopark activities, significantly, it will allow for, the first time, the designation of official UNESCO Global Geoparks. UNESCO Global Geoparks will be the first new site designation from UNESCO since the creation of the World Heritage Site label in 1972.

NATURAL AND CULTURAL HERITAGE - MANAGEMENT AND VERSATILE BENEFITS

Dr. Rauno Väisänen

Director, Parks&Wildlife Finland

Mr. Väisänen describes the functions, services and development work in the Parks & Wildlife Finland, the organization responsible for nature protection areas and cultural heritage monuments on state-owned lands in Finland. Parks & Wildlife Finland is the publicly funded division of Metsähallitus, a state-owned enterprise which manages all the lands owned by the state of Finland, altogether ¼ of the land area.

The Parks & Wildlife Finland manages 39 national parks, 19 strict nature reserves, 6 national hiking areas, 12 wilderness areas and almost 500 other protected areas, as well as the public water areas, altogether 7,1 million hectares. In 2014, it employed 654 people, of which one-third were seasonal employees. The fields of work are acquisition and management of protected areas, land use planning, conservation of habitats and species, protection of cultural heritage, landscapes and traditions, as well as game and fisheries management and licenses for fishing and hunting. Significantly for the citizens and the tourism industry, the Parks & Wildlife Finland provides trails and other outdoors recreation facilities for a wide variety of activities - hiking, biking, canoeing, schools, nature photographers, scientists, fishers, hunters, voluntary workers, etc. Extensive communication work with up-to-date channels and appliances helps reach current and potential visitors. The number of visitors to National Parks is continually growing; the 2 million mark was exceeded 2011.

Mr. Väisänen describes how the National Parks in Finland reflect the geodiversity, as well as the biodiversity and cultural heritage, of the land and its people and how these values are communicated. Two geologically unique areas with an active Parks & Wildlife Finland involvement are highlighted: the Kvarken (Merenkurkku) World Heritage Site and the Rokua Geopark. In the Kvarken, Parks and Wildlife Finland acts as the Site Coordinator, and in the Rokua Geopark, it was one of the founding members and innovators of the Geopark concept. The Rokua National Park is a part of the Geopark.

Mr. Väisänen also covers the long-standing cooperation agreement between Parks & Wildlife Finland and the Geological Survey of Finland, where the aims are (1) to secure the geological diversity in Finland; (2) to promote sustainable use of natural resources; (3) to increase interest in and communication of geological phenomena and (4) agreement on terms and conditions of geological research on protected areas.

Mr. Väisänen concludes his presentation by introducing the multiple benefits – to health, to local economy - that nature protection areas and their recreational and tourism use create to individuals and communities. To account for both kinds of benefits, the Parks & Wildlife Finland participates in method development with several research institutions. Especially the measurable and demonstrable health benefits of even a short-time stay in the nature are attracting wide interest in the society.

Mr. Väisänen has worked as the director of Parks & Wildlife Finland (earlier: Natural Heritage Services, Finland) in Metsähallitus since 1995. He has a Ph.D. in zoology from the University of Helsinki in 1984.

Aspiring Geoparks

A GEOPARK PROJECT IN MATO GROSSO DO SUL STATE (W BRAZIL): AN AMERINDIAN AND PANTANAL TERRITORY

M. Margareth E. R. Lima[1]*, Gilberto L. Alves[2] & Artur A. Sá[3]

[1]Architecture department, UFMS, Campo Grande, Brazil; [2]Doctoral department, UNIDERP, Campo Grande , Brazil; [3]Geology department, UTAD, Vila Real, Portugal
* Margareth Lima (margareth18sr@hotmail.com)

Keywords: *Aspiring Geopark; Amerindians; Pantanal; Mato Grosso do Sul; Brazil*

In 2006 the Brazilian Geological Survey (CPRM) created the project "Geoparks of Brazil" in order to identify, classify, catalog, georeference and promote the Brazilian geological heritage and to set guidelines for sustainable development, in line with local organizations and communities. Among the proposals presented in this project, since 2007 was carried out the "Aspiring Geopark Bodoquena-Pantanal" in the State of Mato Grosso do Sul. This proposal covered an area of 22,000 km^2, with 45 geosites inventoried in 13 municipalities with 265,000 inhabitants. Geologically this territory is indicative of the occurrence of global changes in the late Neoproterozoic and of the fragmentation of the Rodinia Supercontinent. This area involves important ecosystems of interest for tourism, as the South Pantanal, recognized as Biosphere Reserve by UNESCO, inside a sedimentary subsident basin with important records in the understanding of the Cenozoic tectonic and environmental conditions, and by the presence of the fossil calcretes of the Xaraiés Formation (Pleistocene), associated with an arid phase during the early stage of sedimentation and to the Morraria the Urucum landscapes, with important iron-manganese deposits. The Serra da Bodoquena is marked by karst landscape (with caves, sinkholes and fossiliferous tufa limestone excavated by rivers with crystalline waters, among others), rich biodiversity, and many archaeological and historical sites, which attests the human occupation of this region. The Neoproterozoic fossils *Corumbella werneri* and *Cloudina lucianoi* are paleontological *ex-libris* of this territory. The first one corresponds to a primitive form of life, as well as for the establishment of geological correlations and paleoenvironmental reconstructions in South America. The presence of *Cloudina lucianoi* in the Tamengo Fm. (Corumbá Group – Ediacaran Period) allow regional correlations and to deduce the existence of an ocean with sedimentation similar to these units in eastern Greenland, northwest of Scotland, Ireland and Iberian Peninsula. On the other hand, this region is recognized by the important presence of indigenous Amerindian population, which lives there in harmony with the environment. Its way of living remains as a treasure regarding the ancestral. In this context, the recognition of this area as Global Geopark in the near future can contribute significantly for the preservation and promotion of elements who witness ancient times of the Earth and Life history. These bring together a set of geological, hydrological, climatic, paleontological, archeological and cultural features, which contribute to the regional sustainable development, while strengthening a multitudinous knowledge and respect for the local culture, especially related to Amerindians and Pantaneiros, main objective of this work, strengthen and promote the importance of this region as a future geopark.

ASPIRING TROLLFJELL GEOPARK – CONNECTING GEOLOGY, LANDSCAPE AND HUMAN HISTORY AT SØR-HELGELAND AND LEKA, CENTRAL NORWAY

A. Bergengren[1*], A. Bang Rande[2], K. Floa[3]& M. Gilstad[4]

[1,3,4] Employee, Trollfjell Geopark, Brønnøysund, Norway [2] Project manager, Trollfjell Geopark, Brønnøysund, Norway
* Anna Bergengren (anna.bergengren@trollfjellgeopark.no)

Keywords: *aspiring geopark, geoheritage, geotourism, strandflat landscape*

The aspiring Trollfjell Geopark, central Norway, is established upon the knowledge and impression of a rich and unique geological heritage. From ancient times, settlers and travellers along the coast have used and depended on this landscape, the rocks and processes that formed it, and processes that still are actively changing it. The aspiring Trollfjell Geopark displays a 500 million years geological cycle, from ocean to ocean. The rocks exhibit uniquely preserved pieces in a geological puzzle, enabling us to reconstruct past landscapes, from the volcanic ocean floor of Iapetus, via tectonism and sedimentation on the Laurentian margin, to ice age landscape and a land rising from the Atlantic Ocean.

The geological attractions in the area are unique and diverse. The ophiolite complex at the island Leka is designated as the geological Monument of Norway, and here you can walk on MOHO, the boundary between the Earth´s crust and the mantle. The famous hole through the mountain Torghatten is one of Norway´s most visited tourist attractions. The outstanding landscape feature called the strandflat has entranced visitors for thousands of years. In Trollfjell Geopark you can experience the strandflat as a wide archipelago with a myriad of more than 13 000 islands, 6500 of which comprise a UNESCO World Heritage Area, the Vega Archipelago. The geology is the foundation for a landscape rich in resources, where the early humans settled around the rising mountains and gathered food in the shallow sea. The apparent link between geology, landscape, biodiversity and cultural history is quite distinctive – the area has been inhabited for more than 11 000 years.

The districts of Brønnøy, Vega, Vevelstad, Sømna, Bindal and Leka are cooperating on the Trollfjell Geopark project. The aim is to raise our sights beyond the national sphere and view geological heritage and natural and cultural assets as a single entity in a region that has much in common. A regional perspective on geological heritage and natural and cultural assets entails automatic comprehensive thinking and connection with natural resources. Trollfjell Geopark is intended to contribute to make the area more attractive and to create values by facilitating geotourism and world-class activities and experiences based on the exceptional geological history and features. Trollfjell Geopark wants to present the unique geology in a new and inspiring way, to enhance knowledge about the geological attractions and bind them together. Our aim is that this will enhance pride and fortify local identity.

In this presentation, we aim to present the concept and principles of the aspiring geopark, our strategy for community participation and local development, as well as the geological attractions in the area and our focus on geotourism.

BUILDING THE ASPIRING BUZĂU LAND GEOPARK: INTERPRETING INTANGIBLE HERITAGE

A. Andrășanu[1*], R-G. Popa[2] & D-A. Popa[3]

[1] University of Bucharest, Romania; [2]Institute of Geochemistry and Petrology, ETH Zurich, Switzerland;
[3]Institute of Geodynamics of the Romanian Academy, Bucharest, Romania,
* Alexandru Andrășanu (alexandruandrasanu@gmail.com)

Keywords: *nature, culture, heritage, geopark, interpretation, intangible heritage*

The Buzău Land Geopark project started as an initiative of the University of Bucharest in partnership with the Buzău County Council and supported by other local and national bodies and institutions. The commitment of local communities has generated national projects dealing with public awareness, cultural events, promotion, and informal education. Involvement of an enthusiastic team of young researchers transformed the initiative into a successful international applied research project funded by the EEA Financial Mechanism (GeoSust project contract no 22 SEE/30.06.2014) with a strong support from Norwegian institutions and Gea Norvegica Geopark.

Unique geological sites like mud volcanoes, amber deposits, salt caves, and oil springs are present. Sedimentary rocks folded and overthrusted outline a geological history covering more than 70 million years. The geopark territory is covering three biogeographic regions: steppic, alpine and continental ones, grouped in 77 habitats types, a great number of species listed in different national and European directives for nature conservation and few endemic species: *Euscorpius carpathicus, Nitraria shoberi* and *Artemisia santonicum.* One of the most impressive historical and archeological characteristic is done by the 30 caves digged since VI century (?) by orthodox Christians. Hard living conditions and isolation of this small monastic community made people to call the area „Romanian Athos".

One of our objective is Buzău Land Geopark to play an active role in the economic development of its territory through enhancement of a general image linked to geological heritage. Geotourism products development has direct impact on the territory by influencing its inhabitants to reconsider the approach they have for local development. The objective is to enable the inhabitants to re-appropriate the values of the territory's heritage and actively participate in the territory's cultural revitalisation.

Another objective is to sustain local development and democratic participation using geologic, natural and cultural heritage as a 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 development plan have to be the interpretation of tangible and intangible heritage that makes planning an inspiration for stakeholders.

The paper is presenting our approach in developing a visiting infrastructure for geotourism and education based on iconic geological assets and the intangible heritage generated by them during generations. The selection was based on geologic, anthropologic and ethnographic studies of an interdisciplinary team and the selected subjects are: mud volcanoes, amber, salt diapirs, old volcanic tuff deposits, natural fires, oil and salt water springs. All these are present in spectacular outcrops but also in local folklore and scientific papers. Local people are speaking and imaging dragons, hell fires, ogres, knights, faeries, springs of life and death and geologists about tectonic movements, ancient seas and volcanoes, extinct prehistoric creatures. All of them are part of the local intangible heritage in a direct dialogue with the tangible one. This dialog is used in developing visiting trails (*Trail of Volcanoes, Trail of Legends, Trail of Rocks*), info-points, booklets, exhibitions. The approach is a key part in our attempt to sustain the branding process of the Geopark as the *Land of Earth and Human Legends.*

BUILDING THE ASPIRING BUZĂU LAND GEOPARK: PHILOSOPHY, APPROACH, FUNDS

R-G. Popa[1,2*], D-A. Popa[2] & A. Andrășanu[3]

[1] Institute of Geochemistry and Petrology, ETH Zurich, Switzerland, [2] Institute of Geodynamics of the Romanian Academy, Bucharest, Romania, [3] University of Bucharest, Romania
* Razvan-Gabriel Popa (razvangabriel.popa@yahoo.com)

Keywords: *nature, culture, heritage, Geopark, interdisciplinary, project*

Buzău Land is a territory located in Romania, at the Carpathians Bend Area, where hills and mountains converge. It is a rural area with about 48000 inhabitants, situated in a very dynamic natural landscape: the Fold and Thrust Belt of the Carpathians, in proximity to the Vrancea seismogenic area. The local geodynamics led to the appearance of spectacular phenomena, such as mud volcanoes, gas seepage with natural combustion ("living fires"), oil and mineralised water springs and mountain-forming salt diapers. Other geological elements add to this variety: amber, plant fossils, marine fossils, sandstone concretions, a complete stratigraphic sequence that covers almost 40 million years in Earth's history, and much more. Erosion creates spectacular geomorphologic shapes, dissolution carves salt caves and gravitational collapse forms unexpected depressions filled by lakes. This variety describes a rich natural environment that has stimulated the human imagination for millennia, an environment to which its inhabitants adapted by crafting stories that add up to build a wondrous subjective reality. In this reality dragons, ogres, malevolent or benevolent spirits and magical stones have their own place, being responsible for the occurrence of the natural phenomena. In Buzău Land, nature and culture converge, intertwine and enrich one another.

Our working philosophy for building the Geopark follows up on this, and it can be simplified by stating that the natural environment has inspired the human imaginary over time, and that geodiversity contributed to differences in the traditional (folkloric) interpretation of nature, thus creating cultures. The Buzău Land aspiring Geopark is being built around the interaction between nature and culture and it is envisaged as the place where one could explore the connection between the physical (natural) and spiritual (human) spheres.

Our approach is highly interdisciplinary and it requires the support of specialists from Earth, Life and Social sciences, assisted by programmers who facilitate communication and by artists that emphasize the natural-cultural connection. A team of 67 people of which 47 researchers are currently involved in this approach: geologists, geophysicists, geographers, chemists, physicists, biologists, landscape architects, anthropologists, ethnographers, psychologists and economists. The reason for this collaboration is to be able to present each geological element or phenomenon from both a natural and a cultural point of view.

DEVELOPING RISING AWARENESS FOR THE PROTECTION OF THE GEOLOGICAL HERITAGE OF THE TROODOS MOUNTAIN RANGE AND ECONOMIC PROSPERITY BY THE INTEGRATION OF THE PROPOSED TROODOS GEOPARK IN THE EUROPEAN GEOPARKS NETWORK

E. Tsiolakis[1*], E. Morisseau[1], Z. Zomeni[1], T. Tsintides[2], K. Vasiliou[3] & K. Konstantinou[4]

[1] Geological Survey Department, Lefkosia, Cyprus, [2] Forestry Department, Lefkosia, Cyprus, [3] Troodos District Development Agency, Galata, Cyprus, [4] Troodos Tourism Board, Kyperounta, Cyprus.
* Efthymios Tsiolakis (etsiolakis@gsd.moa.gov.cy)

Keywords: *Troodos Oceanic crust, Awareness, Protection, Geotourism, Cyprus*

The proposed Troodos Geopark covers an area of 1.147 km^2 and is located in the heart of the island of Cyprus, which is situated in the easternmost part of the Mediterranean Sea. Cyprus is recognised by the international scientific community as a unique geosite, that of the Troodos ophiolite, a fully developed fragment of oceanic crust and the earth's upper mantle, recording the processes of ocean floor spreading.

The area of the proposed Geopark is the largest biotope of Cyprus hosting remarkable natural and endemic flora and fauna co-existing in rare and protected habitats created by unique lithology, topography and climate.

The geoscientific and environmental importance of the area is not well known to the visitors and local inhabitants who in some cases have contributed to its misuse. Such bad landuse practices have led to open mine pits to be used as landfills sites, the destruction of abandoned mining ore processing facilities or the destruction of geosites from expanding residential areas or other infrastructures.

According to the Cyprus Tourism Organization, the island attracts about 1.5-2 million tourists per year, out of which only 1-2% visit the Troodos mountainous area. This small tourist industry, does not offer significant incentives for investment for the development of large geotouristic infrastructures in the area like a lift line, renovation of abandoned galleries and mines, restoration of old buildings, etc.

Several state-initiated strategic actions are now taking place aiming to contribute significantly to the awareness of the local inhabitants and visitors for the uniqueness of the geology and natural environment of the area. These actions are: (i) promoting with informational signs the unique geotopes of the area, (ii) developing a complete nature trails network, picnic sites and camping sites and (iii) implementing activities for the enhancement of geotourism such as traditional workshops, various festivals, etc.

The integration of the area to the European Geopark Network will increase the potential for the promotion of the Geopark on a worldwide scale through conferences, workshops and other activities resulting with the enhancement of local and foreign awareness. This awareness needs to focus around the importance of the region, the need for it to be protected as a part of the geological heritage of the earth, the increase in the number of visitors and the development of geotourism infrastructure from the private sector.

For the reasons mentioned above, it is strongly believed that the integration of the area to the European Geoparks Network, will ensure the protection, sustainable use and economic development of the region, giving to the residents of this mountains area substantial prospects in geotourism, providing conditions that can sustain their lives in their community.

GEOEDUCATION AND COMMUNICATION IN THE SAARTE GEOPARK PROJECT, ESTONIA

V. Bubukin[1*]& G. Põldemaa[2]

[1] NGO Saarte Geopark, Project Manager, Lossi Street 1, 93819 Kuressaare, Saare County, Estonia, [2] NGO Saarte Geopark, Development Manager, Lossi Street 1, 93819 Kuressaare, Saare County, Estonia
* Viktoria Bubukin (info@saartegeopark.ee)

Keywords*: Saarte Geopark, Silurian era, Estonia, GeoConnect, UNESCO*

Couple of years ago the local conditions of founding the Saarte Geopark were very good. Since the Saarte Geopark embraces entirely local nature and includes also heritage sites by not merely focusing on geological natural resources, the impact of the geopark to the economic and social development of Saare County is much broader than only focusing on its geological resources. Saarte Geopark was founded by the local municipalities.

Saare County is the most western county in Estonia – its area is 2922 sq. km, representing 6.5% of Estonia´s territory. In addition the island of Saaremaa, there are smaller islands such as Muhu, Ruhnu, Abruka and Vilsandi and a lot of small islands in the county. All are well-known destinations among tourists. Saaremaa is unique because of its location and its isolation – a unique atmosphere and architecture have been conserved (reed roof buildings, stone fences), the inhabitants of island have its own style of speaking and beautiful traditional costumes.

The Saare County is rich in natural monuments. The most important aspect for the creation of the geopark is an internationally well-known geological monument – the Kaali meteorite crater. The main pillar of Saarte Geopark is based on the presentation of the Silurian era. The outcrops of Silurian that are located all over the island of Saaremaa allow presenting almost ¾ of the Silurian era. Most of them are located on the seashore and form high or low cliffs.

Current year has been very active for the Saarte Geopark as we carried out several large projects in the area and submitted a project application in cooperation with Magma Geopark in Norway and Illulissat Icefjord World Heritage Site in Greenland. Saarte Geopark started to use GeoConnect solution which is an integrated IT solution for geoparks.

In 2015 Saarte Geopark reviewed its territory and enlarged it to Hanila Municipality where is also possibility to present Silurian era. Hanila Municipality is now presented as main entrance to the Saarte Geopark. The enlargement was needed to fulfill one of the recommendations made by the GGN as Saarte Geopark had similar territory with the existing Man and Biosphere area Saarte Geopark carried out several other improvements to be able to join the GGN, EGN and UNESCO network.

Saarte Geopark applied for admission to the European Geoparks Network and Global Geoparks Network in 2013. Saarte Geoparks application is at the moment active application and we hope that in 2015 Saarte Geopark will be acknowledged as an UNESCO Geopark.

GEOPARKS AND REGIONAL AND LOCAL DEVELOPMENT: ASPIRING ESTRELA GEOPARK

Emanuel de Castro[1*], Gisela Firmino[2], Gonçalo Fernandes[3] & Ana Ferreira[4]

[1,2,3,4] Touristic Observation of Serra Estrela, Polytechnic Institute of Guarda, Guarda, Portugal
* Emanuel de Castro (emanuelcastro@ipg.pt)

Keywords: *Estrela Geopark, Aspiring Geopark, Local Development; Touristic Promotion*

A Geopark is a well-defined territory, holding a remarkable geological heritage combined with a sustainable development strategy, whose main pillars are Geo-conservation, the Education for Sustainable Development and Tourism. Among its objectives we can include the construction of new infrastructures which promote the conservation of geological heritage, education and tourism; the development of new local products and services; the encouragement of crafts and local economic growth and thus the creation of new employment opportunities. In view of the three main areas of operation of a Geopark: Conservation of the Geological Heritage, education for Sustainability, Tourism and Local Development; the Global Network of Geoparks, argues that a geopark should also enhance, promote and preserve Biodiversity, Cultural Heritage, the Gastronomy and Scientific Research.

As geoparks are eminently territorial, these are based on territorial approaches such as development, preservation and promotion of biodiversity, cultural heritage, geology, gastronomy and scientific research. The apex of action of these spaces are the conservation of geological heritage, the education for sustainability and therefore a tourist development of the areas where they operate. It is important to note that upstream to a tourism strategy is a regional strategy based on the use of local resources.

In this regard, Serra da Estrela, in central of Portugal, sets a territory, geographically defined, with resources of geological and geo-morphological interest, not always properly valued. Thus, the creation of the Geopark Estrela will demonstrate the diversity of resources capable of supporting this classification, as well as its importance for the holistic development of the region, promoting sites through geo-heritage networks. The diversity of glacial brands, the richness of its heritage and the nature of its landscape give Serra da Estrela a unique geography, which structured approach will allow the creation of a strong brand, with tourism, heritage and cultural potential. Thus, the municipalities of Guarda, Seia, Gouveia, Celorico da Beira, Fornos de Algodres, Manteigas, Belmonte, Covilhã and Oliveira do Hospital would be part of the area of Geopark Estrela. In addition to the municipalities, it is intended that the network Geopark Estrela can be composed of other local agents such as educational institutions, local associations, tour operators, and with the different stakeholders of the Serra da Estrela.

It is intended that the Geopark Estrela is also seen as a territorial brand, for creating a brand is to mentally build a space, and the territory of the Serra da Estrela creates mental images of its geography in order to be recognized as a tourist destination and as a tourist brand, often translating itself into the very tourism product.

In fact, the importance of setting up a structure like this for the territory of the Serra da Estrela is unquestionable. The classification of the Geopark Estrela by the European and Global Network of Geoparks would bring a new vision on tourism of this territory and its sustainability by introducing a holistic view of the area, based on its geography, its cultural references and its brand.

GEOTOURISM DEVELOPMENT IN THE LAUHANVUORI REGION IN CENTRAL-FINLAND GIVES PROMISING RESULTS FOR GEOPARK APPLICATION

Brozinski, A.[1] & Konttinen, T.[2]

[1]Åbo Akademi University, Geology and mineralogy, 20500 Åbo, Domkyrkotorget 1, Finland. <aribro@abo.fi>
[2]Metsähallitus, 34530 Länsi-Aure, Seitsemisentie 110, Finland. <terttu.konttinen@metsa.fi>

Everything we see around us has a geological history; even the materials used in man-made structures. Thus humans and our interactions with nature have a strong geological connection. Moreover, the biosphere that surrounds us, is ultimately enabled by geology. The importance of geology in nature-related human activities has also been recognized by Metsähallitus (Parks and Wildlife Finland) and since 2012, there have been successive projects aiming to develop an eco- and geotourism infrastructure in the Lauhanvuori region.

The project area, which is bound by the Lauhanvuori and Kauhaneva-Pohjakangas National Parks, the Haapakeidas Mire Reserve and the Hämeenkangas military training and multi-use area, lies approximately 300 kilometers North-West of Helsinki. It consists of landscapes formed primarily during and after the Weichselian glaciation, in the course of the last 11 000 years. Geological features vary from steep-ridged eskers to supra-aquatic moraine and formations that resulted from post-glacial land-uplift/retreating water level. Striking for Finnish conditions is the 500 million year old sandstone that is exposed on Lauhanvuori. The whole area is underlain by a partially exposed crystalline basement, with parts of it at least 1860 million years old.

Particular geological highlights are the extensive mire systems that can be enjoyed across the project area, mostly in a natural state. For southern Finland, they provide unusually extensive areas of wilderness and quietness. The year-round experience at the mires is enhanced by rich bird-life. Furthermore, next to the nature reserves, there are peat bogs, where different phases of peat production can be observed.

Geologically seen, the project presented two main points. First, the goal was to promote geology by updating the existing information that was aged and partially inaccurate. Secondly, the project area was mapped for geological highlights. In addition to the geological update, co-operation and visibility with the areas' enterprises operating within the nature tourism sector was enforced. In various workshops, a dialogue between Metsähallitus and the enterprises was encouraged.

We found that many companies operating within the nature tourism sector were poorly informed about geology and its potential for touristic operations and product development. There was a clear demand for easily accessible geological information. Moreover, the success of the Geopark-theme among local companies and other organizations was surprising.

The new geological material was used in different kinds of products such as 3D animations, a web portal called lauhanvuoriregion.fi, notice-boards along nature trails and as information for a mobile GPS-based application. Local firms realized that they can benefit from the produced materials and thus attract new visitors to the area.

We agreed that once basic geological information is provided, development should focus more on the latest geological feature, mires. It was also thought that mires could serve as the main attraction for the potential Geopark. The Geopark project and more extensive research related to it will be set forth in near future.

GOLDEN GEOPARK OF LAPLAND – DEFINING AND EVALUATING THE GEOLOGICAL SITES

V. Karkola[1*], P. Johansson[2] & J. Seurujärvi[1]

[1] Inari Municipal Business & Development Nordica, Sairaalantie 3b, FIN-99800 Ivalo, Finland, [2] Geological Survey of Finland, Box 77, FIN-96101 Rovaniemi, Finland
* Venla Karkola (venla.karkola@inari.fi)

Keywords*: geotourism, geological site, geosite, Lapland, Finland*

The Golden Geopark of Lapland project has applied for membership to the European Geoparks Network (EGN). The Golden Geopark of Lapland project has consisted of several different elements, one of the most important of which is probably the work on the geological sites. We have defined the sites that serve best in bringing out the unique geology, gold history, northern nature and local cultures.

One part of the project was to define criteria for a good geosite, and it has been an underlying guideline for our work throughout the process. Firstly, a geological site has to be geologically interesting, and/or has the interest of the public at large. Secondly, it is easily accessible. And thirdly, there are stories related to it. When interpreting the sites, one should keep in mind these three aspects.

An example of a good geosite is the Karhunpesäkivi (Bear's Den Rock) erratic. Firstly, it can be considered to be of scientific interest, as well as being of interest for the public at large. It is a several meters high erratic that has a cave inside. The process of its formation is scientifically interesting, and not simple or self-explanatory. As a site it is interesting, since one can go in to the cave and touch its walls, both inside and outside. Secondly, it is easily accessible. It is near the main road, and there are some services - car park included - nearby. From the car park there are steps that take the visitor to the erratic. Thirdly, the story of its discovery is fascinating; it was first found by two huntsmen on a cold and dark winter night when they were hunting far away from home. They found a nice and warm cave to sleep in overnight. Everything was fine, until they found themselves sitting next to a sleeping bear.

Geosites can also be categorized by the same three criteria, and these criteria can be used in interpretation. Categorising geosites, based on these criteria, will help visitors plan their program in the Geopark, and it can also be used for other purposes (eg. educational). 1) Interest level of the site: Visitors would obviously travel further for a great site, so it is important that this information is available. 2) Accessibility: Accessibility is a very important aspect for categorizing sites, and information about accessibility has to be widely disseminated and easily understood. There are practical reasons for this (eg. informing people who sit in a wheelchair or have other constraints), but it is also a security question. It might be risky to go and visit sites located in the wilderness without the capability to read a map and use a compass. 3) Stories: Stories related to geosites might raise interest in the topic. Storytelling is a basic need of human beings, and eg. in education, and it makes learning easier.

KARELIA GEOPARK PROJECT – THE OLDEST EUROPEAN CONTINENT BETWEEN EAST AND WEST

J. Parviainen

Joensuu Regional Development Company Ltd, Finland
(jouko.parviainen@josek.fi)

Keywords*: North Karelia, geopark project, Archaean bedrock*

North Karelia is the easternmost region of Finland and the continental EU sharing a 300 km borderline with Russia. There the first collision between the Finnish and Russian pre-continents dates back to 2,800 million years.

The landscape is characterized by undulated topography with hills, lakes and rivers. Versatile walking and biking trails and waterways make the region attractive for outdoor life. As a consequence of western and eastern heritage and impulses for centuries the region has today a rich and versatile Karelian culture and cuisine.

The region boasts both the earliest and youngest geological history of Europe. Across the region lies a major geological borderline from southeast to northwest created by plate movements for 2,300 million years ago. The line is visible in the Koli National Park crowned by white quartzite outcrops as a memory of ancient sandy beach. Koli offers visitors the best known Finnish national landscape which has attracted also our famous artists.

Eastwards to the border lies the oldest continent in Europe. The Archaean granitoids with interlayers of metavolcanics formed mainly 2,500-3,000 million years ago by series of plate tectonics followed by extensive erosion. Meanwhile westwards there is a schist belt, remnants of the Karelian mountain range once higher than the Alps, formed 1,900 million years ago during the massive Svecofennian orogeny.

North Karelia has been one the main mining and natural stone industry areas in Finland. Since 18th century there have been over 30 ore mines, over 20 industrial mineral mines and 14 small scale iron works. Modernization of Finnish mining started in 1910 with the foundation of the Outokumpu mine. It operated until 1989 and was the largest copper mine in Europe. Today it acts as a museum to explore geological and mining heritage. In Juuka, you find the Finnish Stone Centre, another place where the modern natural stone industry, science and art meet.

In North Karelia we have two operating mines, the Pampalo gold mine in Ilomantsi and the Kylylahti copper mine in Polvijärvi. In addition there are building stone quarries as well as a world leading industry of heat retaining stoves based on soap stone formation dating back to 2,788 million years.

Over the ancient bedrock stand young glacial and post-glacial deposits, like eskers, marginal formations and deltas. A unique feature reflecting the close relation between a man and geology are the top-of-hill farming lands in the supraglacial areas.

Karelia Geopark Project's (KGP) goal is to submit an application in 2015 for membership in the European Geoparks Network. The work is carried out by Joensuu and Pielinen Karelia regional development companies, the University of Eastern Finland, Geological Survey of Finland, the Regional Council of North Karelia, as well as the region's municipalities, and tourism and cultural associations and enterprises.

LAST EUROPEAN DINOSAURS & GEOLOGY: A DIVULGATIVE NETWORK FOR AN ASPIRING GEOPARK IN SOUTHERN PYRENEES

À. Galobart[1,2*], G. Rivas[3], J. Poch[4] & O. Oms[4]

[1] Mesozoic Research Group, Institut Català de Paleontologia, Sabadell (Catalonia, Spain), [2] Museu de la Conca Dellà, Isona (Catalonia, Spain), [3] Territorial Supporting Center of the Pyrenees, Institut Cartogràfic i Geològic de Catalunya, Tremp (Catalonia, Spain), [4] Geological Dept. Universitat Autònoma de Barcelona, Bellaterra (Catalonia, Spain)
* Ángel Galobart (angel.galobart@icp.cat)

Keywords: *Tremp-Montsec area, Pyrenean Diosaur Museu, cultural tourism, dissemination network*

Located in the south-central Pyrenees (Catalonia, Spain), the Tremp-Montsec area has recorded some of the main pages of the Mesozoic-Tertiary boundary, showing a complete sketch of the continental environments from Cretaceous and Palaeogene ages. The posterior formation of the Pyrenean range has modelled the characteristic landscape of this inland territory that bases its economy in agriculture and livestock farming.

Research on Geology and palaeontology has been carried out in this area for more than 50 years, but only in recent times the administration has considered this research as a tool for socio-economic development. Montsec-Tremp is a worldwide known reference area attracting students and professionals of geology. Several points are reference sections (Ilerdian stratotipe), include interesting events in Earth history (such as the K-Pg boundary or the Paleocene-Eocene thermal maximum), contain classical sedimentological outcrops examples or display large exposures displaying tectosedimentary relationships.

On the other hand, the Tremp formation has provided a huge record of bones, eggs and ichnites of the last European dinosaurs, just before of its extinction 66 my ago, which opens a window to the deep time. Dozens of paleontological sites are scattered for the Tremp-Montsec area and several municipalities had expressed their interest to host a dinosaur museum. With the aim to keep the paleontological heritage and also to deal with the scientific divulgation as close as possible to its original place, the dissemination network "Pyrenean Dinosaur Museum" was created to distribute the museographic information about environments and the dinosaurs who lived in, in the different venues as a part of a whole museum scattered in the territory.

The presence of several research institutes in the territory (Catalan Paleontological Institute, Catalan Cartographic, Geological Institute, Autonomous University of Barcelona, etc.) reinforces the commitment to the decentralization of science in rural areas as a catalyst for cultural tourism. These institutes, together with the local dissemination centres (Conca Dellà Museum, Dinosfera & Epicentre) and geological and paleontological visitable areas configure a low scale network governed by the precepts of sustainability and proximity to the territory, which contribute to the development of this region as an aspiring geopark.

MEXICO'S GEOPARK PROJECT OF THE "COMARCA MINERA", HIDALGO STATE

P. Alfonso[1], A. Camprubi[2], C. Canet[3*], F. Climent[4], A. Conde[5], E. Cruz-Chávez[6], M. García-Vallès[7], A. Gil[3], C. Guzmán[5], A. Iglesias[3], A. Jiménez[1], A.B. Jiménez[3], J.M. Mata-Perelló[1,4], M. Mendoza[6], J.C. Mora[3], D. Parcerisa[1], B. Peláez-Pavón[3], J. Poch[8], M. Ramírez-Cardona[6], O. Sterpone[9], M. Yáñez[6], D. Zamudio[3]

[1]Universitat Politècnica de Catalunya, Spain, [2]Instituto de Geología (UNAM), Mexico, [3]Instituto de Geofísica (UNAM), Mexico, [4]Geoparc de la Catalunya Central, Spain, [5]Asociación de Ingenieros de Minas, Metalurgistas y Geólogos de México A.C., Mexico, [6]Área Académica de Ciencias de la Tierra y Materiales (UAEH), Hidalgo State, Mexico, [7]Universitat de Barcelona, Spain, [8]Universitat Autònoma de Barcelona, Spain, [9]Instituto Nacional de Antropología e Historia, Mexico
*Carles Canet (ccanet@geofisica.unam.mx)

Keywords: *Geopark; mining heritage; sustainable development.*

The geopark project referred to as "Comarca Minera" in the Hidalgo State, Mexico, is here presented as a candidate to be included in the Global Geoparks Network. This zone has an outstanding mining and geological heritage, including the following highlights: (*a*) the Pachuca–Real del Monte world class epithermal Ag–Au deposit and historical mining district; (*b*) the type locality of cristobalite; (*c*) the columnar basalts of Huasca de Ocampo (reported by Alexander von Humboldt in 1803); and (*d*) important examples of New Spain mining *haciendas* (*i.e*. colonial metallurgy plants).
The Hidalgo state, in central-eastern Mexico, is known by its mining wealth. Mineral resources in this state have been the object of continuous exploitation for more than 500 years. The "Comarca Minera" geopark project is focused on the sustainable benefit of old mining areas, buildings and historic remnants, by a throughout research and documentation in Geology, Mineralogy and Mining Heritage.

With this geopark project, we are following the next goals as favorable factors for sustainable development and conservation:

(1) To promote the enhancement and documentation of the geological and mining heritage through the landscape conservation and the research in Geosciences, comprehensively approaching natural, cultural, social and economic aspects.
(2) To promote the sustainable economic development of the region, mainly through cultural tourism.
(3) To promote education and dissemination of culture, with special emphasis in the Geosciences as well as in Environmental Sciences and History.
(4) To promote a thorough documentation of oral tradition.

To achieve the above goals, a multi-disciplinary and bi-national team that includes geoscientists, engineers, geographers, anthropologists, biologists, teachers and students, has been constituted and is actively working.
Natural resources along with outstanding cultural and ethnic richness converge in the "Comarca Minera", making this region as potential hot spot for sustainable development based on integrated management of the heritage in a holistic way, that reconnects inhabitants with the Earth, especially young generations.

TEN STEPS TOWARDS EGN/GGN MEMBERSHIP – REYKJANES ASPIRING GEOPARK ICELAND

Eggert Sólberg Jónsson

Reykjanes Aspiring Geopark, Project Manager, Iceland
(eggert@heklan.is)

Keywords*: Aspiring Geopark, management, visibility*

Reykjanes Aspiring Geopark Iceland applied for EGN/GGN membership in November 2012. The coordination committee discussed the application in September 2013. The application was deferred until further developments were implemented. During the time from the EGN meeting in September 2013, Reykjanes Aspiring Geopark has taken 10 steps towards EGN/GGN membership. Those steps were taken to fix the two main problems identified in 2013, management and visibility.

Actions on the management factor are e.g. a new management plan where the role of each partner in the geopark is clearly stated and establishment of two advisory councils on marketing and advisory council on education and research.

The visibility of the geopark has been improved in local and national media, on-site and in the Geopark. The infrastructure to receive visitors has been improved. Now more than 10 geosites are interpreted with information panels. Reykjanes Geopark opened a visitor center in March. It was an important step to be able to receive visitors. The Visitor center also serves as an information center for the region.

Reykjanes Geopark will hand in a detailed and formal progress report in June/July 2015.

THE ASPIRING GEOPARK "ALTAI"

S. Zyablitsky[1], N. Kocheeva[2], A. Ebel[3] & N. Iurkova[2*]

[1]President, Association of Tour Operators of the Altai Republic, Gorno-Altaisk, Russia,[2]Department for Sustainable Development of Mountain Territories, Gorno-Altaisk State University, Gorno-Altaisk, Russia, [3]Department of Archaeology and General History, Gorno-Altaisk State University, Gorno-Altaisk, Russia
* Natalia Iurkova (dipgasu@mail.ru)

Keywords*: tourism, development, geological, archaeological and cultural heritage, geopark, Altai, mountains*

Located in southern Siberia between Kazakhstan, Mongolia, and China, at the very heart of Eurasia, is the Altai Republic.This mountainous country, where there are still argali and snow leopards, has been the crossroads of major human migrations since the beginning of time. These migrations have left their marks in the landscape through graves, tombs, and numerous petroglyphs.This area has exceptional geology, mainly glacial, and an extraordinary hydrology with Biya and Katun which form the Ob.The Altai people are very attached to their traditional culture and have preserved a unique shamanic mysticism.

The collapse of the Soviet Union resulted in closure of industrial companies and a subsequent dramatic increase in unemployment.The Altai is now facing a dilemma: how to improve the social and economic situation of the people while preserving its natural and cultural heritage. The development of tourism as a priority for the economy is the solution.

In recent years, efforts have been made to attract tourists while, at the same time, preserving the Altai culture and different geological and archaeological sites. But to become an international destination, these efforts must be coordinated within a common concept such as a Geopark.

Having received the status of "special economic zone of tourist-recreational type,"the Republic attracts more and more investment in infrastructure development, including the reconstruction of the Gorno-Altaisk airport and the federal highway M -52.Based on the evolution of tourism over the past five years the Altai could eventually accommodate up to 3 million people per year. Thus not only would the tourism industry be improved, but also agriculture, catering, transport, local crafts and other activities. This will bring additional revenue to the inhabitants of remote areas, especially though the development of rural tourism.

The proposal will draw on the experience and close contacts during the past ten years between the Bauges in France and the Altai Republic. The aspiring 14,500 km^{2}Geopark "Altai" will involve the 20,000 residents of 22 municipalities. This area is particularly interesting for the development of geological, historical, and cultural tourism. The most attractive geological features include glaciers, river terraces, and gorges. The archaeological heritage of the Altai includes Scythian and Turkic monuments, the old mining vestiges from the Palaeolithic to the late Middle Ages, and other historical sites. The Altai people, through the retention of their beliefs, ancestral language, customs, original traditions like throat singing, and respectful attitude towards nature, are a significant cultural attraction for tourism. In addition, the region is notable for the peaceful coexistence of diverse religions, including Orthodox Christianity, Islam, Buddhism, and Shamanism.

Thus, the formalization of the aspiring Geopark "Altai" initiated by the Regional Government is actively supported by the local indigenous and non-indigenous peoples, who see this as a way to bring about economic and social renewal and enhancetheir Earth.

THE INFRASTRUCTURE AT THE GEOSITES IN GOLDEN GEOPARK OF LAPLAND

P. Johansson[1*], V. Karkola[2] & J. Seurujärvi[2]

[1] Geological Survey of Finland, Box 77, FIN-96101 Rovaniemi, Finland, [2] Inari Municipal Business & Development Nordica, Sairaalantie 3b, FIN-99800 Ivalo, Finland
* Peter Johansson (peter.johansson@gtk.fi)

Keywords*: infrastructure, geotourism, geological site, Lapland, Finland.*

The Golden Geopark of Lapland, in northern Finland, is famous for its natural Arctic landscape, geological sights, placer gold deposits and historical sites related to gold prospecting. Gold in the Precambrian bedrock formed gradually over the course of millions of years. During the Ice Ages, glaciers carved and eroded the rock and loosened gold grains into till deposits. Glacial meltwaters enriched the gravel deposits along the river shores and channels with gold nuggets from till. They are the result of repeated erosion, transported and deposited as placers by the flowing water.

During the last twenty years the geological history and landscapes of the geopark area have been mapped. As a result, two geological outdoor maps and guidebooks have been published. The first map, covering the western part of Urho Kekkonen National Park and Ivalojoki gold prospecting area, was completed in 2000. The second map, of Lemmenjoki National Park, was published two years later. Rock types and various glacial and postglacial formations and deposits are indicated on the map with different colours and symbols. In addition, the maps include selected geological excursion sites, accommodation information, marked paths, cycling and canoeing routes, and campfire sites. The colourful gold prospecting history of the area is also presented alongside the geological sites. The history of gold prospecting in Finnish Lapland begins in the Ivalojoki river valley in 1868, when the first gold nuggets were discovered there. The geological history, gold-related stories, gold prospecting and natural and cultural sights (e.g. old mining villages and claims, dilapidated gold huts and mine shafts excavated into the rock) are explained in the accompanying guidebooks of the maps.

The data compiled during the mapping process has also been used to revamp the nature trails. Information panels have been added to the trails, explaining the origins of the landscape, the related geological time-scales and the gold prospecting history. Information about the sites has been published on the Internet, too. In future, it will be possible to download it onto mobile devices for use on personal hikes or guided tours. The information about and interpretation of the geology are also presented in museums and information centres, e.g. the Tankavaara Gold Prospector Museum and Siida – the Sámi Museum and Northern Lapland Nature Centre.

THE NATURAL AND CULTURAL HERITAGE OF THE SAIMAA LAKE DISTRICT HAS A GEOLOGICAL FOUNDATION

M. Kähtävä-Marttinen[1*], T. Tervo[2] & K-M. Remes[3]

[1] Imatra Region Development Company, Imatra, Finland, [2] Geological Survey of Finland, Kuopio, Finland, [3] Geological Survey of Finland, Kuopio, Finland
* Minna Kähtävä-Marttinen (minna.kahtava-marttinen@imatra.fi)

Keywords: *Saimaa lake district, geological history, natural heritage, cultural heritage*

South Saimaa is one of Finland's most remarkable lake districts. A patchy bedrock between 1,910 and 1,620 million years old underlies the area's mosaic of lakes. Chains of ice-marginal formations, formed on the edges of the melting continental glacier 12,500 to 11,500 years ago, have bisected the area since the Ice Age. The Salpausselkä ridge system is even visible from space. As the Saimaa basin emerged from under the continental glacier, ice dams formed temporary glacial lakes. Next came an era in which Saimaa formed part of the ancient Baltic Sea area. The massive continental glacier dissipated, allowing the earth's crust to return slowly to its pre-Ice-Age elevation. Land uplift was uneven, tilting the land's surface towards the south-east and forming the current labyrinth of water bodies. The forests and swamps submerged long ago by Lake Saimaa, and the ancient shores and Stone Age habitations above the modern shoreline, bear witness to this.

Saimaa's geological base has shaped its natural environment and cultural heritage. The area includes rare relics of the birth of the lake district such as the Saimaa ringed seal and Saimaa salmon, isolated in the basin during the Ice Age and now unique to Saimaa. People brought culture and adapted to life in Saimaa's geological environment. In various eras, they found ingenious ways of using the area's geological formations: during the Stone Age the smoothest rock faces and those reminiscent of human faces were daubed with rock paintings. Ancient fortresses were located on high and steep rocky hills. As the cultural spheres of east and west were formed, Saimaa remained between them and defensive stone structures – facing east and west in turn – were built. The largest fort chain running through the area is the 1,200 kilometre-long Salpalinja line, one of the strongest defensive structures of the Second World War.

Saimaa, its natural environment and culture are a key resource for locals. People here want to tell the unique geological story of Saimaa's lake landscape and develop the area through geotourism. They also want to showcase the area's natural and cultural heritage sustainably, as part of Saimaa's identity. South Saimaa is home to a project aiming at membership of the Geopark network. Three towns on Saimaa's shores – Imatra, Lappeenranta and Mikkeli – are involved, as are 6 municipalities, the regional councils of South Karelia and South Savo, the Geological Survey of Finland, the South Karelian Foundation for Recreation Areas (Etelä-Karjalan Virkistysaluesäätiö) and the Saimaa Association for Recreation Areas (Saimaan Virkistysalueyhdistys ry).

THE VOOREMAA ICE AGE GEOPARK INITIATIVE IN EASTERN ESTONIA

Kaidi Randpõld[1*], Aivar Soop[1] & Heikki Bauert[2]

[1]Tartu Rural Municipality, Tartu County, Estonia, [2]NGO Geoguide Baltoscandia, Tallinn, Estonia.
* Kaidi Randpõld (kaidi.randpold@tartuvv.ee)

Keywords*: communities, green energy, sustainable tourism, mires, drumlins, Old Believers Orthodox sect*

The 23 local communities of the Tartu and Jõgeva counties in East Estonia have come up with an initiative to establish the geopark project in East Estonia with an estimated area of 4,100 square kilometres. The geopark is bordered in the East by Lake Peipus, which is the fifth largest lake in Europe, straddling the Russian-Estonian border. The idea to establish a geopark sparked already in 2012, when we opened the Ice Age Center. We are not only thinking about the geopark, we are working on it. Since then, we have involved local governments, and on 4 February 2015, 23 rural municipalities signed partnership agreements to establish the geopark. By then, we prepared the geopark strategy. Now, we are working on the internal marketing and preparing investments activities. Tartu Rural Municipality has been the leading partner and organises idea development with other organisations. The geopark is devoted to communities, green energy, sustainable tourism and our unique natural and cultural heritage.

The proposed geopark will integrate a broad range of local natural resources, including a variety of landscapes related to Ice Age (drumlins, kame fields, mires), geological attractions of Silurian and Devonian ages, as well as cultural heritage sites and traditions. The geological highlights of the geopark project are large and diverse mire areas – Endla, Alam-Pedja and Emajõe Suursoo that have different genesis and are currently at different mire-development stages.

The Vooremaa drumlin field (977 km^2) forms the central elevated area of the proposed geopark and includes almost 100 NW-SE elongated drumlins with several picturesque lakes filling the depressions between drumlin hills. Most of drumlins are 2–5 km long, 0.5–0.8 km wide, and 20–40 metres high.

The Vooremaa Ice Age Geopark project promotes Eastern Estonia as an attractive destination for educational activities. The hub of the geopark activities and its main educational centre will be the Ice Age Centre (2,200 m^2), located in Äksi, in the close proximity the university town Tartu. It is a unique nature tourism attraction with an exhibition area devoted to nature education. Every year, 50,000–60,000 visitors visit the Ice Age Centre.

Besides seeing rather unique landscapes of natural beauty and a great variety of natural and geological heritage, the geopark visitors can take a glimpse at the cultural heritage traditions of Russian Old Believers, who settled at the shores of Lake Peipus in the 17th century. As devout adherents of old rituals and belief, they rejected the Russian Church's reforms of the 1660s, were persecuted by the government, and eventually fled to Estonia.

Certification and quality management

LOCAL FOOD CERTIFICATIONS IN GEOPARKS

S.Gentilini[1*]& P. Thjømøe[2]

[1] Magma Geopark, Norway; [2] Magma Geopark, Norway
* Sara Gentilini (sara@magmageopark.com)

Keywords: *Local food, tourism, certification, quality.*

Last June 2014, Magma Geopark has been granted by Norden-Kreanord for developing the GEOfood project along two years. Partners involved are: Rejkyanes Geopark project in Iceland, Odsherred Geopark in Denmark, Rokua Geopark in Finland, Stonehammer form Canada, Sierras Subbeticas Geopark in Spain, Shetland Geopark from UK, Fernando de Noronha Geopark project in Brasil.

Geofood is an innovative project aims to strengthen the cooperation between Nordic Countries in the creative industry. One project goal is defining standards for developing GEO food and GEO menus in the different Countries involved. The project underlines the differences between partners in the field: during the first project phase the discussion concerning the food criteria has started following the great experience from Sierras Subbeticas Geopark in Spain that has been the leader for the EGN food criteria since long time. The project will define a common philosophy and tools to create storytelling linked with the local heritage, Geofood will develop the basic concept in how to set up Geopark menu that can be discussed inside the EGN GNN as common general criteria.

All the partners agreed that Geo menus need to have strong connection with Geological Heritage and achieved through: shape, origin of products with geological elements and geological raw ingredients. Three categories of Geofood have been detected: Natural products, artisanal products and dishes in the restaurants. Commitments and procedure for adhering Geofood and how to create a brand based on the food qualities.

The discussion is still in progress specially regarding some crucial questions like: when products become tradition and how Geoparks define the so- called traditional food?

These items are supporting the development of the Fernando de Noronha Geopark project in Brasil, the idea is to increase the involvement of local communities and policy makers in the Geopark process through the development of Geofood products.

The presentation will introduce to the audience the details of the discussion following the different partners' point of view and conclusion.

SICTED-ECST: A DUAL SUSTAINABLE AND QUALITY TOURISM PROGRAMME

B. Fortuny[1*]

[1] Tourism Department, Central Catalonia Geopark, Manresa, Spain
* Benjamí Fortuny (info@geoparc.com)

Keywords*: tourism, quality, sustainability, dual programme, SICTED, ESCT*

The Central Catalonia Geopark has definitely gone for Tourism Quality and Sustainable Tourism. Since 2013, it has joined the Integrated Tourism Quality System in Destination (SICTED for its acronym in Spanish) as Bages County Destination Manager. SICTED is a programme intended to improve the management of tourist businesses, professionalize the sector and thus enhance tourist satisfaction by raising the quality of the destinations. It is aimed basically at small and medium-sized establishments that wish to improve their business management, standards of service and customer satisfaction levels. SICTED is currently implemented in Spain at more than 180 destinations by +5,000 companies and services distinguished with the "Commitment to Quality" qualification by the Spanish State Tourism Department. Currently there are +40 distinguished establishments in the Geopark ranging from restaurants and hotels to museums or caves to visit.

Since 2014, the Central Catalonia Geopark is also working under the European Charter for Sustainable Tourism in Protected Areas (ECST) via the Natural Park of Sant Llorenç del Munt i l'Obac. The ECST in Protected Areas provides a practical management tool for ensuring that tourism contributes to a balanced economic, social and environmental development of protected areas in Europe. Like the SICTED quality programme, the Charter is a voluntary agreement and aims to encourage good practice and a sustainable approach for the development and management of a tourist destination. Currently there are 6 establishments from the Geopark working under the ECST programme.

As a pilot test, these 6 establishments have been working on both programmes (SICTED and ECST) under the coordination of the Geopark and the Natural Park as if it was just one single dual-programme of "Sustainable and Quality Tourism". A special "SICTED and ECST group" representing the Natural Park, the Geopark, the regional SICTED coordination board and representatives from Europarc Spain was created to develop the single itinerary to join both methodologies and requirements. A dual programme was implemented with a single itinerary that included training plans, technical assistances, group workshops, working groups, quality standards checklists and sustainable checklists to grant both Commitments to Quality and Sustainable Tourism marks to participating establishments.

This approach has important advantages for the establishments: 1) simplification of bureaucracy, 2) a better understanding of both projects considering all the administrations involved are coordinated, and 3) a clear motivation to implement the dual programme since with little extra effort you get both distinctions. The advantages for the Geopark are equally relevant: 1) the development of a single administration procedure for the implementation of two key programmes, 2) improvement in efficiency, effectiveness and profitability of public resources, and 3) a better coordination between all the administrations involved in both programmes at a local, regional and national level.

Community participation

LOCAL NETWORKING AND AUTHENTIC GEOPARK PRODUCTS: GEOPARK COOKING AND GEOPARK HONEY NETWORK – THE AUTHENTIC TASTE OF NATURE (GLOBAL GEOPARK BERGSTRASSE-ODENWALD)

J. Weber[1*]

[1] Geopark Bergstrasse-Odenwald, Lorsch, Germany
* Jutta Weber (j.weber@geo-naturpark.de)

Keywords: *Local networking, Geopark products, honey, taste of nature*

The cooperation with local stakeholders and the development of sustainable projects supporting the philosophy of a Geopark is a prominent task inside the Global Geoparks network. Information facilities, trails, guides as well as products are ambassadors of the Geopark and reflect its Earth history, nature, culture and traditions.

A well balanced bundle of those activities is suitable to create sustainable and valuable memories for visitors and inhabitants, which are very different from the everyday expectations and routines.

During the last decade, the Geopark Bergstrasse-Odenwald has implemented a comprehensive regional network of information facilities and trails in cooperation with local partners. Geopark Rangers and Geopark-on-site guides act as ambassadors of the Geopark´s philosophy.

The cooperation with the local partners is animated regularly by common projects highlighting the thematic potentials on site:

The “Forest and Meadow Kitchen, which is developed together with the information facility “Bioversum”, (museum of biological diversity), combines field trips with Geopark Rangers and cooking in the outdoors laboratory. The collection of mushrooms and wild herbs, the analysis of the findings, and the creation of a common meal is highly appreciated by the participants and the guarantor for unforgettable culinary and nature memories. Furthermore, the event format enables an impressive basic experience of nature and its gifts, which are usually not considered.

The “Bioversum” museum is one of 20 information facilities, which are equipped with beeyards from a local beemaster. In 2012, the Geopark has started the cooperation with the company, which follows the ethics of “Bioland”, a German certificate for biological food production.

The Geopark information facilities are now able to sell their own honey, produced directly in their neighborhood, labelled with a Geopark tag and their own logo. The beemaster covers full service, from the maintenance of the beeyards, the layout and production of the tags, to the delivery of the honey to the partners. Geopark honey enables them, to present an authentic seasonal high quality product - the “essence of nature” - and to earn additional money without any own work or risk. Each glass of honey acts also as ambassador of the Geopark, which is sold also worldwide, e.g. by the UNSECO WHS Messel Pit, where the “Geopark Messel honey” it is one of the favorite products. Besides the local Geopark honey network, the Geopark communicates also the high importance of bees as pollinators in our ecosystem, and invites the beemaster regularly to regional events and workshops.

Geopark cooperation projects and authentic products are of fundamental importance for a vivid Geopark network. They support the Geopark philosophy essentially and act as ambassadors for inhabitants as well as for visitors.

RAISING THE PROFILE OF GEOPARK CHABLAIS: AN INTER-SCHOOL COMPETITON TO DESIGN A GEOPARK MASCOT

S. Justice*, T.Sarre & J.F. Baud

Geopark Chablais, Syndicat Intercommunal d'Amenagement du Chablais, Thonon, France
* Sophie Justice (coordinationgeopark@siac-chablais.fr)

Keywords: *education, communication, mascot*

Following the completion of major projects, such as the installation of the 23 geosites of the Georoute, the training programs for the Geopark Chablais guides and the erection of Geopark road signs, the team sought to consolidate the profile of the Geopark within the territory.

To achieve this, and in order to promote our newly developed educational catalogue, we chose to run a schools competition. Many Geoparks have mascots and use them as a way of communicating in a fun way with younger audiences, and also for creating Geopark souvenirs. Given that the territory did not have anything of this nature, it was decided a competition to design a mascot would be well received.

A package of information was prepared to explain the idea of the mascot competition, the Geopark and the rules. This comprised a detailed teacher's guide accompanied by an animated presentation for the pupils. The pupils were given 4 weeks to design their mascot. In order to build links with the widest possible number of schools, the competition was open to the last class of the primary schools and the entry class of the secondary schools.

The selection of the winning design was made during the Geopark Week by a jury made up of the SIAC president, the mayor of Douvaine, (the Geopark representative), a very well known local illustrator and the president of the Museum of Prehistory and Geology.

Winning designs were displayed for two months in the library of Thonon les Bains concurrent with an exhibition linked to the Chablais Georoute, and animated by a day of free public workshops.

During the talk the Chablais Geopark will explore the interest and quality of the submitted designs. A critique of the subjects addressed through the mascots will also be discussed as a means of evaluating our communication "What is a Geopark", as well as the principal geological heritage of the territory. The designs awarded the first, second and third prizes will be revealed and coupled with the remarks of the judges.

WE ARE GEOPARK- PROMOTING (PRIDE AND) A SENSE OF UNITY

I. Auer[1*], H. Kollmann[2]

[1] Nature- and Geopark Steirische Eisenwurzen, Markt 35, 8933 St. Gallen, Austria,
[2] Naturhistorisches Museum, Burgring 7 ,1010 Wien, Austria
*Irmgard Auer (i.auer@eisenwurzen.com)

Keywords: *Internal Marketing, Cooperations, Children's Engagement*

We understand under marketing the communication of the value of a product, service or brand to customers for the purpose of promoting or selling it. This external marketing is performed by all geoparks through all media, printed or electronic, which promise stimulating times in its area.
These marketing measures aimed at visitors are taken almost exclusively by the executive staff. Additionally, it has to be a primary challenge to communicate the significance of the Geopark internally to the local population. According to Wikipedia, Internal Communication is responsible for effective communication of members of an organization who have to be convinced of a company´s vision providing a consistent experience to customers. It is one of the goals to promote pride and a sense of unity in a company.
The goal in a Geopark is the same. The difference is that we do not deal with a uniform group but with a heterogenous crowd which needs a whole range of approaches.

Cooperation with stakeholders

Geoparks have to rely on the population for ensuring the protection of sites and assisting visitors in their ambition of making the best of their visit. Networking between geopark representatives, accommodation and gastronomy enterprises, local producers, nature guides and managers of geotouristic and other destinations is therefore a must. They play an important role in all sorts of events the Geopark cannot fulfill by its own.

Geopark festivities

Especially in rural areas, where geoparks are usually located, festivities provide an important opportunity for the population to escape daily routines. These are important chances for a geopark to get into contact with the local population.

Engagement with children and teenagers

This is one of the most promising activities. By cooperating with schools and kindergartens, outdoor projects, power point or specialized presentations can be included into the classes. Enormously successful were the summer vacation adventure days at the Nature- and Geopark Eisenwurzen which offer the possibility to experience Geology and Biology and to visit agricultural and other enterprises of the area.

General activities

Articles in newspapers, in the electronic communication media , social media lectures, field trips, seminars and lectures by scientists of Universities and other scientific organizations complete the internal marketing.
It is a banal statement that nobody can be proud of something which is not known to him or her. The internal marketing of the geopark is therefore a long-lasting procedure of conveying this knowledge. The increasing number of school and student groups and individual visitors helps certainly to introduce this feeling in to the local population.
We consider the children as our greatest assistants in achieving this goal. Open-minded for all new experiences when they are presented in the right way without expecting too much knowledge they convey their new experiences to parents, relatives and friends.

Education and educational program development

A KEY SUBJECT CALLED GEOPARK.

J. M. Barrera[1*], J.M. Corrales[2] , J. López [3]& J. Vázquez[4]

[1]Villuercas-Ibores-Jara Geopark Director, Cáceres, Spain,
[2]Department of Science Education, University of Extremadura, Cáceres, Spain
[3]Geography Department, University of Extremadura, Cáceres, Spain.
[4]Art Department, "Javier Garcia Tellez" High-School, Cáceres, Spain.
* Jose M. Barrera (jmbarrera@dip-caceres.es)

Keywords: *Villuercas-Ibores-Jara, geopark education, science education tools, educative community participation.*

In 2014 was published the book *"Natural, Social and Cultural environment's knowledge of Villuercas- Ibores-Jara Geopark*" as a local complementary textbook for the subject of Environmental Awareness. This subject belongs to the Spanish Primary Education national curriculum and, in its last courses (children 11 and 12 years old), deals with
issues such as biophysics environments, culture and economy. This comprehensive training feature needs attractive examples of the own territory in which it is taught. The Geopark textbook contains those curricular issues studying them from the environment that the students know, making the learning easier and identifiable. As an added value, it makes that the students achieve a personal appropriation of their environment and heritage values and an appreciation of their Geopark.

Education was stated as one of the Geopark hallmarks. In the last years, the Primary Schools have carried out many practical activities linked with the Geopark, in which the students' participation, research and creativity were necessary. During the current school year, those activities devised by the teachers using the textbook units, are being compiled and evaluated. A second publication entitled "Villuercas- Ibores-Jara Geopark Educational Activity Book" is in preparation to give a diffusion of this cooperative work. This new book will facilitate the development of activities in any school. Following the example of the former textbook, we expect that the later will go beyond the walls of the classroom to participate in the Geopark's social function, in other training courses for new workers and in the non-formal education activities.

Educative centers and their teachers constitute the so called Geoschools Network. They share training activities and a site web as a tool for permanent exchange of information. This educative network is conducted by the Geopark Educative and Scientific Committee with the help of the Geopark staff. The Regional Educative Administration firmly support all the activities.

This communication describes the content of this experience, the appreciation and participation made by the educational community and the positive impact in the social development of Villuercas- Ibores-Jara.

AN EDUCATIONAL TOOL FOR GUIDING EARTH-SCIENCE TEACHERS ON THE FIELD IN THE MASSIF DES BAUGES GEOPARK, FRANCE

C. Peisser[1*], P. Renau[1], C. Lansigu[2,3] & J. Higel[3]

[1] CalcEre, Geology & environmental education association, Arith, France; [2] GeoloGrafis – La Terre En Dessin, Cournols, France; [3] Bauges Geopark, Le Châtelard, France
* Carine Peisser (carine@calcere.fr)

Keywords*: educational program, illustrations, outings, pedagogy*

In France, the national educational program concerning geology includes, during the second year of secondary school, an outing on the field. In fact, this outing only rarely takes place, mainly because the earth-sciences teachers are not aware of the geoheritage they can visit close to their schools. And yet, the Bauges area is extremely suitable for pedagogical purpose, being both very rich and relatively simple in its geological patterns. Based on these statements, the *Massif de Bauges* Geopark, which supports a strong environmental education sector, decided to develop a tool which could help the teachers organize the outing on its territory.

The tool was developed through a geo-partnership between 2 consulting firms: CalcEre, a specialist in scientific mediation on the field which has been developing geoeducation and geotourism activities in the *Massif de Bauges* Geopark for 10 years (including many specific geological outings for scholars), and GEOLOGrafis, specialised in pedagogical drawings explaining geology.

The tool is an interactive notebook which presents the geology of the Geopark in a simple way. It is based on CalcEre's knowledge of the local geosites, its pedagogical experience and on the illustration enhancement of GEOLOGrafis. It includes texts, interpreted photos, animated drawings, access maps and virtual visits of geosites. Intended to the life-and-earth-science teachers, this tool can be used either as a simple course-support to illustrate the program, or more specifically to effectively organize the field trip. It is not intended as a geology course, but as an illustration of the various points of the program, based on local geosites.
In order to fit the National Education program as well as possible, a group of teachers has been closely associated to the conception. Finally, the tool was validated by National Education administration, in order to guarantee its pedagogical value.

The notebook application is free and can be downloaded on the Geopark's website. All the files included in the application are pdf files or Flash objects, reducing compatibility problems to a minimum. http://www.parcdesbauges.com/fr/agir/que-fait-le-parc/assurer-la-mise-en-valeur-des-actions/education-au-territoire.html#outils-pedagogiques
Teachers, from the Geopark area or from outside, can use the tool as a support for guiding their own field-visits or request an extra specialized guide: nature guides from the Geopark can attend a training course about the geosites which are described in the booklet. The middle schools from the territory can also benefit from a logistic and financial support from the Geopark in organizing their outings (transport, housing).

The toll has now been online for three years. The teachers who used it all gave positive feed-backs. The concept, developed in the *Massif de Bauges* Geopark, can now be exported on other territories and used as a basis for educational tools in other geoparks.

BUILDING BRIDGES BETWEEN SCIENCE AND EDUCATION: A WAY TO PROMOTE CAPACITY-BUILDING AND COOPERATION BETWEEN GEOPARKS

E. Silva[1*], A.A. Sá[2], D. Rocha[3] & M.J. Roxo[4]

[1] Portuguese NatCom for UNESCO, Ministry of Foreign Affairs, Lisbon, Portugal; [2] Department of Geology and Geosciences Center, University of Trás-os-Montes e Alto Douro, Vila Real, Portugal; [3] AGA – Arouca Geopark Association, Arouca, Portugal; [4] Department of Geography and Regional Planning, University Nova de Lisboa, Lisbon, Portugal.
* Elizabeth Silva (elizabeth.silva@mne.pt)

Keywords: *Cooperation, capacity-building, training courses, educational programs, best practices*

Networking has played a major role in the success of the Global Geoparks Network, by facilitating the sharing of experiences and good practices, creating joint initiatives and projects and especially by promoting capacity-building. In this context, the Portuguese National Forum of Geoparks (PNFG) in close cooperation with the Portuguese National Committee for IGCP and, with the support of the Portuguese NatCom for UNESCO, has for more than four years built bridges between Science and Education, based on the promotion of the Educational Program "GEA – Mother Earth*"*. This program has functioned as a very important tool for capacity-building and has encouraged strong cooperation between Portuguese and Brazilian Geoparks. It also intends to contribute to strengthen the creation of new Geoparks, especially in Portuguese-speaking African countries. Therefore, this educational program involves: *i*) training courses; *ii*) school contests, such as "*it's the Soils that sustains Life!",* developed within the framework of the International Year of Soils, and *iii*) itinerary exhibitions related to Geoscience themes, such as "*Once upon time Earth"* or "*Crystallography in Basic Sciences"*. The focus of the main themes in the training courses are education for sustainable development, climate change, geohazards, water, desertification, evolution of life and biodiversity, and geosciences for society. Since 2011, it has been proved that this program, involving different activities, has also fulfilled its role in capacity building at a national and international level, including Brazil and Cape Verde. In this context, in 2013/2014, "GEA – Mother Earth" involved more than 75.000 students and 2.500 teachers in Brazil. In Portugal, the program has mobilized the four Portuguese Global Geoparks (and other municipalities from the surrounding areas) and also some Portuguese Biosphere Reserves, involving more than 10.000 students and about 500 teachers. In Cape Verde, all schools from the ten islands are participating in the referred school contest. The figures for the number of participants will be available by the end of June 2015. They have also received the itinerary exhibition "*Crystallography in Basic Sciences*", which was launched at the Cape Verde National Parliament involving the presence of students from High Schools. Furthermore, the PNFG, along with the Portuguese and Cape Verde NatComs, are monitoring the potential candidature of an aspiring Geopark within this African archipelago. In conclusion, the PNFG has been playing an active role in nurturing partnerships and sharing best practices, by building bridges between Science and Education in order to promote capacity-building and cooperation between Global Geoparks and aspiring geoparks.

COLLABORATING UNDER EVANDE TO ESTABLISH A GEOPARKS NETWORK OF VOLUNTEERS AGAINST NATURAL DISASTERS

C. Fassoulas[1*] & M. Burlando[2]

[1] Natural History Museum of Crete – Psiloritis Geopark, University of Crete, Heraklion 71409, Crete, Greece; [2] Beigua Geopark, 16011 Arenzano, Italy
* Charalampos Fassoulas (fassoulas@nhmc.uoc.gr)

Keywords*: Natural Hazards, e-training, Volunteers, Civil Protection*

Natural disasters and Climate Change induced impacts are considered as the most serious threats for modern societies. Recent disasters like wild (forest) fires, floods and earthquakes have severely affected many European countries with a burden of life and economic losses. Having in mind past experience it is supposed that societies should be robust to withstand potential hazards with the less damage or losses, flexible in order to adapt to changes, integrated to allow consistent and fast decision making processes and resourceful to rapidly find and exploit all possible resources to achieve the targets in case of shock. It is obvious that knowledge of methods, best practices and available or potential resources is a one way procedure to make our societies more resilient for the case of a disaster.

Several studies and local experience document that not always existing knowledge is available or a possession for all those actors engaged in civil protection, policy design and decision making. In several cases (like earthquakes or wild fires) wrong information is shared, while crucial knowledge is missing. Geoparks as rural areas are more vulnerable in various Natural Hazards and have to face their consequences, in most cases, without the proper resources and the necessary staff. On the other hand, being inside local communities and having close relationships with local authorities are benefited to develop initiatives for knowledge transfer, awareness raising, capacity building, and increase of preparedness of local communities against natural disasters.

Psiloritis Natural Park, through the Natural History Museum of Crete and Beigua Geopark developed a project titled “EVANDE” that is funded by EC, to establish a web platform to host educational and e-learning activities addressed to volunteers and local authorities’ civil protection actors. Project will concentrate, analyze and assess knowledge, methodologies and best practices for prevention, preparedness, adaptation and resilience against wild fires, floods and earthquakes. Data will be used to produce live and recorded e-courses, seminars and training activities, evaluate products and knowledge gained, and publish e-books and printings. All resources will be hosted in a MOLE educational platform, with free access for all, that is being developed by the Technical university of Crete. A series of training activities are foreseen to take place at geoparks’ info-centers and the three Educational Centers participating form Italy, Spain and Bulgaria, whereas National and International Volunteer Meetings will be organized to strengthen collaboration and communication among them. The project aims to develop a network of Voluntary groups all over Europe and European Geoparks Network is considered as an excellent opportunity. Geopark authorities can disseminate information to local communities, support the establishment of local volunteer groups and provide them access to EVANDE’s e-training platform.

EDUCATIONAL PROGRAMME ANIM'A ROCHA AT NATURTEJO GEOPARK: "DISCOVERING ALMOURÃO"

A. F. Ferreira[1] & M. M. Catana[2*]

[1]Instituto de S. Tiago – Cooperativa de Ensino C.R.L., Sobreira Formosa, Portugal, [2]Naturtejo Global Geopark under the auspices of UNESCO, Educational Service of the Municipality of Idanha-a-Nova, Idanha-a-Nova, Portugal
* Maria Manuela Catana (mmscatana@gmail.com)

Keywords: *Educational programme, geodiversity, biodiversity, geopark schools, educational game*

"Discovering Almourão" was an annual project developed within the framework of the Educational Programme *"Anim'A Rocha"*. There are three types of Educational Programmes at the Naturtejo Geopark: *"School goes to the Geopark"*, *"The Geopark goes to School"* and *"Anim'A Rocha"*. The latter's aim is to motivate the Geopark schools for the finding of geodiversity and biodiversity around the schools through field and classroom activities. The annual project called *"Discovering Almourão"* was carried out by a partnership between the Naturtejo Geopark and 12 students of Biology and Geology from the 11th Form, Class A, belonging to the Institute of S. Tiago during the school year of 2013/2014. The Project focused on the geomonument "Portas de Almourão".

"Portas de Almourão" is a gorge excavated by the river Ocreza on the quartzitic ridges of the mountain ranges of "Talhadas" and "Perdigão", situated between Vila Velha de Ródão and Proença-a-Nova. It is one of the sixteen geomonuments of the Geopark with high scientific and didactic value which allows the understanding of the relevant stages of the regional geologic history. Its classification as a Regional Natural Park is being prepared by the Municipalities of Vila Velha de Ródão and Proença-a-Nova due to its bio and geodiversity.

The stages of this annual project consisted of: a pre-field trip lesson at school; two field trips for the observation of bio and geodiversity in the Viewing Point of *"Foz do Cobrão"* and in 2 km of the pedestrian path called *"Secrets of the Mourão Valley"* in *Sobral Fernando*, with the register of data and pictures; 12 lessons at school in order to process the collected data, analyse bibliography, elaborate reports and make a game; public presentation of the project to the school community at the "Ceremony of the Diploma Day" at the beginning of the school year of 2014/2015.

The final product of this project was a board game named *"Discovering Almourão"* with the following elements: a board with a game circuit; a dice; 6 pawns, 70 cards with questions and answers; the game rules. The questions on the geomonument *"Portas de Almourão"* were about fauna, flora, geodiversity, geological heritage and geoconservation.

With the participation in this educational programme students have learnt about and applied the knowledge *in situ* in their school vicinities; produced an educational resource – a game – which allows other students and the general public to know through a playful and pedagogical way this geomonument, thus contributing for its geoconservation strategy; raised awareness for the Natural Heritage of a relevant area of the Municipality of Proença-a-Nova.

FREE CAVING TRAIL - AN UNDERGROUND AND PEDAGOGICAL ADVENTURE

J-L. Desbois*[1], C. Lansigu[1], B. Tiberghien[1], J. Higel[1], A. Meslin[2] & P. Renau[3]

[1] Geopark du Massif des Bauges, Regional Nature Park, La Châtelard , France,
[2] Ludequip, Chapareillan, France,
[3] CalcEre, Geology & environmental education association, Arith, France
* Jean-Luc Desbois (jl.desbois@parcdesbauges.com)

Keywords: *karst interpretation, caving, tourism activity development, education, interpretative trail*

The calcareous Massif des Bauges Geopark highlight its karstic heritage since the emergence of the Regional Nature Park. In 1996, the first interpretative trail that has been set up is the "Ice holes and karts geotrail" which present the different appearances of a karstic landscape but only from above. Although the site is on the deepest and longest cavities of Savoie, general public couldn't discover it.
After the Geopark recognition in 2011, the Massif des Bauges Geopark started to work to find the better way to give access to the karstic network for the general public. In most cases, the caves in Bauges require specific material and accompanying. It doesn't fulfil the requirements to welcome a large public.
The goal for the Geoparks was to find a site to welcome the most of people (families, schools, tourists …) without complicated materials and freely.
The Geopark has to face a lot of questions to allow people to go underground. The most adapted sites are also ones the spelunkers use for beginner's guide. The rules on the underground are very complicated and restrictive for security raisons. How give pedagogic information as good progression conditions? How find the balance with professional caving activity? How make the required material available? How preserved geoheritage? …
The first free caving-trail in France is now open. Visitors can have a one hour underground adventure with only a helmet and lighting as material. Footbridges and scales help them make headway. They progress inside a "true art gallery" which allows them to understand the long work of the water on the surface and the inside of the Margériaz Mountain.
They can extend their trip along the aerial trail to discover the surprising landforms: sinkholes, stone arches and dolines through a mobile application or an interpretative booklet.
Professional mountain leaders or caving guides offer some additional underground discoveries for the most audacious or for the schools.

GEOEDUCATION IN ACTION

V. Rozakis[1], I. Valiakos[1], K. Mpentana[1] & M. Burlando[2], A. Duarte[3], C. Woodley-Stewart[4], & N. Zouros[1*]

[1] Vocational Training Center - Natural History Museum of the Lesvos Petrified Forest,
[2] Arouca Geopark, [3] Beigua Geopark, [4] North Pennines AONB
* Nickolas Zouros (lesvopf@otenet.gr)

Keywords: *Vocational training, Geoeducation, Geoparks, training methodology*

The Leonardo Da Vinci: "GeoEducation in Action" Project aimed to the identification of the requirements for professional training and certification in Geoeducation, to develop common standards and tools for training and to define the links between Geoducational activities with labor market, in European level, using the experiences of four European & Global Geoparks (VTC - Natural History Museum of the Lesvos Petrified Forest -GR, Arouca Geopark -PT, Beigua Geopark-IT, North Pennines Geopark-UK) with different approaches in geo-education and different national systems of training and certification, of trainers and trainees.

The partnership developed a concrete methodology to design workshops, forums and meetings for stakeholders such as teachers, trainers, staff and trainees of geoparks, which will be an asset to the acquisition of skills. Besides the project partners intend to research, prepare, publish and disseminate this new methodology to boost professional training in Geo-education. This methodology will be disclosed and available to European and Global Geoparks Network, schools, universities, UNESCO and other partners in order to be a base for additional contribution in the above thematology.

Project partners were requested to perform certain tasks. VTC - Natural History Museum of the Lesvos Petrified Forest - Lesvos Geopark introduced a methodology to design training courses for staff training in the field of Geopark management. Beigua Geopark developed a methodology to train personnel to offer geoeducation activities to the general public and proposed a methodology to link vocational trainees with the labor market. Arouca Geopark proposed a methodology to train teacher in order to be able to offer geoeducational activities for youths and children and North Pennines Geopark composed a glossary of geoeducational terms and introduced methodologies to create interpretation material to assist geoducational activities

As there is a growing need for well-trained personnel at all levels – vocational, bachelors, masters - in the field of geotourism, education, conservation management etc in European and Global Geopark's activities we believe that the outcomes of GeoEducation in Action project will be beneficial for the members of the network.

GEOKIDS

A. Donslund[1*], N. Lemkow[2]

[1] Cultural Department of Odsherred Municipality, Denmark,
[2] Geopark Odsherred, Denmark
* Anne-Marie Donslund (anmdo@odsherred.dk)

Keywords: *education, children, land art, holistic approach, collaboration*

Geokids is an educational program in Geopark Odsherred, Denmark. All school children, about 4500 pupils from nine public and five private schools in Odsherred will during four years from 2014 until 2018 participate in Geokids, a tutorial project that combines the themes and elements of Geopark Odsherred – geology, cultural history, art and local produce.

The working group of Geokids is a collaboration between the Nature School, Museum Odsherred, the Geopark secretariat, Odsherred Municipality/department of Culture and the local artists Martin Nybo and Henrik Boe who came up with the original idea.

The basic program is as follows:
The children have their class lessons out in the countryside, where they dig ice age clay, make glaciers out of sand, play rock bingo and produce pesto from wild garlic. They paint the view from the highest point in Odsherred, Vejrhøj, draw Bronze Age symbols on buckskin leather like the chieftain's cloaks and listen to the legend of the troll Lars Krans.
The artists bring home the clay, prepare it and take it back to the schools formed as half cylinders. Now each child creates his or her own unique artwork formed as heads.
The head masks are put on iron stakes and are exhibited contemporary on a local landscape spot in Geopark Odsherred. Each mask carries a QR-code which loads a short video about the project and the child who has made the head mask.

Additional program:
Each school is, besides the above, able to make its own edition of Geokids in cooperation with the working group. One school, for example, is working on a GeoTeens program during two month, where the teenagers will go deeper into the knowledge, communication and mediation of the Geopark. Other schools are adding local history or specific sites and whishes to the program. And still some schools just want the basic program if they don't feel they have the time and courage to do more.

During the years up until 2018 all 4500 head masks will be collected at the Shelters of Veddinge in Odsherred. The municipality owns the land and the Geokids-project have the permission to make a contemporary sculpture park till the end of 2019.

By that time all children and their families feel that they are part of Geopark Odsherred, and this is the main purpose of the Geokids project to make the children proud of the landscape and surroundings they live in.

GEOPARK SCHOOLS, A NEW CONCEPT ADVANCING ROKUA GEOPARK´S AIMS AND ACTIONS

M. Kiuttu[1*]

[1] Rokua Geopark, Kiviharjunlenkki 4, 90220 Oulu, Finland
* Mikko Kiuttu (mikko.kiuttu@humanpolis.fi)

Keywords: *education, sustainability, local pride, geoparks, school, curriculum*

Rokua Geopark has, over a number of years, cooperated closely with local schools and other educational institutions. As a result the teachers have experienced the possibilities of Rokua Geopark and its sites for environmental education and outdoor activities and have also realized the importance for pupils to have a better understanding and appreciation of their home region.

Teachers´ experiences about Geopark's opportunities contributed to a development towards Geopark-oriented schools. The renewal of national curricula and concomitant increase in demands for nature education enhanced the development. Consequently the local schools initiated the idea to become "Geopark schools". During the autumn of 2014, Rokua Geopark responded to this need by drawing up instructions for educational institutions to apply for authorization to call themselves Geopark Schools, enabling them to include Rokua Geopark's role and themes as well as logo within their educational activities.

To become a Geopark school, the educational institution has to fulfill certain criteria referring the given instructions. The criteria were established following the general guidelines and educational principles of the Geoparks Networks and, in more detail, the values and aims of Rokua Geopark. The criteria seek to prevent the misuse of the Geopark and its logo, to promote the inclusion of the Geopark's themes in the schools´ curricula and to encourage the schools to contribute to the aims of Rokua Geopark.

Following the experiences, the Geopark school concept is an effective opportunity to inspire the local educational institutions to take part in Geopark´s activities and to advance Geopark´s objectives such as enhancing the local pride and sustainable way of living among pupils. It is also an encouraging concept to advance the general guidelines and educational principles of Geoparks Netowrks.

HOW TO DEVELOP A BASIC GEO-EDUCATION PROGRAMME? EXAMPLE WORLD HERITAGE SITE MESSEL PIT, GERMANY

M.-L. Frey[1]

[1]Welterbe Grube Messel gGmbH, Roßdoerferstr. 108, 64409 Messel, Germany;
Marie-Luise Frey (frey@welterbe-grube-messel.de)

Keywords: *Geotourism, Geo-Education, World Heritage, Geoparks*

The World Heritage Site Messel Pit meanwhile has been awarded nearly 20 years ago with the UNESCO-World Heritage certificate. In 2013 UNESCO has actualised the OUV's of the WHS worldwide. Since then latest the new activities of UNESCO aim to activate the WHS on "World Heritage and its value". What are the situation and the result of 11 years work on programmes, target groups and demographic change about? Will the change in modern society affect us and in which way? How can we prepare for this?

This contribution will give information to the chosen holistic approach to transmit earth sciences and will give numbers on the visitor development and on the type of programmes which were used below education of the WHS. New programmes for adults are presented to show the generation change and new demands in geo-education and geotourism as e.g. "coach".

After having drawn up the frame of the World Heritage Site on the product, the infrastructure and the necessary units to bring all into life this, an example on a new programme is given to show which aspects need to be looked after to generate an attractive programme and which can be different aspects for different ages.

By giving impressions on the programme target group, information on necessary internal logistics and service it will be emphasised that identifying and characterising the "profile" of the Site or the territory is one of the main first measures to be don, after having shown the scientific importance.
Educating visitors is one step out of a lot, as too by the successful activities of WHS and geoparks all are gripping for "outdoor-activitites" in our modern world of digital media. Important not to leave out or off the young generation who is not yet being taught at university the necessities they need to work in this geo-education sector.

SCIENCE EDUCATION MADE INTERESTING: OUTDOORS EDUCATION IN THE ASPIRING REYKJANES GEOPARK IN ICELAND

A. Ólafsson[1*]

[1] Director of International Cooperation, Keilir Institute of Technology & GeoCamp Iceland, Reykjanesbær, Iceland
* Arnbjörn Ólafsson (arnbjorn@geocamp.is)

Keywords: *education, Iceland, practical training, international education, study visits, earth sciences*

Increasingly during the past few years college students within the field of earth and natural sciences, have realised the potential of outdoor active education in Iceland, especially when focusing on geology and renewable energy. Iceland become a popular travel destination for international study groups because of easy and short access to places of geological interest, earth formation, visible tectonic plate boundaries and utilisation of renewable energy sources.

Teachers and students within the field of earth and natural sciences have always emphasized the benefits of outdoor active education, but recently the access to a bigger variety of sites and geological places of wonder has become within the reach of a bigger group. Today it is not uncommon that student groups at undergraduate level or even secondary schools travel to other countries for project work.

Hands-on and applied on-site training has thus become a greater part of practical education – together with teacher and student motilities becoming more frequent – has led to a rapid growth of study groups in Iceland, especially those focusing on geology and renewable energy.

For the past years GeoCamp Iceland has annually received a number of secondary school study group visits from Scandinavia and North America. This has been done in collaboration with educational institutions, local teachers and experts in the area, and in recent years in cooperation with the aspiring Reykjanes Geopark. The groups travel to Iceland to be able to witness and experience geology, geography, earth science and renewable energy resources. For them the active involvement and close proximity to the sources of geophysical activities and harnessing of renewable energy sources, is equal to few other places on earth. This closeness to raw and unspoiled environment along with easy, inexpensive and frequent access is the ultimate natural science classroom and provides an ideal learning environment for study groups.

At Reykjanes Peninsula Keilir Institute of Technology, along with University of Iceland, GeoCamp Iceland and the aspiring Reykjanes Geopark, has been focusing on how we can arrange short and intensive study visits with primary focus on field trips and visits to local professionals, where students are actively engaged in natural science education. We do this by creating an environment for students for active exploration and dialog on crucial issues concerning the earth and by taking advantage of Iceland's unique nature and our natural surroundings, working closely with local students, teachers and experts on hands-on projects and fieldwork.

The focus of the presentation is show how we are able enhance understanding of our environment by strengthening the natural sciences in education and creating a culture of awareness by connecting international teacher and students groups with the local population through practical training and applied educational activities.

UNESCO HERITAGE EDUCATIONAL ACTIVITIES IN GEOPARK IDRIJA

Bojan Režun[1*], Nina Erjavec[1], Jaka Kenk[1] & Mojca Gorjup Kavčič[1]

[1] Idrija Heritage Centre – Geopark Idrija Ulica, IX. korpusa 17, 5280 Idrija, Slovenia
* Bojan Režun (bojan.rezun@gmail.com)

Keywords: *UNESCO heritage, school networks, education, partner, curriculum*

Geopark Idrija is an area of unique natural and cultural heritage, which is largely characterized by 500-years of mercury mining operations. The technical heritage of mercury in Idrija is now recognized as outstanding universal value (OUV) and, together with the technical heritage of mercury in Almadén, is inscribed on the UNESCO World Heritage List.

Geopark Idrija places great emphasis on raising awareness among the younger generations on the importance of Idrija heritage, both at the local and national level. As a result, the Geopark aims to connect and collaborate with other institutions and individuals concerned with the preservation of heritage in Geopark Idrija (Idrija Mercury Mine, Idrija Mercury Heritage Management Centre, the Idrija Municipal Museum, the Municipality of Idrija, Slovenian National Commission for UNESCO, various associations and non-governmental organizations).

Geopark Idrija's activities include education, particularly through the innovative integration of natural and cultural heritage in educational programs for local schools. For this purpose, we have created a network of elementary schools in Geopark Idrija, where we are actively preparing joint practical activities, devised to maintain and revive our local heritage, both in the town and in rural areas.

Geopark Idrija’s main objectives for integrating heritage with the educational activities of local schools are: **improving heritage awareness** in school age children, **popularising** science content and promoting **creative thinking** in heritage.

To achieve these goals, Geopark Idrija uses innovative teaching methods within the learning process, which aim to promote heritage to school age children. For this we use the following activities: guided tours of Geopark Idrija's interpretation points (Gravel is a Playground, The Idrijca Reveals Rocks, The Idrija Fault ...), using thematic learning paths (Mercury Path, Path of the Idrija Naturalists, Karst Forest Learning Path ...), creative workshops for children (preschoolers, 3-6 years), organising science days using Geopark Idrija study materials, lectures and excursions. Also important for youth education is the annual EGN Week, which, in Idrija, is extended throughout the month of May, offering a variety of learning activities (16 events in 24 days).

These educational programmes are co-designed with teachers in order to meet both national curriculum standards and UNESCO Declaration commitments.

Geopark Idrija hopes that the educational planning and activities for school children and their teachers will encourage a sense for preserving this natural and cultural heritage, and present opportunities for sustainable development.

Future trends, changes and challenges in Geoparks conservation, management and use

BOOKING MANAGEMENT FOR A GEOTOURISM PROGRAMME GEARED TOWARDS PRIVATE INDIVIDUALS

L. Barriuso [1*], A. Hilario[1], Jasone Galdona[1], Estibalitz Irureta[1], Marta Amonarriz[1] & Cristina Iturriagagoitia[1]

[1] Basque Coast Global Geopark. Ifar Kalea 4. 20820 Deba. Basque Country. Spain.
* Leire Barriuso (geogarapen@geogarapen.com)

Keywords: *Geotourism, guided visit, online booking, management, individuals*

Geotourism is one of the fundamental activities enabling a Geopark to work in support of the local sustainable development of the area and its inhabitants. It needs to exert a clear economic impact, and to achieve this, a Geopark has to be capable of designing an attractive geotourism programme as part of its offer for tourists.

The reality of many Geoparks is that they find themselves outside the main tourism flows and circuits and most of the activities on offer are geared towards groups of schoolchildren or other types of groups. The great challenge facing these Geoparks is therefore to develop a geotourism offer for private individuals that enables the programme of guided visits to be maintained throughout the year.

The Basque Coast Geopark, in particular the coastal outcrop known as the Flysch, brings together the ingredients needed to turn a geological resource into a tourism resource: 1) It is an international scientific reference; 2) It is highly spectacular and is located on the coast; 3) It is easily accessible on foot and by boat; and 4) It is supplemented by other items of natural and cultural interest, as well as good general infrastructure for tourism.

Started in 2010, every year the Geopark organises a programme of guided visits with a pre-arranged calendar and geared towards private individuals. This programme, which in 2015 is offering nearly 500 guided visits to the main resources, allows private individuals or small groups to join a guided excursion which would be unaffordable if it had to be undertaken on their own initiative. After these five years of operation and looking at the data we can say that the initiative has been a success.

The carrying out of the guided visits is put out to public tender and it is the successful bidding enterprise that is responsible for running them. The bookings are managed by means of an online tool through the www.geoparkea.com website which allows the tourist bureaus to work in a network with updated information.

This programme of guided visits is the main means for promoting the Geopark. This has been the spirit underpinning the visits ever since they were started, and so the losses they incurred were regarded as promotional expenditure. Over the years this promotional expenditure has made its effect felt in the increase in visitor numbers and, as a result, in the profitability of the programme of visits.

SMARTPHONE APP – THE LANDSCAPE CREATED BY THE ICE

Jakob Walløe Hansen* & Nina Lemkow

Geopark Odsherred, Denmark
*Jakob Walløe Hansen (jawha@odsherred.dk)

Keywords: *education, landscape dissemination, new technology*

Geopark Odsherred has a little bit of everything to offer, and comprising both geology and landscape, a rich art and cultural history, and a long tradition of local quality produce, the dissemination demands to the geopark is high. Constituting one of the most thorough studied examples of a glacial series anywhere in Northern Europe, the ice age landscape of Odsherred is central to the geopark's geological heritage and is thus also a central part of the geopark's dissemination. As a consequence, Geopark Odsherred has launched a new app for both smartphones and tablets. The app helps to enhance the impression of the marvellous landscape of Odsherred.

The development of the app initially started out as a project between Geopark Odsherred and the local schools, and was intended to function as a teaching app. It ended up, though, being a product that appeals to all those seeking knowledge on Odsherred as a geological area of interest. Through the use of augmented reality, based on computer-generated animation, the app helps to elucidate the wonders of the landscape.

The app offers many channels in which the user can obtain information on the geopark and especially the landscape, but also offers ways to immersion, both for the inaugurated as well as for first time visitors.

The entry site of the app presents a map of Geopark Odsherred, from where it is possible to access certain infospots, which introduce users of the app, to the many places of interest within the geopark. But even more important is the single hotspot, placed at Vejrhøj, the highest point in Odsherred. The hotspot allows the user to travel through time in four time slots (25,000; 17,000; 7,000; c. 100 years ago) and reveals a series of infospots, yielding information on certain elements and phenomena, which again contributes to the explanation of the extraordinary landscape.

The time slot design of the app is based on spherical navigation principles. This means that wherever the user turns, there is a reality replication. In other words, the user needs to focus in a certain direction in order to get the full experience of it's true potential. A zoom function is incorporated, revealing a more in-depth view of certain features.

The app has a huge learning and outreach potential and the many positive evaluations of the app, causes great optimism for its future use. The Geopark Odsherred website offers a link to a web-based edition of the app, allowing schools etc. to use the app as a part of in-house teaching. Next step in the future development of the app, is concentrated around incorporating a second hotspot into the app, thereby enabling an even more thorough dissemination of the ice age landscape of Geopark Odsherred.

USING SEABIRD COLONIES AT THE CLIFFS OF MOHER TO ENGAGE LOCALS AND WIDER PUBLIC IN CONSERVATION MEASURES

C. McGinley BSc

Education Officer, Burren and Cliffs of Moher Geopark, Liscannor, Ireland,
Cormac McGinley (cormac.mcginley@cliffsofmoher.ie)

Keywords*: Seabirds, conservation, schoolchildren, data*

The Seabird colonies are an amazing but often overlooked seasonal phenomenon at the Cliffs of Moher in the west of Ireland. As a result of both the fish stocks and the particular geology of the area, the Cliffs of Moher support some of the largest populations of seabirds on the mainland of Ireland. Common Guillemots (*Uria aalge*), Kittiwakes (*Rissa tridactyla*) and Atlantic Puffins (*Fratercula arctica*) in particular are found in large numbers. Over 30,000 pairs of birds use the cliffs each year.

A decision was taken in late 2014 to try and enhance the public awareness and understanding of the uniqueness and importance of these colonies. A number of steps are to be implemented in 2015 these include:

- The launching of a Seabird Festival in conjunction with Birdwatch Ireland (one of the largest conservation groups in Ireland) to be held at the Cliffs of Moher during the month of May. This will include talks, guided walks and photography workshops.
- Use of the "Birdtracker" App which allows staff to record sightings as they happen and then upload this data to a central database for later analysis.
- Training of staff, in collaboration with Birdwatch Ireland, for the continuation of bird counts year on year.
- The involvement of local primary school children in this ongoing conservation and monitoring work.

The seabird session with the school children begins with a geological history of the cliffs and an explanation as to how the cliffs have been sculpted to form the kilometres of rock ledges and grassy areas that present the ideal nesting place for birds that are normally only found in these numbers on offshore islands.

When possible, yearly counts are taken of the colonies in the immediate vicinity of the visitor centre. In years when the counts have not been conducted photographs of the colonies are taken then stored on file to be gridded and counted at a later date. The counting of birds in these images can be a laborious and tedious process as the numbers of guillemots in particular runs into the thousands. The children are asked to help in counting the birds in the gridded photographs of the colonies.

Through these various strategies it is hoped that we will reach a variety of groups, local children, visitors who are already coming onsite but are unaware of the birdlife and interested locals who may come specifically for the events.

In the long term it is hoped that along with increasing understanding and awareness these actions will also help build a considerable body of data on the seabirds.

Geoparks and regional local development

ENLARGEMENT OF THE AROUCA GEOPARK TO THE MONTEMURO AND GRALHEIRA TERRITORY (PORTUGAL): HOW TO ACHIEVE THIS GOAL?

D. Rocha[1,2*], A. A. Sá[2,3], J. Brilha[4] & A. Duarte[1]

[1] AGA- Associação Geoparque Arouca, Arouca, Portugal; [2]Centro de Geociências da Universidade de Coimbra, Coimbra, Portugal; [3] Departamento de Geologia da Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal; [4] Instituto de Ciências da Terra, Pólo da Universidade do Minho, Braga, Portugal

* Daniela Rocha (drocha@geoparquearouca.com)

Keywords: *Arouca Geopark enlargement, Montemuro and Gralheira territory*

During the last three years a series of studies have been implemented in order to support, scientifically, the enlargement of the Arouca Geopark to include the Montemuro and Gralheira territory.

The Montemuro and Gralheira territory (MGT) covers a surface with an area of approximately 1690 km^2 and includes seven Portuguese municipalities: Arouca, Castelo de Paiva, Castro Daire, Cinfães, São Pedro do Sul, Sever do Vouga, and Vale de Cambra. All are associated with ADRIMAG, the Local Action Group. Arouca Geopark, a Global Geoparks Network member since 2009, is located in a central position within the MGT. The Geopark corresponds to the whole administrative area of the Arouca municipality and is known as an example of good practices involving geoconservation, education for sustainable development and geotourism. Therefore, the success achieved in the development of Arouca Geopark attracted the attention and interest from the surrounding municipalities to join this strategy.

The MGT is accredited, since 2013, within the European Charter for Sustainable Tourism (ECST) by the Europarc Federation, under the Magic Mountains® designation. The ECST Magic Mountains® action plan and the report of the revalidation mission of the Arouca Geopark made by the European Geoparks Network (EGN) in 2013 also reinforced the need to evaluate the possibility of expanding of the Arouca Geopark to include the MGT. The investigative studies facilitated the assessment of the potential for enlarging the Geopark, particularly through the study of the geological heritage and the production of a master plan for the implementation of the geopark approach to the whole MGT.

The developed work has produced an update of the scientific knowledge of this area based on the inventory of 69 geosites, two palaeontological collections, and nine mining areas. Several other assets were also identified and included in the action plan, namely: four Natura 2000 sites, a significant intangible heritage, a diversified tourism infrastructure, which includes tourism offices, accommodation facilities, restaurants, museums /interpretative centres, pedestrian trails, fluvial leisure areas and whitewater trails, together with 11 school groups and five training centres responsible for teacher training courses. A SWOT analysis was implemented in order to analyse the essential factors inherent in the expansion of the Arouca Geopark to include the entire MGT. Among other issues the aim was to identify questions related to the management structure and the name/brand of the new territory to be classified as a geopark. Based on this SWOT analysis, AGA (Arouca Geopark Association) seems to be the appropriate structure to manage the new geopark territory. In addition, it is also proposed to merge the two existent brands into "Arouca Geopark - Magic Mountains". The master plan was based on a diversified set of 67 actions to be implemented during the period 2015-2017. If this master plan is well, the conditions for the MGT being classified as global geopark would be satisfied, and coincide with the next revaluation of the territory by the Global Geoparks mission in 2017.

GAIBU MUD BATH (SANTO AGOSTINHO CAPE, PERNAMBUCO, NE BRAZIL): GEOLOGICAL HERITAGE AND HEALTHY LIFESTYLES

T. Guimarães[1]*, G. Mariano[1] & A. A. Sá[2]

[1]Department of Geology, University Federal of Pernambuco, Recife, Brazil, [2]Department of Geology, University of Trás-os-Montes e Alto Douro and Geosciences Centre, Vila Real, Portugal
* Thais Guimarães (thaisguimaraes.geo@gmail.com)

Keywords*: Mud bath, geological heritage, geotourism, healthy lifestyles, Santo Agostinho Cape, Pernambuco, Brazil.*

Mining is an economic activity related with the extraction of non-renewable natural resources. In this sense the duration of the activity is essentially determined by the amount and quality of the resources, by the reserves depletion or economic reasons. The mining area is sometimes abandoned or discarded. The most common features in these areas is the modification of the landscape and its natural elements, sometimes making their aesthetic properties seriously altered. In the municipality of *Cabo de Santo Agostinho* old clay mining pits achieved geotouristic importance and are used in activities related to the well-being and health. The clay pits of Gaibu were excavated in white-yellowish siltstones and mudstones belonging to Algodoais Fm. (Sedimentary Basin of Pernambuco). The clays were exploited in the second half of the 20th century for civil engineering uses. Currently some of the ancient pits turned into artificial lakes that provide mud baths and is already part of the sightseeing tour of the municipality. In addition, the "mud bath" is located in an area of environmental preservation, the “Two Ponds State Park”, dedicated to the protection of the Atlantic Forest ecosystem. The tourist activity comprises besides the mud bath a short pedestrian trail in the middle of the Atlantic Forest, an apiary and a support structure that includes a snack bar and the sale of honey bee and products made with clay, such as soaps and creams. It is important to mention that the clay used as raw material for manufacture of these products is not taken from the clay pits, since its extraction is prohibited. This work aims to contribute to the sustainable development and the geotourism of the region. This is a descriptive work that is part of a doctoral research in progress that covers the entire Southern coast of the State of Pernambuco. The use for mud therapy baths inside natural environment, contributes to the users well-being helping to reduce the negative physical effects of harmful actions related with the life-style diseases, particularly those associated with stress. This new reality is likely to create a dynamic of local sustainable development based on small businesses, with focus on native products, crafts and even the provision of services for relax (hydro- or mud-massage) or tour guide in the area, among others, thus contributing to reducing the unemployment negative impact that resulted from the end of the mining activity. Guided tourism and associated with geological knowledge contributes to increase awareness and respect for the environment, helping to preserve this natural heritage, increasingly important in this region where tourism of "sun and beach" is still the main tourist activity.

GEOPARKS AND LOCAL DEVELOPMENT: THE LINKS BETWEEN GEOLOGY, SOILS AND ECONOMY IN THE BEAUJOLAIS ASPIRING GEOPARK

C. Besombes[1*], B. Rousselle[2]

[1] Syndicat Mixte du Beaujolais, Aspiring Geopark Manager, Villefranche-sur-Saône, France; [2] Espace Pierres Folles, Geologist, Villefranche-sur-Saône, France
* Charlotte Besombes (cbesombes@pays-beaujolais.com)

Keywords*: local development, Beaujolais, Aspiring Geopark, France, geoheritage*

The Beaujolais is offering a great diversity of landscapes, resources and heritages, largely determined by the underlying geology. Expressed in landscapes' multiplicity born from the agricultural activity and at the heart of a rich architectural heritage, the geological heritage gathers also all that the regional geology is achieving on people's lives, preparing with them a geoheritage both for the past and the present.

Vineyard landscape: the land, the vine and the wines, the Beaujolais alchemy:
The beaujolais vineyard has a central position in the territory. Covering a large area of 17 000 hectares, it produces wines which are made from a single grape variety, the White-juice Gamay Noir. However, on the territory, you can find 12 different wine designations, which expresses a great diversity of characteristics. It is the geology and the pedology that gives this variety of terroirs. The history of the rocks of the Beaujolais, which span more than half a million years, have created the substratum of the vineyard. We will give examples based on a recent and innovative study: Terroirs' characterization.

Forest and rural landscape: from geology to forestry and cattle rearing:
With a varied geography, a fairly moist climatology and siliceous acid soils emanating from volcanic and hypovolcanic grounds, the western part of the Beaujolais is offering to softwoods, and particularly to the Douglas fir, suitable ecological conditions. This tree, discovered in 1791 on the island of Vancouver, has been introduced in Europe by Sir Douglas. It has been spread in the Beaujolais since 1872 up until today, where forestry is an important element for local development: production of high quality wood and contribution to landscape heritage.

An abundance of mines and quarries, rich mineral resources:
From Roman times up until today there has been mining of materials, minerals and useful substances. Almost each village has traces of exploitation. The great geological diversity has given to building industry a large range of materials, dominated by granite, volcanic, calcareous and clay formations. Tens of mines are spread across the territory, which have worked Copper, Iron, Lead, Fluorite Baryte, etc.

A remarkable architectural heritage: the strong impression of the geology in the traditional architectural heritage:
If the geology of the Beaujolais is often hidden, it is no less visible through the architectural heritage of this territory. Rich in its stone varieties constructions are a "permanent exhibition" of the numerous types of Beaujolais geology. We will give some examples of projects that bounds architectural heritage and local geology in the Aspiring Geopark.

With the Aspiring Geopark project, the territory is looking now for a new way to highlight its richness and enhance local economy: geotourism.

PARTNERSHIPS OF GEOPARKS AND EARTHS AND STONE INDUSTRIES – BENEFITS IN GEO-EDUCATION AND REGIONAL DEVELOPMENT

S. Roth[1*], D. Pietsch[1], H.-J. Stede[2] & T. Beisswenger[3]

[1] Geopark Swabian Alb, Münsingen, Germany, [2] District Office, Reutlingen County, Germany, [3] Building Material Association Baden-Württemberg (ISTE), Ostfildern, Germany
* Siegfried Roth (roth@geopark-alb.de)

Keywords: *Partnership, ISTE, Geo-Education, Quarrying, Gravel pits, Swabian Alb*

The mining industry is exploiting raw materials such as rocks and sediments in terms of economic needs (covering demand of raw materials) and interests. The Building Material Association Baden-Württemberg (ISTE) is the umbrella organization of mining companies producing building stones, crushed rock and rock flour within the federal state of Baden-Württemberg. Quarrying always means a temporary intervention into nature and landscape, whereupon today the extraction of rock is also associated with recultivation and or renaturation after the laying of a quarry.

Mining activities frequently create wet and dry habitats, which are extremely rare in our cultural landscapes. That's why quarries with such habitats are important hotspots of biodiversity. Further, outcrops provide excellent insights into our earth history. Mining sites usually are privately owned and therefore not accessible to the public. Thus mining sites cannot be used as places of geo-education and as places of nature experience for the public.

Enhancing people´s awareness for geology, earth history and nature is one of the main tasks of both the ISTE and the GeoPark Swabian Alb. Mining activities cause noise, dust and other emissions which can lead to problems such as the lack of acceptance by local residents. With the opening of quarries people will increasingly develop an understanding of the need for economic use of geo-resources to cover the demand of society for rocks and sediments. Thus, the problems associated with mining will be better accepted.

For the reason of introducing people into geology, earth history and mining, the Geopark Swabian Alb and the ISTE agreed a partnership. In the following three years both partners will jointly carry out projects and events such as "Public day of quarries", the training of quarry guides, teacher training or cultural events what will be continued after in the case of success.

The Geopark profits through financial contributions from member companies of the ISTE. The funds will be used to enhance the work of the Geopark and to finance projects regarding mining and geology. The partnership allows the Geopark also to sharpen its profile in the fields of geo-education and regional development, the ISTE will gain a better acceptance in the population concerning the extraction of raw materials.

THE POTENTIAL OF LOCAL AND INDIGENOUS KNOWLEDGE FOR GEOPARKS SUSTAINABILITY

M. Paskova

Bohemian Paradise Geopark, Turnov, Czech Republic
Martina Paskova (martina.paskova@mzp.cz)

Keywords: *indigenous knowledge, indigenous peoples, geoparks, geotourism, sustainability*

The contribution deals with importance of knowledge, skills and traditional lifestyles of local and indigenous peoples for the geoparks sustainability. It focuses on the analysis of the level and form of usage or at least the respect for this know-how passed from generation to generation and for other elements of collective memory and living heritage among geoparks. The author presumes that the quantitative and qualitative level of usage of this traditional know-how in geoparks, mainly in geotourism management, correlates positively with their level of sustainability. Secondary data (e.g. geoparks' promotional and educative materials, annual and revalidation reports) as well as primary data were used to verify this hypothesis.

This verification process began in the year 2014, when author conducted a small research on this topic in the form of questionnaire survey among global geoparks, as well as the first phase of the case study in emerging Rio Coco Geopark (Nicaragua).

Just 18 geoparks of 58 European geoparks responded, which created a 31% sample. In spite of the fact that 44 % responding geoparks stated that they do not have (or do not know about) such specific group of local people in their geopark, it is obvious from author experience and from content analysis of secondary data that the majority of geoparks dialogue with locals who play a pivotal role in the geopark, as they are involved in its creation and operation in various ways. Local inhabitants present and offer geopark to visitors, they serve as guides, producers of local products, artisans, artists, typical accommodation providers, small (in many cases organic) farmers etc. The other 46 % of the geoparks sampled indicated that they use traditional knowledge of local inhabitants for geotourism. They specifically mentioned local farming practices (e.g. 'basserias' farms in Basque Geopark), original local products (e.g. in Arouca Geopark and Bohemian Paradise Geopark), typical local architecture style (e.g. Sesia Val Grande Geopark), locally specific way of mining (e.g. Karavanke / Karawanken Geopark and Idria Geopark), local way of singing and dancing (e.g. Arouca Geopark and Cilento Geopark), hard mountain way of living (Adamello Brenta Geopark), specific language (Basque Geopark) and folk story-telling art (Fforest Fawr Geopark).

The sample of Chinese geoparks had much higher validity, 23 geoparks of 29 Chinese global geoparks responded (80 %). All of them except one (96 %) use local and indigenous knowledge with the positive impact on their sustainability. It involves mainly touristic usage of various traditions and lifestyles of many different ethical groups which helps to conserve intangible local heritage and enhances local economy.)

The use of indigenous Chorotega knowledge also indicates increase in Rio Coco Geopark sustainability.

The majority of all the researched geoparks confirmed that the usage of traditional know-how or practices has been increasing their sustainability, in terms of local environment, society and economy.

WHEN WATER RISES FROM THE DEPTHS: A SPARKLING GEOLOGY FOR THE BENEFIT OF LOCAL COMMUNITIES

M. Lutz[1*], N. Klee[1] & G. Naud[2]

[1] Parc naturel régional des Monts d'Ardèche, Domaine de Rochemure, 07380 Jaujac, France
[2] Société géologique de l'Ardèche, 07380 Jaujac, France
*Marc Lutz (mlutz@pnrma.fr)

Keywords: *Hydrogeology, spas, mineral waters, added-value products*

Geopark des Monts d'Ardèche shows a very wide diversity in its geological heritage. Water is everywhere, especially through the many streams that contributed to shape the landscapes. The diversity of geological terrains and hydrogeological features, especially with a large set of faults, have allowed to lift up many sources.

Some of these waters are known since ancient times (roman times and even earlier) for their therapeutic qualities. Depending on hydrogeological settings, thermal waters of Ardèche are more or less mineralized and can treat a wide range of diseases, such as trauma or rheumatism, skin diseases, and digestive disorders. One of the captured water source rises out at 53 ° C. Three spas exist within the Geopark, each of them having specific water qualities. They welcome all together a total number of ca. 9 000 persons per year for health cures, which corresponds to 16 000 health cure days, many of them occurring in spring or autumn, thus extending the touristic season.

Beyond the spas, mineral waters (mainly sparkling), also known for a long time for providing benefits to the health, are now meeting a true renewal through a high-end segment valuation. Their consistency over time built a real cultural heritage and local identity. The so-called *minéraliers* who run these sources have been developing a real know-how, from the extraction of water to its bottling, always respecting the resource. The total volume of mineral water placed on the market is ca. 91 Mo liters a year. Thanks to the support of the Park, these waters are now passing from a restricted, local and confidential market, to the ranges of water bars or starred restaurants. The geology of the place fully contributes to the quality of these unique water-related products, gives them significant added value, and participates in the wealth of the territory.

Pristine rivers and streams are also constitutive of beautiful sceneries, showing shredded schist reliefs and gorges with lava flows and basaltic columns, which are much appreciated for watersports. These additional assets are also fundamental for economy, and enable local businesses to provide products and activities year-round for local communities and visitors.

Geoparks and tourism

A NEW MOBILE APPLICATION TO DISCOVER OCHRE BY BIKE IN THE LUBERON GEOPARK (FRANCE)

S. Legal[1*] & C. Balme[1]

[1] Parc naturel régional du Luberon, 60 place Jean-Jaurès - 84400 Apt - France
* Stephane Legal (stephane.legal@parcduluberon.fr)

Keywords*: geotourism, cyclotourism*

The ochre outcrop is located in the south east of France, in the heart of the Parc naturel régional du Luberon, European and Global Geopark. This major geosite shows special red and yellow sandstones formed in tropical conditions 100 million years ago. It is a protected area, one of the highest places in the Geopark.

It is exceptional not only for its unique geology, but also for its outstanding scenic landscape, its industrial history and its economic impact on the inhabitants in the 19th and early 20th centuries. Currently, parts of this feature are visited annually by more than 600.000 tourists.

Since 2014, the Luberon Geopark offers visitors a new free mobile application to discover this outstanding site by bike. The mobile application proposes four itineraries, on quiet roads, along routes involving between two to four hours cycling (11 - 27 km). Four themes are proposed, the history of the ocher industry, geological and human time, being a geologist and crossing landscapes.
More than fifty geo-referenced interpretation points are defined. When the cyclo-tourist is approaching a point, with its GPS switched on, information is automatically accessed. It can, among others, be either a text, a video, an augmented reality view or a game. The content is accessible to all audiences, covering aspects of geology, geography, history and economy.

The application and its multimedia content are fully downloadable from the Apple Store and Google Play, in French and English. A mobile website also provides access to information on other system devices.

In addition to delivering a new tourism offer, the aim is to provide cultural information to schools using a tool they can appreciate and also to promote sustainable mobility (cycling) in a protected site with too many cars during the tourist season.

This application was created with European Agricultural Fund for Rural Development (EAFRD) and local authorities funds.

APPLYING WEB GIS TECHNOLOGIES & BEST PRACTICES IN PROMOTING GEOPRODUCTS AND GEOTOURISM WITHIN GEOPARKS

S. Staridas[1*] & Ch. Fassoulas[2]

[1] STARIDAS GEOGRAPHY, Heraklion, Crete, Greece
[2] PSILORITIS NATURAL PARK – History Museum of Crete, Heraklion, Crete, Greece
* Spiros Staridas (info@staridasgeography.gr)

Keywords: *WebGis, Geoproducts, Geotourism, Geoparks*

Geoparks provide a unique opportunity for visitors to experience nature, to enjoy outdoor activities and to discover local culture and history. These visitors would appreciate a supportive, easily accessible and straightforward tool in order to explore what a geopark can offer before they decide to travel there, as well as to assist them to explore the territory when they arrive. On the other hand, local enterprises established within geoparks offer their products, the so called Geoproducts, which may vary from traditional culinary products to folklore, art, crafts and a wide range of facilities such as boutique accommodation, as well as outdoor services - the list is limitless. The local inhabitants also require a reliable and comprehensive tool which makes them visible and accessible to their potential visitors. The numerous issues that a Geographical Information Systems can solve, also includes these two related aspects. Therefore correctly designed Web GIS maps and apps can function as a reliable means for liaising between these two interested parties.

Web GIS is a very recent development in the GIS industry which already has abundant different technologies all intended to create attractive, well designed and flawlessly operating web maps. Among these various and diverse technologies, one that can perform very suitably for the Geotourism audience, is that of ArcGIS on Line since it is based in the HTML language with Java Script functionalities. It can be accessed either by any GIS expert or non-expert and it communicates with the Desktop GIS software and concept.

The procedure for creating promotional maps for Geoproducts and Geotourism is very straightforward. It involves two clearly defined stages beginning with the mapping of data in the field, which obviously includes all the places of interest within a Geopark, the Geotrails and Georoutes, and of course the local enterprises offering their Geoproducts. Then these data are loaded in a geospatial database and further related editing is applied in order to prepare the data for web publishing. The next step includes the competitive advantage of this technology which is the publishing of these data as Web Map or Feature Services using the REST protocol. Finally the web application which will visualize these services is being designed, as well as all the interactive features, the look and feel and the data symbols.

A large number of case studies already benefits from these Web GIS apps. However, this paper focuses on how to promote Geotourism within the Psiloritis Natural Park on Crete in Greece (staridasgeography.gr/psiloritis-geotourism & staridasgeography.gr/psiloritis-geosites) and the aspiring Troodos Geopark in Cyprus (staridasgeography.gr/troodos-geotourism & staridasgeography.gr/troodos-geopark), as well as on their common activities for promoting Geoproducts (geocreating.weebly.com/).

BUILDING A TOURISM CARRYING CAPACITY FRAMEWORK FOR RESPONSIBLE USE OF GLOBAL GEOPARKS

W. Guo[1] & S. S. Chung[1*]

[1] Department of Biology, Hong Kong Baptist University, Kowloon Tong, Hong Kong
* S.S. Chung (sschung@hkbu.edu.hk)

Keywords: *Carrying capacity, tourism carrying capacity framework, global geopark, geotourism, responsible geopark management*

The concept of geopark was first proposed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1999. After that, geotourism emerged as a novel strategy for sustainable development in rural areas. Tourism carrying capacity is a concept related to the optimum use of natural areas without creating environmental degradation. This concept has been widely employed in nature tourism in national parks.

To apply the carrying capacity concept in global geoparks, the purpose of this paper is to remodel existing tourism carrying capacity frameworks to foster responsible use of global geoparks. A review of the development of carrying capacity concept and six tourism carrying capacity frameworks, namely, Recreation Opportunity Spectrum (ROS), Limits of Acceptable Change (LAC), Visitor Impact Management (VIM), Visitor Experience and Resource Protection (VERP), Visitor Activity Management Process (VAMP), and Tourism Optimization Management Model (TOMM) demonstrates that the carrying capacity concept is able to raise the awareness on sustainable tourism in national parks but the traditional tourism carrying capacity frameworks commonly failed to address the interests of all stakeholders. Thus, the six frameworks, which are born for national parks, cannot be directly applied to global geoparks management. The existing tourism carrying capacity frameworks can be made more compatible with responsible use of global geoparks if they are modified to serve the interests of stakeholders better.

For the said purpose, building a tailor-made tourism carrying capacity framework for global geoparks from social science perspective, this paper thus purports to examine: 1) how the generic carrying capacity imperative minimizes the environmental degradation associated with tourism and maximizes the responsible use of natural resources in parks, and 2) what kind of adaptation is called for in the application of conventional tourism carrying capacity frameworks associated with geological heritage.

Based on these, revisiting six traditional frameworks using modern geotourism management perspective, i.e. conservation on physical environment, education on the public, and sustainability on local economy, we hope to advance the methodological innovation of responsible geotourism management and supplement the lacuna of criteria and standards for global geoparks.

CONCEPTS & UNDERSTANDING BENEFIT INDICATORS IN GEOTOURISM ACROSS GEO-EDUCATION & PR AT WORLD HERITAGE SITES AND IN GEOPARKS

M.-L. Frey[1], Guy Martini[2] & N. Zouros[3]

[1]Welterbe Grube Messel gGmbH, Roßdoerferstr. 108, 64409 Messel, Germany
[2]Global Geopark Haute Provence, Digne les Bains, France; University of the Aegean [3]Department of Geomorphology, Mytilene, Hellas
frey@welterbe-grube-messel.de; guy.martini@gmail.com; nzour@aegean.gr

Keywords*: Geotourism, Geo-Education Concepts, World Heritage, Geoparks*

World Heritage Sites (WHS) base on the "Outstanding Universal Value - OUV" and Global Geoparks on the "Past-Present-Future - PPF philosophy". Within marketing of these two quality labels there are some discussions on benefit indicators as quality proofs since a while. They have become of increasing importance. To improve the understanding of the differences and bringing together the potential of both will be of benefit for both of them. In having a WHS in general the size is often smaller when being compared with a global geopark. By this second difference it is obvious that the type of criteria which can be defined and work as benefit indicator are not the same as those which are usually used for showing tourism economic benefits.

Talking about a PPF concept that has a frame of "science, heritage conservation, tourism, education and sustainable development" and which is based on creating an identity of the whole territory in the geopark is different from a "Science knowledge Society" based on the OUV. Both require however similar concept columns to achieve e.g. to promote geological heritage, transfer the value of it to the residents and market the developed products to attract visitors. The so called five "C's" of World Heritage show clearly that the needs of future generations are integrated. In geoparks this is described as sustainable development.

Quite a number of geoparks as well as WHS have started to generate data without defining clear questions in this context. In this presentation the main emphasis is laid on the measures which result in "benefit indicators" in a broad sense. For the Messel Pit WHS the realisation of integrating the "PPF" of global geoparks for its own positioning within the geotourism market will be highlighted. Awareness will be given to define a quality base for the service logistics, the content of guided tours, the service to give advise to visitors as well as to get a qualitative resonance on booked products by the visitors across e.g. Service Quality. These so called products or service offers comprise education activities and the professional service added.

Not only the collaboration with the Global Geopark Bergstraße-Odenwald, too projects with other Global Geopark partners like Lesvos (Greece), Haute Provence (France), Hong Kong (PR China) or exchange projects in spé with Sangshan WHS (PR China) and Jorgins Cliffs (Canada) are part of synergy benefits which are created. The results show that parallel to the PR and education activities which may differ on topics benefit is being raised by project activities creating infrastructure, additional activities of hotels for visitors as well as too generating pride and identity of residents and visitors. Having these columns next to each other it is obvious that PR or Earth Science transfer plus Geo-Education and adequate activities plus marketing activities related to geological heritage territories and sites leads to "Geotourism". Different concepts and labels can raise synergies and some benefit criteria shall improve the understanding that PPF and OUV collaboration leads to fruitful partnerships.

DESIGN AND APPLICATION OF GEOSITE INTERPRETATION AND GEOTOURISM INFRASTRUCTURE IN KULA GEOPARK

E. Gumus[1*]

[1]Kula Geopark Coordinator, Kula / Manisa, Turkey
* Erdal Gumus (erdalgumus@hotmail.com)

Keywords: *Kula Geopark, Volcanism, Geotourism, Geosite, Geotrail*

The Kula Geopark is situated in the Aegean Region of Turkey at Western Anatolia, within Manisa Province. The Geopark area covers 300 km^2. The Kula Geopark is the first and only European and Global Geopark of Turkey. The outstanding volcanic structures of Kula Geopark area are well known at least for 2 thousand years. The great ancient Greek Geographer Strabo (63BC-24AD) in his majestic book "Geographica" named Kula as "Katakekaumene" (fire-born) because of the coal-black lava.

Kula Geopark is the land of miniature volcanoes including outstanding geosites like cones, craters maars, lava plains, lava caves, basalt columns as far as karstic caves and fairy chimneys. The geosites of the Kula Geopark area have great educational, scientific research and geotourism value. In order to benefit from this potential it is necessary to provide safe and comfortable access to the geosite supported by information and sign panels. In this manner, "Explore the Kula Geopark" project was developed by the Kula Geopark to prepare 5 outstanding geosites for public access. The 250.000€ equivalent project is co-financed by the Kula Municipality and the ZAFER Regional Development Agency of Turkey.

The project follows the EGN philosophy: Aiming to bring together visitors and local producers at the new Visitor Centre in village; to facilitate geo-conservation via creating awareness on Geosites through public access; to support local development where safe and comfortable geosite access will attract more students for geo-education and more visitors for geotourism.

All constructions were considered in minimalistic manner to reduce impact on site while ensuring safe and comfortable access and visit on geosites. Only local stones were used for the construction to preserve landscape integrity as far as enhancing the sites visual identity. The geotrails combines most outstanding geosites to provide high visitor satisfaction in terms of scientific significance, visual appeal and personal experience. The ongoing project includes:

- Construction of a new 12.5 km geotrail and trekking route where 6 km will also for cycling
- Transforming an abandoned village school to a Geopark Visitor Centre
- Installation of 12 information panels and 18 direction sign
- Construction of 5 observation platforms for extraordinary scenic points through geosites
- Construction of 8 park shelters through the geotrails as temporary resting areas
- Installation of 134 wooden milestones through the geotrails to inform and encourage visitors
- Construction of 3 car parking areas in the beginning of the geosites for visitors safety
- Installation of 4 modular toilets in the beginning of geosites
- Design and printing of 10.000 Geopark leaflets
- Design and printing of a Kula Geopark promotional book in 10.000 copies.

DESTINATION MARKETING: LOCATING REGIONAL IDENTITY WITH REYKJANES GEOPARK, CASE STUDY FROM REYKJANES ASPIRING GEOPARK

Th.H.A. Braun*

Visit Reykjanes, Reykjanesbær, Iceland
* Thuridur Halldora Aradottir Braun (thura@visitreykjanes.is)

Keywords: *destination marketing, tourism, geopark, content marketing, Reykjanes Geopark, Visit Reykjanes*

The Reykjanes peninsula has had to deal with an idendity crisis as a destination, strugling to find its tone of voice and stories to share. With the Reykjanes aspiring Geopark, the region found a common denominator and a baseline for developing the identity of Reykjanes peninsula as a tourism destination. The strategic plan for the region began two years ago with the cooperation of the five municipalities on the peninsula, the Reykjanes aspiring Geopark and tourism operators with the aim to establish a stratetic marketing plan. Milestones were set and reached even though some work is still to be done.

Today the Reykjanes peninsula has been able to position itself as a destionation within Iceland, it has made its way into national promotional material and is working closely with Promote Iceland in branding the country as a whole. It has strengthten the cooperation within the tourism sector, increased the numbers of visitors to the area and lenghtened the duration of vistors time in the area.

The presentation will highlight key success stories from the Geopark and how they have been used in the destination marketing of the area.

Visit Reykjanes is an organisation responsible for marketing and promoting tourism for the Reykjanes peninsula and Reykjanes aspiring Geopark. It is one of seven regional promotional organisations in Iceland, working with the Icelandic Tourism Board with promoting Iceland abroad.

GEOCACHING IN THE AZORES GEOPARK: A TOOL TO EXPLORE THE GEOLOGICAL HERITAGE

Marisa Machado[1*], Eva A. Lima[1,2], Luís Machado[3] & Carla G. Silva[1,4]

[1] Azores Global Geopark, Associação Geoparque Açores, Rua do Pasteleiro s/n, Angústias, 9900-069 Horta, Azores, PORTUGAL. *marisamachado@azoresegopark.com; evalima@azoresgeopark.com
[2] Geosciences Department, Azores University, Campus de Ponta Delgada, Rua Mãe de Deus, P.O. Box 1422, 9501-801 Ponta Delgada, Azores, PORTUGAL evalima@uac.pt;
[3] Geocaching Azores, Ponta Delgada - Azores, PORTUGAL; lfbcmmachado@sapo.pt
4 Services for Conservation of Nature and Environmental Awareness, Regional Directorate of Environment, Edifício Matos Souto, Piedade ,9930-210 Lajes do Pico, Azores, PORTUGAL carla.sg.silva@azores.gov.pt
* Marisa Machado (marisamachado@azoresgeopark.com)

Keywords: *geocaching, geodiversity, geocache, geotourism*

Geocaching is treasure hunting, where the adventure begins before going out of home, it is assumed as an adventure game, and the interaction with nature and local culture.

First it is necessary to make the registration on the official website (www.geocaching.com) to get the cache coordinates or a mistery that has to be solved to get the coordinates, and with a GPS or a map depart to the discovery of the cache. All the caches found must be registered. The caches change according to their type in: traditional, multi-cache, mystery, wherigo-cache, virtual cache, letterbox, EarthCaches and event caches (in particular events CITO – Cash In Trash Out). This free game can be practiced individually or in groups for all the people of any age or profession. Geocaching has a strong environmental component, ever since its inception fifteen years ago. It promotes and instills respect for the environment, promoting cleaning events in trails and coastal areas, for example. For these reasons and many others, Geocaching is recognized for having a strong educational component and can be a very interesting activity for children.

Geocaching is assumed as a "fun" tool to explore the sites, and in the Azorean archipelago can be a geotouristic and nature tourism activity, as it disseminates and promotes the potential of the islands in different areas, namely the geological heritage, to discover the Azorean essence.

The archipelago presents itself as a privileged place to practice geocaching, currently with about 1800 geocaches and around 100 earthcaches that are panoramic points for the geolandscape, not only in nature but also in the urban areas, and has about 1000 geocachers.

The Regional Government (through the Regional Tourism Directorate) and a regional team of geocachers (Luis Machado, Pedro Almeida and others) developed a Geo Tour entitled "Ilha Verde / Green island", the first in the countries that constitute the Iberian Peninsula (Portugal and Spain). This project was developed in partnership with the six municipalities of the island, as well as the Island Natural Park, the Azorean Volcanological and Geothermal Observatory and the Azores Geopark. Several other entities also joined, including Cybermap, the company that developed an application for smart-phone on this geocaching adventure. There is already a plan for 2016 to extend this project to all the islands.

The Geocaching, mainly through EarthCaches, take the users to explore our volcanoes, calderas, lakes, volcanic caves, "fajãs", fault scarps, and many others geolandscapes, as well as to experience the traditions that persist today in the daily life of the Azorean people.

Through the practice of geocaching there are many geotouristic activities appreciated in the Azores to find the caches, such as walking trails, visit the viewpoints, dive in the Azorean sea, visit museums, discover historical monuments, practice canyoning or climbing, among many other activities.

The adventures are enriched by the geodiversity and by the emotions that are provided in the Azores discovery.

GEOTOURISM AND (RURAL) WELLBEING TOURISM - DEVELOPING COMMON FRAMEWORK

K. Tervo-Kankare*

Department of Geography, University of Oulu, Finland
* Kaarina Tervo-Kankare (kaarina.tervo@oulu.fi)

Keywords: *geotourism, wellbeing tourism, geological resources, Geoparks, tourism attraction, tourism development*

Geomorphosites, geomorphological landforms have an important role as tourism attractions of geological origin. The utilization of geological resources has long traditions in the history of tourism; tourists have been attracted to the beauty of the landscapes of geological origin for ages, but also the healing impacts of certain terrestrial substances and mineral waters, for example, have been utilized for touristic purposes. In addition, geological formations (some of the most well-known and spectacular examples being Uluru in Australia, Grand Canyon in North America) and certain geological phenomena (geysers, hot springs) also considered highly attractive.

While the definition for geotourism focuses on visitation to geological features and geo-site visitor centres, use of geotrails, guided tours and geo-activities, the geological resources are also utilized in wellbeing (or wellness) tourism. Mineral waters, natural springs and thermal spas are maybe the most traditional elements of geological resources utilized under this form of tourism, but also medical geology (the intake of mineral and chemical elements in order to heal or prevent illnesses) can be utilized to promote tourists' wellbeing. Innovative thinking and simple solutions are the key in developing tourism products under this category; mud, thermal spas, mineral waters, rocks, sands, dunes, soil, groundwater, springs, peat, landscapes (and the stories of their formation) etc. give enormous resources for this form of tourism. In addition, the mere contacting with the nature can bring one back to one's childhood and past, and especially so in relation to geology and landforms (the abiotic environment), when the geological elements carry with them history, show marks and hold memories from the Ice Age and beyond. Thus, connecting and interacting with them, acknowledging their age and history may emphasize feelings of harmony and stability - therefore promoting wellbeing. Therefore, Geoparks, with their outstanding geological heritage have high potential to create added value to more traditional uses of geological elements in wellbeing tourism.

However, the connection of geotourism and wellbeing tourism, is not well established and has remained relatively little studied, even though they certainly have unifying aspects. This exploratory paper, therefore, aims to search and examine the existing and develop potential connections between geotourism and wellbeing tourism that is based on geological resources, with focus on the forms of non-consumptive use of the abiotic environment. The objective is to examine the potential of geotourism products offered in Geoparks as tourism attractions for wellbeing tourists. The study is based on existing literature concerning wellbeing tourism focusing on geological resources, and on analysis of the geotourism products offered under five Geoparks located in the Nordic countries. The tentative results aim in promoting the development of sustainable utilization of geological resources in wellbeing tourism.

THE APPLICATION OF M-GAM MODEL IN COMPARATIVE ANALYSIS OF THE POTENTIAL LOESS GEOPARK (SERBIA), BAKONY-BALATON GEOPARK (HUNGARY) AND LUOCHUAN LOESS NATIONAL GEOPARK (CHINA)

T. Višnić[1]*& S. Božić[1]

[1]Department of Geography, Tourism and Hotel Management, Faculty of Sciences, University of Novi Sad, Trg Dositeja Obradovića 3, 21000 Novi Sad, Serbia
* Tamara Višnić (visnic.tamara@gmail.com)

Keywords: *Geopark, Loess, Serbia, Bakony-Balaton, Luochuan*

Geological heritage, especially in form of loess, provides immensely important information about paleoclimate and paleoenviromental changes during the Pleistocene. Moreover, it represents a valuable natural heritage with a great significance for the development of geotourism of many regions. However, the existence of the resources is not sufficient, so it is necessary to use those resources in order to build an adequate geotoruism offer. A potential loess geopark (Fruška Gora), contains six loess plateaus, and it is located in the Vojvodina region (northern Serbia). In order to assess the values of its geosites and identify the most attractive ones, the authors applied Modified Geosite Assessment Model (M-GAM). The model was used to assess the value of eight most representative geosites, which were singled out for this study (eg. Čot loess profile, Loess cave in Surduk, Feudvar, Ruma brickyard etc.). The results show a high level of Main Values (scientific, educational, aesthetical values and protection), but a very low level of Additional Values (functional and tourist values) in most of the geosites in the analyzed potential loess geopark. The lowest ratings were given in terms of the existing tourism infrastructure, which can be explained by the fact that geotourism in Vojvodina is still in its initial development stage, and that the loess profiles and their significance are recognized only by a small number of people. Furthermore, the M-GAM model was also used to assess the value of geosites of two other geoparks (Bakony-Balaton Geopark and Luochuan Loess National Geopark). These geoparks were chosen for this study because of some similar features with Fruška Gora, which makes the results comparable. Moreover, the study aims to show how examples of good practice, regarding the recognition, conservation, equipping the sites for geotourism purposes and promotion can be implemented to the potential future Fruška Gora loess geopark. A principal aim of this paper, besides geosites evaluation, is to pointed out the main strengths of the geosites and develop some concrete steps towards a better management of loess geopark and its faster proclamation as a geopark. As it has been mentioned, protected areas have a comparable geological resources and the comparison of their Main and Additional values could point out the major gaps which need future attention if Fruška Gora is to be proclaimed as loess geopark and included into the Geoparks network. Based on the geosites evaluation, it is possible to determine direction of the further development of geotourism in Vojvodina region, especially based on loess sediments, and clearly define areas (geosites) in which to invest, because of their great potential to become the future geotourism destinations.

THE GEOLOGICAL TRAILS NETWORK IN SOBRARBE GEOPARK (PYRENEES, SPAIN): A NEW TOOL TO DISEMINATE GEOLOGY

Á. Belmonte Ribas[1*], L. Carcavilla Urquí[2] & A. Ruiz Conde[1].

[1] Geoparque de Sobrarbe. Avda. de Ordesa 79, Boltaña (Huesca), Spain, [2] Instituto Geológico y Minero de España. Ríos Rosas 22, Madrid, Spain
* Anchel Belmonte Ribas (anchelbr@unizar.es)

Keywords: *disemination, geotrails, Sobrarbe Geopark, Pyrenees.*

Sobrarbe Geopark, a territory of more than 2200 km^2 ,lies in the heart of the Pyrenees, the most important mountain range in Spain. The Geopark's contains more than 50 peaks over 3000 m a.s.l., a complex pattern of valleys, and a dense network of fluviokarstic canyons .

The geology of the territory comprises two orogenies (Variscan and Alpine), some of the most famous geological sites in the Pyrenean chain, a varied lithology and the effects of several ice ages. Together with many other factors these are the core of more than 100 geosites and contribute to the outstanding geodiversity of Sobrarbe.

To correctly interpret this complex relief and geolog for the general public is a major challenge for the Geopark managers. The current tools to achieve this goal are a visitor center, a network of informative panels, a road-route with 13 interpretation panels, 13 btt georoutes and a geological route along a *via ferrata*. During 2015, a new tool has been created namely a network of 30 geotrails.

Geotrails are a powerful means of disseminating geological information. Easy walking trails alow direct contact with the geological environment. The topics incorporated try to combine explanations of the most representative facts about Sobrarbe's geology but also the main unique features of the area. All the geotrails contribute to a network, with contents that are complementary and show the geodiversity of the Geopark.

The geotrail's network is addressed mainly to visitors without any previous knowledge of geology. The different itineraries present the main geological features of the area and cover the widest chronostratigraphic interval. They also take advantage of the preexisting signposted walking trails of Sobrarbe (more than 1000 km long) and other touristic facilities. The design of the trails tries also to establish links between geology and other aspects of the natural and cultural environment.

Eleven geotrails go across Ordesa and Monte Perdido National Park, also a UNESCO World Heritage Site and part of the Ordesa-Viñamala Biosphere Reserve. The other 19 trails are located through the rest of the Geopark, ranging from the mild mediterranean southern lowlands to high mountain glacial lakes, surrounded by complex Variscan folds.

The geotrails have been designed to be self-guided. Visitors can download a free leaflet including all the information required to follow the itinerary locate the viewpoints and to interpret the geology along the trail. However, the general public may require the assistance of a guide. In order to provide a quality service, Sobrarbe Geopark designed a training course for local geological guides. Thus, local people can incorporate the interpretation of the geotrails as a new addition to their professinal activites in the Geopark.

THE NISIOPI PETRIFIED FOREST MARINE PARK: A NEW INNOVATIVE APPROACH ON GEOTOURISM DEVELOPMENT IN THE LESVOS EUROPEAN AND GLOBAL GEOPARK, GREECE

I. Valiakos, G. Gribilakos, K. Mpentana, V. Rozakis, M. Agiasoti & N. Zouros*

University of the Aegean, Department of Geography, Mytilene, Hellas;
Natural History Museum of the Lesvos Petrified Forest, Sivri, Lesvos, Hellas
*Nickolas Zouros (nzour@aegean.gr)

Keywords*: Geoparks, Local Development, Marine Park*

Nisiopi islet (or Megalonisi) is located at the westernmost tip of Lesvos, 1.5 km west of the village of Sigri. With a total surface area of 81.5 ha it is the biggest islet near the island of Lesvos. In the northern part of the islet exists a great concentration of plant fossils. The Petrified Forest of Nisiopi is part of the wider Petrified Forest of Lesvos. It includes a large number of petrified logs belonging to the angiosperms and conifers. These logs can be found not only on the islet but also at the bottom of the see surrounding the islet and constituting thus a spectacular geosite.
The Natural History Museum of the Lesvos Petrified Forest has submitted a project proposal for funding under the NSRF 2007 – 2013 and specifically the Operational Programme "Crete & Aegean Islands" which was approved in 2011. Since then it is conducting a series of excavation, conservation and protection works as well as works for the improvement of the accessibility to the various geosites of the islet as the petrified tree trunks needed immediate protection and conservation and similar works have never been done before in that area.
The project included:
• the conservation of petrified tree trunks in situ on the islet of Nisiopi, documentation-identification of fossils both on the islet and in the marine area around the islet of Nisiopi and in the Bay of Sigri,
• the highlighting the value of the fossil-bearing sites through geochemical works and radiodating,
• the mapping and determination of activity zones in the marine area, identifying the fossil-bearing sites and determination of sites of interest in the maritime area of the Park.
• the acquiring the necessary equipment for the operation of the Park
• the construction of a glass bottom boat for visiting and observing the submarine sites as well as for the transportation of the visitors to the islet of Nisiopi.
• the signage
• the visibility of the project through exhibitions, the creation of documentaries, guides, printed and electronic material, publications, workshops and conferences.

The operation of Nisiopi Marine Park will contribute to the development of geotourism and the improvement of the economic and social development of the region through the creation of new jobs and will contribute to the protection and preservation of the natural environment. It will also provide a more complete view of the Petrified Forest of Lesvos, a unique protected natural monument.

THE SACRED AND THE PROFANE? TOURISM AND SPIRITUAL LANDSCAPES

Carol Gleeson

Burren & Cliffs of Moher Geopark, Clare County Council, Ennistymon, County Clare, Ireland
cgleeson@burren.ie

Keywords: *Tradition, Holy Wells, tourism experiences, impacts, authenticity, change*

Rural Ireland, and in particular the Burren region, is noted for the survival of rich cultural traditions dating back thousands of years. The Burren is often referred as 'a vast memorial to bygone cultures'; thousands of sites and monuments have survived to provide us with a landscape redolent with atmosphere, memory, and tangible connections to the past. Visitors come from all over the world to experience these connections and it is the quality and impact of these sought for experiences that will be explored in this presentation.

The topic chosen is the growth of spiritual tourism rooted mainly in the exploration of holy wells and pilgrimage sites. The hydrology of the karstic landscape of the Burren provides a network of natural springs, many of which have been used for spiritual purposes and survive to this day as *Holy Wells* associated with Christian saints and curative powers. Scholars believe that holy wells also had spiritual functions for earlier societies; based on the echoes of pagan rituals which survive in the beliefs and practices that surround these wells.

There has been a significant growth in pilgrimage tourism in Europe, as witnessed by the development of pilgrim paths that criss-cross the continent and the popularity of the Camino. The Burren is no exception, and there has been a marked increase in visits by tourist groups to holy wells and church sites in secluded locations traditionally used by local people. These sites have a special value and significance for local communities, and feast days at these wells to celebrate the local saint are still popular. The opportunity for quiet contemplation at these sites is also an important part of their spiritual function.

The increase in tourism has not only increased physical impacts, it has also changed practices at a number of sites in the Burren. Some rituals appropriate to specific sites, such as tying a piece of cloth to a 'holy' tree or leaving a memento at a well, have spread to other sites which traditionally were left pristine. The mementos are increasingly secular in character, unlike the mainly religious offerings of old. The Geopark has embarked on a project to record these changes and would like the opportunity to present these findings and to discuss the issues raised by this new use of ancient spiritual landscape features. Should the impacts of tourism at these sites be managed? Should the traditional use, community values and practices be conserved at the expense of the new? Are the new practices a genuine expression of spirituality, engagement with local culture or a superficial expression of a tourism 'experience'? Who makes these judgement calls? Should the principles of 'Leave No Trace' apply?

TRANS-ATLANTIC GEO-PARTNERSHIP: INTERNATIONAL APPALACHIAN TRAIL PARTNERS WITH EUROPEAN GEOPARKS TO PROMOTE GEOTOURISM

Paul Wylezol[1,2*] & Carlos Neto de Carvalho[3,4]
[1] Chairperson of the International Appalachian Trail; [2] Chairperson of the Cabox Aspiring Geopark in Newfoundland; [3] Scientific Coordinator: Geological Survey of Idanha-a-Nova, Geopark Naturtejo Meseta Meridional–European and Global Geopark, Avenida Joaquim Morão, 6060-101, Idanha-a-Nova, Portugal; [4]Centre of Geology of the Faculty of Sciences of the University of Lisbon, Bl. C6, 3rd floor, room 6.3.57 Campo Grande 1749-016 Lisboa, Portugal.
*Paul Wylezol (p.wylezol@nl.rogers.com)

Keywords: *IAT, reuniting Pangea, geotourism development, cultural exchange*

In summer 2009, the **International Appalachian Trail** (**IAT**) visited the United Kingdom and Ireland by invitation of the British and Irish Geological Surveys. The goal was to investigate the extension of the IAT from eastern North America across the North Atlantic to Western Europe. Though surprising to many, for those with an understanding of the geological processes that shaped the planet and the North Atlantic Basin, it was a natural progression.

The mission of the International Appalachian Trail is to establish a long-distance walking trail that extends beyond borders to all geographic regions once connected by the Appalachian-Caledonian orogen, formed more than 250 million years ago on the super-continent Pangea. In addition to connecting people and places, the goal is to promote natural and cultural heritage, health and fitness, environmental stewardship, fellowship and understanding, cross-border cooperation, and rural economic development through eco and geo tourism.

Today the IAT has chapters in 18 countries and territories around the North Atlantic rim, from the United States and Canada to Greenland, Iceland and Norway, then south through the British Isles to the Iberian Peninsula and Morocco.

After 2009's visit to Lochaber Geopark in Scotland, it also became evident that the IAT had the potential to connect Geoparks and other designated landscapes across the North Atlantic. It now passes near or through 12 Global Geoparks or Aspiring Geoparks in Western Europe and 3 in Eastern Canada, with the potential of linking to even more. Through its Cabox Aspiring Geopark in Western Newfoundland, the IAT is now also a partner in the European Union's Interreg VB Northern Periphery and Arctic Programme's ***Drifting Apart*** project.

In 2015, the IAT can be viewed metaphorically as a geo-heritage pearl necklace or charm bracelet connecting Global and Aspiring Geoparks by a series of linear footpaths around the North Atlantic Rim. However the potential doesn't end there. Given the shared, yet diverse, cultural heritage across the Atlantic Ocean, the IAT also provides a unique opportunity to promote Trans-Atlantic narratives, such as Norse, Portuguese, Spanish, British and French exploration and colonization, as well as Irish emigration and resettlement.

One example is the important cultural bond between Portugal and Newfoundland. From 1498 to 1502, Portuguese explorers João Fernandes Lavrador, Pêro de Barcelos and Gaspar and Miguel Corte Real were the first modern explorers of much of northeastern North America, on behalf of the Kingdom of Portugal and its negotiated right under the 1494 Treaty of Tordesillas with Spain. Today Portuguese fisherman continue to fish cod in Newfoundland waters, an enduring tradition of over 500 years that spawned the famous gastronomic tradition of "one thousand and one ways" of cooking cod in Portugal.

While the northern end of the IAT and Appalachian Mountains in North America is in Newfoundland, in March 2015, Portugal launched a brand new section of IAT in Naturtejo Global Geopark in southwest Europe, the Grand Randonée called GR38 Muradal-Pangea. Muradal is an Appalachian-type of quartzite crest that is now proudly connecting four rural communities and boosting new paleontological, botanical and archeological discoveries and study. The new interpretive trail has also helped establish new outdoor sports that are attracting new visitors to Naturtejo Global Geopark.

Finally, by reconnecting natural and cultural heritage around the North Atlantic Rim, IAT partnerships help expand geo-tourism markets between eastern North America and Western Europe. In the words of the British Geological Survey's Hugh Barron, "while the tectonic forces underlying the Atlantic Ocean are dividing us, the International Appalachian Trail is once again uniting us!"

WHEN TOURISM OCCURS FROM COUNTER MAPPING AND GEOPARK INDENTITY IS SHAPED

P. Hauch Fenger[1]

[1]The Royal Danish Academy of Fine arts, the Design School, Department of Product Design, Center for Co-Design, Denmark

Keywords: *community, tourism, mapping, identity, place making, meaning making*

From its very beginning, maps have served the interests of the rulers, as a method to create the illusion of territory, but also as a way of regulating and controlling people. Counter-mapping is used in art, critical cartography, urban planning and political activism in an attempt to involve citizens in making their own maps in order to break with the authoritarian exercise of power intrinsic to the structure of maps by virtue of the factuality which the map represents. The power of a map is thus a function of that drawn on it, which ultimately imposes actual influence on reality. We are so deeply involved in the discourse over maps that we don't always question the truth a map pretends to put at the disposal of its reader.

As a challenge to the Geopark Odsherred administration's maps, which identify what is of interest in the Geopark, the inhabitants of one local community were asked to point out places they found interesting with a view to identifying new potential geo-tourism destinations. As they worked on the map, forgotten places came to light; old stories and features in the landscape took on new significance. As the villagers delved ever deeper into the material, meaning making emerged, as did a shared sense of geopark identity, brought about by the stories which mixed with each other. The administration's ideas as to what was of particular interest ceased to be the only truth. The villagers' mapping thus resulted in their own ideas about what future geotourism in their area could also consist of, based on what they identified as interesting in the Geopark.

WONDERFUL KARST: A NEW VISITOR CENTRE IN BAKONY–BALATON GEOPARK, HUNGARY

B. Korbély[1*], A. Knauer[1]

[1] Bakony–Balaton Geopark Group, Balaton Uplands National Park Directorate, Csopak, Hungary
* Barnabas Korbély (korbely@geopark.hu)

Keywords*: karst heritage, lake cave, visitor centre, geotourism*

Bakony–Balaton Geopark was accepted into the European and Global Geoparks Networks in 2012. The 3,244 km^2 Geopark is located in western Hungary, near Lake Balaton, the largest lake in Central Europe, at the boundary between four major geographic regions. Therefore it is characterized by a variety of geological, topographic, climatic and hydrological features and by its extensive biodiversity. Altogether 24 of the 45 geosites are located within protected natural areas of national interest (Balaton Uplands National Park, Protected Landscape Areas, Nature Conservation Areas) and/or the geosite is itself protected by law (e.g. caves, sinkholes, springs). The Geopark territory comprises administrative areas containing 151 settlements with 330,000 inhabitants.

The Balaton Uplands National Park Directorate, as the leading organisation of the Bakony–Balaton Geopark, operates 11 visitor centres and interpretive sites within the Geopark territory, 7 of them are directly connected to the rich geological heritage of the area.

Lake Cave of Tapolca, an outstanding underground maze, protected by law since 1942, is not just the most well-known geosite of the Geopark but it has become the most visited show cave in Hungary for years. The cave hides under the streets of the town Tapolca near Lake Balaton (this region is the second most important tourist destination of the country). The cave offers a unique opportunity for boating and, after installation of a new, energy-saving LED cave lighting system two years ago, from 2015 visitors are also invited to explore an interactive exhibition on 770 m^2 in the new Lake Cave Visitor Centre, focusing on the wonderful world of karst. The geological features are interpreted by special attractions, 3D photos and an impressive 3D film.

Several themes related to the world of karst can be explored in the exhibition, such as dripstones, cave diving, the wildlife of caves, palaeokarst and caves in prehistoric times. Interactive elements make the exhibition even more exciting: children can crawl in the adventure cavern or try the geo-quiz on a touch screen while the sensory abilities of the visitors are challenged by the “feel the rocks” game. A playground and a climbing wall also attract young visitors. Palaeogeographic paintings introduce the wildlife of past epochs in the Geopark Room where the diverse geological heritage of Bakony–Balaton Geopark is introduced to the public. More than 100,000 visitors are expected annually to the new visitor centre, the Western Gate of the Geopark.

The EU-funded investment of 1,000,000 EUR was coordinated by the leading organisation of the Geopark, the Balaton Uplands National Park Directorate.

Geoparks concept, principles and ideologies

GEOPARKS AND GEOETHICS: A FRUITFUL ALLIANCE TO GUARANTEE THE WHOLESOME DEVELOPMENT OF GEOPARKS IN THE WORLD

A. A. Sá[1]*, E. Silva[2] & C. Vasconcelos[3]

[1] Department of Geology and Geosciences Center, University of Trás-os-Montes e Alto Douro, Vila Real, Portugal; [2] Portuguese NatCom for UNESCO, International Association for the Promotion of Geoethics (Europe Coordinator), Lisbon, Portugal; [3] Department of Geosciences, Environmental and Spatial Planning, Institute of Earth Sciences, University of Porto, Portugal
* Arthur A. Silva (asa@utad.pt)

Keywords: *Geoethics, values, social role, responsible use, Geoparks*

The proposed creation of the "Global Geoparks of UNESCO" Programme, currently under way at UNESCO, confirms the importance and timeliness of this issue among member states, in the 21st Century. Moreover, the holistic approach developed in the territories classified as Global Geoparks (GG), implies attitudes able to address the social, environmental and economic dimensions of sustainable development, reaffirming the founding principles of UNESCO. In this context, the role of GG concerning the promotion of scientific research and the cooperation and share of knowledge inside the network, implies that the advances of science and technology will take place within the framework of "universal respect for justice, for the rule of law and for the human rights and fundamental freedoms", as expressed in Article 1 of UNESCO's constitution. In this sense, the ethical aspects of scientific research therefore need to be considered by the GG once helps to create social awareness about the value of the geological heritage and geodiversity. But what is geoethics? Why is it need? Geoethics consists of the research and reflection on those values upon which to base appropriate behaviours and practices where human activities intersect the Geosphere. It deals with the ethical, social and cultural implications of geological research and practice, providing a point of intersection for Geosciences, Sociology and Philosophy. Geoethics also represents an opportunity for Geoscientists to become more conscious of their social role, responsibilities and values in conducting their activity and it is a tool to influence the awareness of society regarding problems related for example with natural resources. As the GGN is growing all over the world, it will be required guidelines for ethical conduct regarding concrete problems and how to find socio-economic solutions compatible with the respect for the environment and the protection of Nature and land. More than ever and in the future, the social role played by Geoscientists and their responsibilities inside the GG have ethical, cultural and economic consequences and therefore repercussions in the lives of the local communities. Implementing geoethics inside GG will encourage a critical analysis of the use and management of natural resources and how to deal with problems related to the risk management and the mitigation of geohazards. It will also allow to organize effective teaching tools to develop awareness, values and responsibility, especially amongst the young people. In this sense, it is vital to implement a policy that can promote geoethics inside the territories classified as GG.

QESHM GEOPARK, A NEW RESTART OR A NEW STRATEGY?

A. Amrikazemi[1] & Hamidreza Mohsenpour[2]

[1]Geoheritage Department, Geological Survey of Iran, Tehran, Iran, [2]Qeshm Geopark, Qeshm Island, Iran
*Alireza Amrikazemi (aamrikazemi@gmail.com)

Keywords: *Qeshm, Iran, Geopark, World heritage, Salt cave*

Qeshm Geopark has had a chequered history; initially a member of the Global Geoparks Network (GGN) in 2006 it was redesignated as a national geopark in 2012 following an evaluation mission. Currently the new managers of the the territory are faced by a new challenge namely, whether to focus on returning to the GGN or to concentrate on nominating the salt cave of Namakdan as a potential World Heritage Site (WHS).

The occurrence of the World's longest salt cave of Namakdan (6500m) in the heart of geopark are a reason for nominating this feature for inclusion as a in WHS. However there are numerous geological, natural and cultural sites and attractions in the island, which need to be protected and promoted. The question is: Which program is better for the Qeshm? Planning to reestablish the territory as a Global Geopark or to focus on developing on feature a WHS?

Qeshm Geopark is currently not a GGN member, but it still retains the character and function of a geopark. Local communities know about and are strongly connected with the geopark. New activities in the geopark have been developed with local partners. Several new geo-host centers have been established with regular visits to geosites by schools and an increasing number of travel agencies offer package tours to the geopark. The geopark's managers have also developed an effective approach for developing geosites. It seems that the geopark concept is going to be more clear and stronger, a slow but continuous trend.

Although being included in the list of WHS sites has many benefits and would make a valuable contribution to the island's identity, inclusion in the list means focusing on a single site. Maintaining a geopark includes the following factors:

- A geopark covers a wide area including several geosites and eco-sites.
- The number of employees in a geopark is not comparable with the employment rates in World Heritage Sites.
- The diversity of attractions in the geoparks is higher. There is interaction between culture, nature and geology.
- The methods and models for protection and conservation in geoparks is different and more creative.

The Qeshm Geopark Management team is running several projects for the development of geosites. The final goal is to create a more active and functional geopark according to the recommendations made in the last assessment delivered by GGN evaluators. The projects also include Namakdan Salt Cave, regardless of its being a geosite or becoming a WHS.

Geoparks conservation: natural and cultural heritage dimensions

ARCHITECTURAL HERITAGES TO GURANTEE THE SUSTAINABLE DEVELOPMENT OF THE QESHM ISLAND GEOPARK, PERSIAN GULF, IRAN

Maziar Qaseminejad A.[1] & Mahnaz Ziaee T.[2]

[1] [2] Piramoon Architetcs, 1495814314, Tehran, Iran
Maziar Qaseminejad A. (maziarch@yahoo.com)
Mahnaz Ziaee T. (archmah88@gmail.com)

Qeshm Island is a rapidly developing trade free zone for trade and industry, located in a hot and humid region of Iran close to the Strait of Hormuz. Most of the island and its marine surround, involving an area of approximately 1500 km^2, falls within the territory of the Geopark.

Geoparks provide an integrated concept which contributes to preserving the world's natural, social and cultural values. Conserving the traditional architecture as well as the necessity to protect the genetic heritage contained in an area's flora and fauna is important for maintaining sustainable development in geoparks. Given the fact that we inhabit many unique spaces and buildings whose architectures reflect our identity, is vital for us to look carefully, learn from, promote and apply this knowledge to new developments. The first lessons come from the architectural patterns that were created over a period of centuries during the development of the the island.

So studying the old buildings that were built using simple techniques and accessible materials, provides rich and practical guideline for designers who always look for and respect environmental values. The primary benefit of applying these techniques in new building projects is the construction of buildings which are designed for the climatic conditions.

In addition, geoparks are the junction between natural and cultural values. This contribution considers the relationship between people and the architecture which reflects their thoughts, their limits, their dreams, and reveals their identity. Therefore, we consider that the engagement with architecture is itself an effective tool to show a geopark's values to the people.

ETHNOGRAPHIC HERITAGE RECOVERY IN SIERRA NORTE DE SEVILLA GEOPARK: RESTORING LIMEKILNS

A. Gil Toja[1]*, R. Pérez de Guzman-Puya[2] & A. Sanz Matencio[2]

[1] Sierra Norte de Sevilla Geopark (Tragsatec), Pol. Parque Sevilla Industrial, C/ Parsi 5, 8. 41016 Sevilla, Spain., [2] Sierra Norte de Sevilla Geopark, Avda. de la Innovación, s/n. Edificio Minister, 41071 Sevilla, Spain.

* Alberto Gil Toja (geosierranorte.cmaot@juntadeandalucia.es or agil3@tragsa.es)

Keywords*: limekiln, Ethnographic Heritage, limestone*

The limekilns were ovens where carbonate rocks was calcined for obtaining lime. These widespread popular buildings are located in specific places of the Geopark, in areas where there is limestone, as it was is raw material.

Lime is a term for all physical forms in which the calcium oxide [CaO] and the calcium and magnesium oxide [$CaMgO^2$] appears, also called, quicklime and calcined dolomite.

The lime is obtained by calcining limestone (calcium carbonate: $CaCO^3$) at a temperature of about 900°C, by the following reaction: $CaCO^3$ + heat → CaO + CO^2. The industrial calcination takes place in vertical or horizontal rotating kilns. The traditional methods could be in a traditional oven, usually built in dry stone.

Lime has been used since ancient times, of binder in construction; also for paint (whitewash) walls and facades of buildings constructed of adobe or mud (very common in ancient Mediterranean homes).

In all the villages of the Sierra Norte de Sevilla it has always been a limekiln and a family that always has done this work, being commonly known these people for the Spanish name "caleros" because their knowledge has been passed from father to children as a way of living.

This activity has gradually fallen into disuse in recent years, disappearing today. But still exists in the territory constructions of these kilns, in some cases well preserved and in others only the ruins of the walls or its supports.

In the last two years the Geopark Sierra Norte de Sevilla, together with the Environmental Volunteer Network of Sierra Norte Natural Park, has been conducting various activities of communication, sensitivity and recovery of several of these old limekilns.

To this end were taught several lectures about these ovens and its construction system; have been compiled the names of the different parts of the kiln or its products, provided by people in the region whose family worked in the office; and they have been rebuilt several limekilns, in which will be installed an information panel about these special buildings.

GEOLOGIC HERITAGE INTERPRETATION AND SOCIO-ECONOMIC DEVELOPMENT IN HATEG COUNTRY DINOSAURS GEOPARK-ROMANIA

Alexandru ANDRÃŞANU[1*] & Cristian CIOBANU[1]

[1]University of Bucharest, Romania
* Alexandru Andrãşanu (alexandruandrasanu@gmail.com)

Keywords: *geopark, geotourism, rural development, geologic heritage interpretation*

A Geopark is an innovative approach aiming to play an active role in the economic development of its communities and enabling the inhabitants to re-appropriate the values of the territory's heritage and actively participate in the territory's cultural revitalization as a whole. The concept proved to be a successful approach in development of rural areas.

Hateg Country Dinosaurs Geopark (HCDG) was the first geopark in Romania. Established in 2004 as a natural park, it joined EGN and GGN in 2005 and was revalidated in 2009, 2010 and 2014. The geopark is the result of a grass root effort which started in 2001 and was initiated and coordinated by University of Bucharest now in charge with the geopark management. Hateg Geopark experience generated in Romania a new approach in nature conservation, Romania being one of the first countries to recognize the geopark as a distinct protected area according to the Act no. 57/ 2007.

The Hateg area is endowed with a wide range of sites of natural, archaeological, historical and cultural relevance. Besides the very picturesque landscapes, deep gorges, caves, alpine forests, meadows, orchards and crops the region hosts remains of the human history from Paleolithic to Roman Antiquity and from the Middle-Age to the Modern time. The region is world-wide known for its "dwarf dinosaurs" that roamed the Hateg Island 70 million years ago.

The paper is presenting our approach in developing an interpretation network for tourism and education, able to offer a journey through Time, a journey into the history of the Earth and a journey in human history of Hateg Country. In partnership with local communities, NGOs and artists geo-trails and geo-points are developed aiming to interpret local geologic heritage represented by specific rocks, old volcanic structures, Ice Age traces, dinosaurs and other fossils remains. *The House of Dwarf Dinosaurs, Dinosaurs Valley, The House of Volcanoes and Volcano Trails, The Balaurs, Dragons and Dinosaurs* permanent exhibition, the *Science and Art House* are just few examples of interpretation points and trails created to enhance local identity and values. The interpretation web will be completed with the *House of Plants, The House of Time, The House of Butterflies* and the *House of Rocks*.

The development of the interpretation infrastructure was associated with educational, outreach activities and geotourism promotion as an appropriate contribution to local socio-economic development. This approach allows the visitor to enter the fabulous realm of the invisible and symbolic ties between physical and spiritual space that communities have built generation after generation in Hateg area.

GOOD PRACTICES ON THE MANAGEMENT OF THE PALEONTOLOGICAL HERITAGE IN THE BASQUE COAST GLOBAL GEOPARK

A. Hilario[1*], M. Lopez-Horgue[2], L.M. Agirrezabala[2] & M. Amonarriz[1]

[1] Basque Coast Global Geopark. 20820 Deba, Spain, [2] Department of Stratigraphy and Palaeontology, Faculty of Science and Technology, University of the Basque Country UPV/EHU, Ap. 644, 48080 Bilbao, Spain
* Asier Hilario (flysch@gipuzkoa.eus)

Keywords: *ammonites, collectors, museum, biostratigraphy, geoconservation, education*

Paleontological collections can be important educational and touristic resources of our geoparks, but their management can be also a complex and committed task that we must face. Selling fossils is not allowed by the network standards, but fossils have been collected very often by private collectors in our territories. Furthermore, in most countries this activity has been allowed by a complete lack of a governmental regulations, and the commercialization of fossils can be an important economic resource in some territories. Such non-scientific activities usually results in the loss of the biostratigraphic context and the scientific value of the collected fossils.

The Flysch section of the Basque Coast Global Geopark is famous worldwide because of its sedimentary thickness and the presence of the K/Pg boundary where the abrupt extinction of ammonites was described.

The most spectacular ammonites of this section have been collected by a private individual during the last 30 years. This collection consist of more than 120 giant ammonites of Albian Age that were taken out from the sea-cliff before the sea could erode and destroy them. This is positive, but these ammonites were not classified by any paleontologist, and their stratigraphic positions were not recorded; thus, their scientific value very limited or even unknown.

In 2008, even before the geopark was created, the townhall of Mutriku, where the ammonites were collected, signed an agreement with the owner of the collection. This agreement, which included the opening of a small museum with a proper laboratory with fossil-preparation facilities, kept the collection in Mutriku, avoided any temptation for its private commercialization and created a new geotouristic and educational attraction in the proto-geopark territory.

The Basque Coast Geopark has designed and financed a new research project in which an expert paleontologist and an expert stratigrapher from the University of the Basque Country are working together with the private collector to place all the samples in the stratigraphic column. This research has provided a proper classification of all the specimens and a much better scientific understanding of the real value of the ammonite collection.

In addition, we are also working to ensure the conservation of the ammonites that are still located in the sea-cliffs. Taking into account that geoparks have no legal capacity for regulating paleontological collections, this geosite has been included in the Mutriku´s subsidiary standard and also in the basque geosite inventory, and approved by the Basque Goverment in 2014.

HONDSRUG GEOPARK GENERATES A PINGO PROGRAMME IN DRENTHE, THE NETHERLANDS

E.P.H.Bregman[1,2], M.Roelfs[1]*

[1]Province of Drenthe, Westerbrink 1, 9400 AC,Assen, The Netherlands
[2]Utrecht University, Department of Physical Geography, Heidelberglaan 2, 3584 CS Utrecht
* Margaretha Roelfs (G.Roelfs@Drenthe.nl)

Keywords: *geopark, pingo, programm, protection, management, education*

A pingo is a permafrost landform, an earth-covered ice hill formed by an ice lens that pushes the overlaying sediment upwards while growing. After climate change the ice lens melts and the sediment slides mainly sidewards. Thus a remnant of the formed ice hill and sediment is formed: a circular depression surrounded by a rim.
In the present time the northern part of the Netherlands covers the biggest amount and concentration of pingo remnants in Europe and they form an important part of the glacial landscape scenery.
Untill today most pingo remnants have got open water and most of them have got Late Glacial – Holocene infillings of lake sediments and peat which strongly reflect environmental conditions of the past and the present. They are valuable for earth- and nature science and most of them have got ecological, archeological and cultural values. Anthropogeneous impact already started in Mesolithic and Neolithic times. Later on they were used for washing sheep and many people in northern Netherlands learned swimming and skating in pingo remnants nearby their villages.
Despite all the values pingo remnants are not recognized as such. In general they are poorly studied and get minor attention in landscape- and nature education and management. Exposure for tourists fails and thus also chances to tell a unique attractive story to visitors of the Hondsrug Geopark. An exception is the pingo remnant ‘Mekelermeer’, which has been well studied recently and will be revealed as a geological monument this autumn.
In order to get more awareness and better management an integrated approach is inititated by the Geopark organization together with the province of Drenthe, landscape- and nature organizations and the Universities of Utrecht and Groningen.. The first outline of this approach, the P!ngo Programme Drenthe, will be presented at the conference. We will focus on the way we integrate several fields of interest to an integral plan and will zoom in at the Hondsrug Geopark as a showcase how to work out the P!ingo Programme on a regional level. Ofcourse also important outcomes of the ‘Mekelermeer’ study will be presented.

INCLUDING INTANGIBLE CULTURAL HERITAGE IN SUSTAINABLE TOURISM DEVELOPMENT IN GEOPARKS; A STUDY ON MANGROVE FOREST, QESHM GEOPARK, IRAN

M. Hassani Esfehani*

Department of Tourism, University of Otago, PhD Candidate , Dunedin , New Zealand
*M. Hassani Esfehani (minoo.hassani@postgrad.otago.ac.nz)

Keywords: *Geopark, Intangible Cultural Heritage, Sustainable Tourism, Natural Heritage, Cultural Spiritual Values*

Nowadays development of unplanned tourism with inadequate planning is taken as serious threat for the existence of those protected areas which are known and used as tourism attraction. Based on the main goals dedicated for Geoparks, tourism has a critical role in existence of a Geopak and its development. If planned carelessly, either domestic or international tourism would hurt both the fragile ecosystem of the Geopark and also the cultural heritage that exist in Geopark territory.

This intangible cultural heritage refer to the non-material aspect of each culture which transmitted from generation to generation ,and is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provide them with the sense of identity and continuity. Based on UNESCO definition cultural and spiritual values (CSV) are introduced as a part of one of six criteria of intangible heritage in the world. The importance of and the deep-seated interdependence between the intangible cultural heritage and the material heritage like earth heritage have been emphasized in last two decades in internationally. In light of this protected areas, including Geoparks, that are associated with the long history of human life, are deeply linked to cultural traditions and beliefs of their inhabitants. Since long time ago, most of these protected areas have been affected, and mostly supported by the human communities who have been living there. This article is an attempt to explore the mutual relationship between CSV and tourism and its impacts on Geoparks. It aims to contribution of CSV to minimizing the negative impacts of visiting activities on environment and its role in more responsible use of natural heritage of Geoparks and consequently developing sustainable tourism. Moreover, it argues that sustainable tourism can support cultural values and guarantee its perpetuity of cultural heritage as well.

The investigation has a qualitative approach in order to produce descriptive data. Open and semi-structured interviews and participant observation were the main methods used for getting information from the selected site. The site is the important international protected area of Mangrove Forest, located in Qeshm Geopark. It is the only International Geopark in Middle East that is located in the biggest southern island of Iran in heart of Persian Gulf. The history of human living in the Qeshm Geopark related back to more than 2000 years ago ,and the cultural context of local community which can be found only in this region is quite considerable.

MAKING INTANGIBLE CULTURAL HERITAGE COME ALIVE AND CONNECT INSIDE GEOPARKS – THE EXPERIENCE IN KATLA, ICELAND

Sigurður Sigursveinsson[1*] & Jonathan Karkut[2]

[1] Katla Geopark, Fjölheimar, Þekkingasetur Suðurlands, Tryggvagarði, 800 Selfossi, ICELAND
[2] Touch TD Ltd., Studio 5, 155 Commercial Street, London E16BJ UK
* Sigurður Sigursveinsson (sigurdur@hfsu.is)

Keywords: *Intangible Cultural Heritage, Community engagement, UNESCO synergies, Future trends*

Intangible cultural heritage (ICH) is a familiar and integrated component amongst the varied aspects of heritage represented across Katla Global Geopark. Even within a tiny population of 3,000 people, a broad spread of manifestations from the collections of local legend and living heritage Þorður Thomasson, to new visualizations and interpretations from the Saga of Njáll Þorgeirsson, have been identified and used to animate the diverse ways in which the landscapes of Katla may be observed or understood.

However, an understanding as to how ICH features emerge, adapt, are transformed and transmitted to future generations, has only recently begun to be fully assessed. The 2003 UNESCO convention on intangible heritage has been a lightening rod through which to consider ICH, but in many cases the countries that have ratified the convention have not progressed much beyond processes of auditing and listing ICH expressions. This had been the case in Iceland, which signed the convention in 2005 but until now had not set the convention to work for practitioners or exponents of ICH in Iceland. That situation is set to change. The UNESCO national commission for Iceland recently decided to engage more fully with the convention and gain a clearer understanding of what ICH means to its citizens, what are the challenges in sustaining and keeping practices meaningful to participating communities, and fundamentally how the 2003 convention can work with and for ICH in Iceland.

Katla geopark is moving to become a significant participant in this process by collaborating closely with the assessment team and building upon its strong application of ICH, which already supports interpretations, communication and active community participation around the geopark. By means of multi-disciplinary analysis particularly embracing geology, geography and social anthropology, Katla will work towards the further integration of its differing heritage components and thus draw together a holistic but multi-faceted presentation of its dynamic landscapes.

This paper will report back on this ongoing process, and consider how elements of best practice in keeping ICH alive, valued and passed through to future generations, may be transmitted out to the wider geoparks network. Furthermore, the paper touches on how the 2003 UNESCO ICH convention can act in practical terms as a further mechanism through which geoparks can converge with other UNESCO programmes and tools.

THE AGRI-GEOLOGICAL LANDSCAPE IN TERRACES BETWEEN CROP ABANDONMENT AND HYDROGEOLOGICAL INSTABILITY

A. Amorfini[1*], A. Bartelletti[1] & G. Ottria[1,2]

[1] Apuan Alps Geopark, Seravezza (Lucca), Italy, [2] CNR, Istituto di Geoscienze e Georisorse, Pisa, Italy
*Alessia Amorfini (aamorfini@parcapuane.it)

Keywords*: terracings, landscape, agri-geosite, archaeo-geosite*

The authors underline the value of terracings as monuments of traditional knowledge and evidence showing the landscape history. In Italy, the technique of terracings dates back at least to the Renaissance period as a way of guaranteeing the conservation of the soil and its efficient management.
Nowadays, in Italy the terraced landscape is endangered due to the progressive cultural and hydraulic abandonment of hilly and mountainous areas. Exception is made for areas with particularly precious crops (vineyards and olive groves) where maintenance operations are more frequent because of the market value of the products.
The terraced landscape is characterized by a wide variety of techniques for its building and maintenance. These include the construction of dry stone walls, the collecting of the underground waters and the creation of fertile soils for the crops. These techniques are the result of construction knowledge, applied together with a perfect understanding of the geological, hydraulic and climatic conditions of the area.
The geomorphological interest stems from the way the terracings follow forms or deposits due to endogenous or exogenous morphogenetic agents while their geological interest can be linked to the different lithological composition of the walls.
In geological literature, several authors have recognized the terracings as geosites when there is a close relationship between the work and its geological environment or when this kind of landscape can be considered “suggestive” or “quaint” due to the harmonious dialogue between man and nature.
The authors present two different cases of terracings that could be classified as a special category of geosites: agri-geosites and archaeo-geosites.
The first example concerns the Apuan Geopark Farm where a dry stone wall, a typical element of this built landscape, is only the upper part of the wall where the “Scaglia Toscana” natural rock outcrops at its base, with nearly horizontal layers. It is a remarkable example of how man is able to imitate natural forms.
A similar case is a terracing which integrates and remodels a large outcrop of marble. It is an ancient archaeomining site that was exploited in the past with rudimental tecniques and subsequently abandoned.
Finally, the authors underline the fact that the terracings are antropic elements, which are full of geological features and able to maintain the various qualities in both the naturalistic sphere and the anthropic sphere.
Nowadays, the conservation of terraced landscapes is a relevant issue in absence of productive interest. The only solution is to follow good practice and profitability linked to quality and short chain agri-food products.
The conservation of a landscape requires a supporting economic framework. The landscape needs to be part of a productive cycle, involving not only agriculture but also tourism and the environment.

THE DISTINCT LANDSCAPE IN ZHANGJIAJIE GLOBAL GEOPARK OF CHINA; ITS FORMATIVE PROCESS AND VALUES

He Qing Huang[1*], Yuanyuan Zhou[1], Liangqun Xiang[2], Guozhou Peng[2], Yuanmang Zhou[2]

[1] The Joint Research Center for Zhangjiajie Geomorphology, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, 11A Datun Road, Chaoyang District, Beijing, China. [2] The Administrative Office of Zhangjiajie Global Geopark, Zhangjiajie City, Hunan Province, China

* He Qing Huang (huanghq@igsnrr.ac.cn)

Keywords: *Zhangjiajie Global Geopark, Sandstone Landforms, Geo-tourism, China*

Zhangjiajie Global Geopark is located in Hunan Province of China, and has been one of the top-listed tourism sites in China. The picturesque landscape in Zhangjiajie Global Geopark of China caught the attention of Wu Guanzhong, a master of Chinese paintings, in 1979 and since then it has attracted worldwide attention. In 1992 and 2004, it was declared as a World Natural Heritage site and a founding member of Global Geopark Network, respectively. The number of visitors from home and aboard to the geopark has been increasing in an exponential form, reaching over 10 million yearly nowadays.

The geologically and geomorphically distinct landscape has developed in Devonian sandstone over an area of ~400 km2 and is characterized by more than 3000 sheer vertical sandstone pillars, peaks and walls of up to 350 m height. To conserve this natural heritage effectively within the context of sustainable tourism development, however, there are urgent issues that need to be answered by scientists, such as naming a distinct site among the variety of landscapes that have either similar landforms or similar lithology, climate, or the other similar aspects. This presentation introduces the major findings of several research projects undertaken recently and consequently briefs how the science-popularization activities are pursued in the geopark in light of the geologic/geomorphic knowledge.

THE STORIES OF THE OLD MINERS OF MURÇÓS (TERRAS DE CAVALEIROS GEOPARK, PORTUGAL)

Ana Lima[1], Elisa Preto[2], Sílvia Marcos[1] & Diamantino I. Pereira[1, 3]

[1] Terras de Cavaleiros Geopark, Macedo de Cavaleiros, Portugal
[2] Geology Department, University of Trás-os-Montes and Alto Douro, Portugal
[3]Institute of Earth Sciences, Pole of the University of Minho, Portugal
(geral@geoparkterrasdecavaleiros.com)

Keywords: *old miners, intangible heritage, documentary*

The Terras de Cavaleiros Geopark (TCG) is located in the Trás-os-Montes region in northern Portugal and corresponds to the administrative area of Macedo de Cavaleiros, which has about 700 km^2 and a population of 15,776 inhabitants.

The main attraction in the TCG is a set of geosites that document an important phase in the history of Planet Earth, a time when the continents of Gondwana and Laurussia, formerly divided by the ocean Rheic, collided and formed the great Variscan mountain range. These geosites are concentrated in the eastern part of the TCG, whereas other parts in the geopark's territory comprise different values. That is the case for the village of Murçós, with 134 inhabitants, which was the centre of intense exploration of tungsten and tin until the 1970s with its peak during World War II. The hydrothermal W>Sn quartz veins cut Silurian schists and a Variscan biotite granite, the mineralization of stockwork type. The exploitation of scheelite and cassiterite took place mainly at the surface in six open pits. The W>Sn quartz veins contain scheelite, cassiterite, wolframite, many sulphides and sulphosalts, native bismuth and rare particles of gold.

A great part of the local population was involved in the mining activities, which therefore were of big relevance to them. In order to preserve the memories of the people who worked in the Mining Complex of Murçós a project was initiated which aims to contribute to the revitalization of this village. The project includes guided visits and the realization of a documentary based on the experiences of the ex-miners. This documentary aims to preserve and disseminate an intangible heritage that is disappearing, a village on the edge of depopulation.

The project started in March 2014 with a research for photos and documents in official entities, followed by an awareness-raising action with the inhabitants of Murçós that resulted in 10 people willing to participate in interviews. At the moment these interviews are being transcribed in order to make a script for the documentary, which will address both the experiences of former miners and the surrounding history of mineral extraction in the village of Murçós.

The activities carried out so far showed positive effects such as an increased self-esteem among the local population and a stronger connection between the people and TCG. Hence the TCG aims to realize similar projects in other villages in the future, to further develop the potential of the Geopark.

TRAIL DEVELOPMENT WITHIN NATURAL AND CULTURAL HERITAGE AREAS

Michelle Shannon

Marble Arch Caves Global Geopark, Geopark Supervisor, Enniskillen,
Northern Ireland.
Michelle.Shannon@fermanaghomagh.com

Keywords*: Trail Development, Sustainable, Environmental*.

Trails have been part of our landscape for centuries and were once essential for getting around the countryside. Over the centuries, the role and purpose of trails has changed and many now enable people to enjoy the outdoors by providing, access to a range of sites and facilitating activities like walking, cycling, and horse riding.

Within the European Geopark Network, trails are important for connecting people with our landscapes. Trails showcase our geology, archeology, biodiversity and cultural heritage and allow us to tell the story of our landscapes from the past to the present.

The importance of our trails reinforces the need to consider key factors when planning a trail – end users, purpose of the trail, safety environmental issues, the route, permissions, planning, funding and future maintenance.

In 2012, the Marble Arch Caves Global Geopark started a new chapter in the story of the Cuilcagh Trail, which is an historical trail over extensive blanket bog to the 666 metre high summit of Cuilcagh Mountain. Cuilcagh is located in the heart of the Geopark and with its distinctive table top profile it is the main focus of an area rich in natural and cultural heritage.

The Cuilcagh Trail was rolled out over three years to protect the blanket bog (which is a Special Area of Conservation under the Habitats Directive of the European Union) from being trampled by walkers. Taking account of the statutory designations and considering the heritage value of the area helped to identify the environmental concerns, constraints and obstacles that dictated how the project would be delivered.

The trail takes in several key landscapes - blanket bog, mountain lakes, scree slopes, rocky cliffs and montane heath so considerable thought was given to intergrating the trail with the landscape and to connecting people with the mountain. Great emphasis was placed on interpreting the trail while close attention was given to the expectations of the trail users and to the ongoing management of the trail.

Interpretation and communication

A DESIGN AND PROTOTYPING OF MOBILE GUIDE APPLICATION FOR GEOPARKS

M. Okumura[1,4*], Y. Yahata[2] , S. Takahashi[2,4] , N. Tsuruta[2,4] , & M. Torii[3,4]

[1] Fukuoka University, Information Technology Center, Fukuoka, Japan, [2] Fukuoka University, Faculty of Engineering, Fukuoka, Japan, [3] Kumamoto University, The Implementation Research and Education System Center for Reducing Disaster Risk, Kumamoto, Japan, [4] Fukuoka University, AIG Collaborative Research Institute for International Study on Eruptive History and Informatics, Fukuoka, Japan
* Masaru Okumura (okkun@fukuoka-u.ac.jp)

Keywords: *geopark, guide, smart phone, visitors*

ACRIFIS-EHAI (AIG Collaborative Research Institute For International Study on Eruptive History and Informatics, Fukuoka University, Japan) aims to solve the following issues that geo-park have.

First issue: In a geo-park, Geographical guidance is indispensable in order to visit a geology inheritance from the restrictions, which are outdoor exhibition. Moreover, exhibition explanation is limited to the explanation on a guide map, and it has not come to perform the learning experience according to the visitor's age or the characteristic.
Second issue: A budget and human resources are restricted and especially an outcrop will be lost in spite of a precious geology inheritance for a short period of time for land development and the preservation purpose. Therefore, it should be record its position, state, etc. promptly.
Third issue: In order to maintain continuous management of domestic museums including a geo-park in Japan, geo-park needs to attract citizens and visitor. For that purpose, the sustainable activity of the education by civic participation or cooperation with the local region, etc. is indispensable.

To resolve these issues, we are planning to design and to develop an original guide application for geo-park visitor's mobile devices, such as Smart Phone, Tablet. This guide application has a function to navigate to exhibition in geo-park, and a function that displays the contents according to the visitor's characteristic. Furthermore, it provides explanation of the effective exhibition using AR (Augmented Reality) technology. Simultaneously with it, it also has a function to report geologic data, such as a photo of outcrop, with easy procedure. By incorporating the information dissemination function from visitors, local residents a both directions communication of information cycle is formed between geo-park.

In Japan, there are 36 domestic geo-parks in 2014, but the parks providing some kind of guide applications are less than 10. It is thought that an offer of the application includes the problem on budget. So, we designed our guide application to adopt common issues of geo-parks. To verify our function, we get the cooperation of two global Geo-parks in Japan, Unzen Volcanic Area Global Geo-park and Aso Global Geo-park. Currently, we are developing the prototype of mobile guide application for Unzen and Aso Global Geo-park. If the framework of our mobile guide application are provided, other geo-parks are easily employed it for them.

In our presentation, we introduce our activities and the prototype of guide application for geo-park visitors.

DIGITAL MARKETING IN NATURTEJO GLOBAL GEOPARK

Joana Rodrigues[1] & Carlos Neto de Carvalho[2]

Geopark Naturtejo da Meseta Meridional – European and Global Geopark under UNESCO. Centro Cultural Raiano, Av. Joaquim Morão, 6060-101 Idanha-a-Nova, Portugal.
[1]Joana Rodriques (joana225@gmail.com)
[2]Carlos Neto de Carvalho (carlos.praedichnia@gmail.com)

Keywords: *Naturtejo Geopark, communication, digital marketing, social media*

In the 21st century digital tools support effectively citizens' opinions and choices. People are always connected through computers and mobile devices, permanently looking for new information. In this Era of Information, more and more contents appear online and the way of communication makes the difference.

Since its beginning, Naturtejo Global Geopark has a strong presence online through its webpage (www.naturtejo.com) where the territory, all the activities, newsletters, e-magazine, projects and useful information are presented. It is the main communication vehicle online, central platform for the mailing of the newsletter that reaches more than 20 000 people, in some cases, the most widespread communication tool in the region. The webpage reflects the communication philosophy of the geopark and is an important working tool for teachers, students, tourists, tour operators, regional entrepreneurs, local communities or geopark staff, providing all kind of tools to better know Global Geoparks and Naturtejo Geopark.

Social Media go further in interaction and are essential for the contact with people nowadays. But it is vital to develop a communication strategy and it is necessary to take advantage of each tool, choosing those who fit the geopark features and to plan regular posts. These tools improve the Geopark position in search rankings and strengthen not only the brand but also the concept that Global Geoparks promote, in a more informal and casual environment. Geoparks need to know their markets and their visitors in order to present themselves as quality and innovation brand. It is necessary to evaluate the pages to find which day, which timetable and what kind of contents the audience prefer to maximise the outreach. Naturtejo Geopark, through Social Media, provides updated information, interaction with geopark's visitors, local communities, press or tour operators, in a way getting closer Naturtejo Geopark from everybody. Naturtejo Geopark pages live from simple but attractive information, remarkable images and eye-catching videos.

Actually, Naturtejo Geopark is present in Facebook, Instagram, Issuu, Slideshare, Youtube and Google Scholar. Facebook is the Social Network with more users worldwide, more than one thousand million, and a large number of the Global Geoparks has profiles. Digital marketing is increasing in Naturtejo Geopark, due to the low budget necessary, high velocity of data transfer, high global spread, environmental friend, easy handling. Global Geoparks need to promote their territories pointing the advantages of the Geopark concept and the local specificities of each in order to increase the prominence of the brand Geopark under UNESCO.

GEOCORNER, A NUMERICAL TOOL TO PRESENT THE MASSIF DES BAUGES GEOPARK

C. Lansigu[1]*, J-L. Desbois[1] & P. Vinit[1]

[1] Geopark du Massif des Bauges, Regional Nature Park, La Châtelard, France,
* Christophe Lansigu (c.lansigu@parcdesbauges.com)

Keywords*: interactive terminal, multimedia, geopark user manual*

Using the framework of the European cooperation program (LEADER with Arouca Geopark (Portugal) and Luberon Geopark (France)), The Massif des Bauges Geopark has designed Geocorner. Geocorner is an application (app) for presenting our Geopark and Global geoparks network. This is intended to assist geopark and their tourism providers in the dissemination of touristic information.

The app, which is based on the principle of a multiplatform application for use on touch screens, touch tablets and a wide range of interactive terminals, includes a short video presenting some aerials view the Massif des Bauges Geopark. The application provides, primarily, the first practical approach to discovering our geopark in the field. It includes a presentation of the geosites with a description of the five categories proposed to the public. It also contains a presentation of the European Geoparks and Global Geoparks Networks.

A photo gallery using aerial views completes the presentation of the geosites and the richness and the diversity of our territory. This gallery and the whole application is directly connected to the Geopark website. This allows a more complete exploration of the territory by using a complete database in conjunction with the dynamic cartography based on the open street map app (Umap). The application includes a practical module presenting the places to visit (e.g. tourist information centers and museums) and all local touristic services (mountain leaders, accommodation, restaurants, local products). A special section is proposed to highlight the geopartners who have signed the geo-partnership convention with the Geopark and can provide specific offers within the spirit of the Geoparks concept.

The objective of this application, Geocorner, is to help our touristic partners to promote and enrich this new approach to the territory and to provide them with a powerful networking tool. The application is freely distributed for use by our partners.

GEODIVERSITY AND GEOHERITAGE AS REFLECTED IN NATIONAL PARKS IN FINLAND

K. Härkönen

Parks & Wildlife Finland, Ostrobothnia Region, Kajaani, Finland
Kerttu Härkönen (kerttu.harkonen@metsa.fi)

Keywords*: national parks, geodiversity, geoheritage, popularization*

Finland has a total of 39 national parks. The earliest parks were established in 1938 and the latest ones in 2014. In national parks, the biological and ecological heritage of the country is preserved, as well as esthetic values in the form of either impressive and/or typical landscapes. National parks are general attractions, open for the public for free and provided with good visitor services. Their popularity is high: and in 2014, a total of 2,286 million visits were made into Finnish national parks.

Geological phenomena play a major role in several national parks. In some, geology is the basis and reason for the establishment of the park. Examples of this are given in the presentation: the Pyhä-Luosto, Helvetinjärvi and Hiidenportti national parks among others. In the presentation geological and geomorfological features of the parks and the significance of these features in the rationale for park establishment are discussed.

Visitors to the geologically significant parks get information on geology in several forms. Geology is displayed in exhibitions, either as the main theme that carries through the exhibition (example: Pyhä-Luosto) or as the "beginning of all other phenomena" (example: Syöte). There are nature trails with geological input. Wonders of geology are conveyed to the visitors also in the form of open lectures by visiting geologists.

Geodiversity and geoheritage are emphasized in the communication of the parks. In order to convey a focused characterization of each park, a profiling process was carried out in 2014. Where geological features are important, they are emphasized. As an example, the profile of the Helvetinjärvi national parks is:

"**Gorgeous geological sights**
The landscape here is dominated by geological features created millions of years ago by mighty movements deep in the Earth's crust. After admiring the rugged cliffs around Helvetinjärvi (Hell's Lake) and Helvetinkolu (Hell's Hole) you can relax on the sandy lakeshore at Haukanhieta. " Also other profiles are discussed in the presentation.

The presentation also discusses the importance of geology on areas with different designations, e.g. the Kvarken Archipelago, which became Finland's first UNESCO World Natural Heritage Site in 2006. Also, visitors´ experiences and visitors´ interests in geological phenomena in the parks are discussed. Visitors´ comments are derived from visitor surveys, which are conducted regularly in national parks, as well as from the experiences of service staff in the parks and their visitor centers. Ways to enhance the quality of information and the appeal of geodiversity and geoheritage for the park visitors are also discussed.

HOW CAN GEOPARKS CAPITALISE ON THE POTENTIAL OF SOCIAL MEDIA? – PART 1

J. Bouwsema[1*], L. Hamlet[2] & R. Barton[3]

[1] Social Media and Marketing Coordinator, Scottish Geoparks Partnership, Fort William, Scotland, [2] Information officer, North West Highlands Geopark, Unapool, by Lairg, Scotland, [3] Project Officer, Geopark Shetland, Lerwick, Scotland
* J. Bouwsema (geoparkshetland@gmail.com)

Keywords: *geoparks, social media, marketing, tourism, community engagement*

This is the first of two linked presentations that will demonstrate how Geoparks can make best use of cost-effective, powerful and wide-reaching social media communications.

Social media has evolved immensely over the past ten years. Once the equivalent of an online college-yearbook, it is now a major part of modern life and an invaluable tool for businesses and organisations seeking to engage with diverse audiences. As social media has moved to occupy more and more traditional marketing territory, organisations are realising the importance of maintaining an engaging on-line presence, but often do not have the time or resources to develop this.
Geopark Shetland, North West Highlands Geopark and aspiring Lochaber Geopark have been working closely over the past two years through a Scottish Geoparks Partnership to raise the profile of the Scottish Geoparks and the wider network locally, nationally and internationally. As part of this process they have employed a Social Media and Marketing Coordinator to develop and implement a coherent and efficient social media strategy. In this context, we present a pair of linked presentations, outlining how Geoparks can captialise on the potential of social media for marketing.
In the first of these two presentations, we discuss the potential for social media to provide cost-effective, targeted reach to local or global audiences, and discuss how Geoparks might engage with specific audience groups. We discuss which platforms are available, and the audience specific to each platform. Further, we explore some of the challenges Geoparks encounter within their social media, and highlight some differences between good and bad social media marketing practice through case studies taken from both real geoparks, and the fictional "Flintstone-Bedrock Geopark". We explore how Geoparks can ensure they are following the patterns of successful social media marketing, and avoid the traps encountered by Flintstone-Bedrock.

INTERPRETING FOSSIL RESEARCH FOR GEOPARK VISITORS IN STONEHAMMER GLOBAL GEOPARK

R.F. Miller[1,2*] & J. Fullerton[1,2]

[1] New Brunswick Museum, Saint John, NB, Canada; [2] Stonehammer Global Geopark, Saint John, NB, Canada
* Randall Miller (Randall.Miller@nbm-mnb.ca)

Keywords: *fossils, ichnology, Stonehammer, interpretation*

The Stonehammer Global Geopark region has attracted geoscientists since the 1830s, when Abraham Gesner conducted some of the earliest geological survey explorations in North America. By the late 1860s geological research concerning the area's geological structure, mineral wealth, and palaeontology were well underway. The study of fossils has been particularly important, and a key component of the Stonehammer Global Geopark story. Palaeontologists continue to make new discoveries every year in our geopark. Precambrian stromatolites, Cambrian small shelly fossils and trilobites, Silurian fish and sea scorpions, Carboniferous plants, arthropods and trace fossils and Quaternary fossils are well represented in the geopark, and rank among some of the earliest discoveries made in North America and beyond. While scientifically important, the fossils of Stonehammer are perhaps among the most difficult to share as stories with the public. 'Small shelly fossils' from the Cambrian rocks of Stonehammer represent some of the first of their kind described in the world, but they are as promised 'small', millimetre-scale enigmatic fossils that just cannot have the same impact as fossils such as dinosaurs, already familiar to the public. The same might be said of our tiny jawless fish, or faint trackways left by Carboniferous horseshoe crabs.

Among several active research projects, the past year has seen the discovery of new Lower Carboniferous fossils near Norton, at the eastern border of the geopark. Norton has been promoted as having one of Canada's oldest 'fossil forests', experienced in part near an historic covered bridge. These newly discovered, beautiful, but delicate fossils were photographed in-situ and collected under a Heritage Conservation permit by a researcher working closely with the New Brunswick Museum. The rocks were highly fractured and recovered from an active quarry with co-operation of the landowner. When the research and description are complete, these will be among the best examples of a Lower Carboniferous non-marine invertebrate trace fossil assemblage anywhere in the world. The challenge for Stonehammer Global Geopark is how to bring this incredible discovery of small, difficult to interpret fossils, to the public. Using this project, and other examples, we provide our experience and strategy for sharing this and other research with a public audience.

MOBILE GUIDING SERVICES IN PROMOTION OF SUSTAINABLE GEOTOURISM

R. Tervo*

[1] Metsähallitus, Parks & Wildlife Finland, Inari, Finland
* Riina Tervo (riina.tervo@metsa.fi)

Keywords*: mobile services, geodiversity, national parks, sustainable geotourism*

An easy way to bring along information, stories and videos on a trip to the wilderness! MobiRanger is a mobile guide presenting the geological sites of Pyhä-Luosto National Park. The easy-to-use, free app guides you to the destinations with information in text, audio and video format. It also shows your location on a map, keeps you on the right trail and guides you to huts and rest stops. The MobiRanger app works in mobile phones and tablets with GPS. It is usable on-line or you can download the data on your device for offline use. On the basis of the most popular starting points, national park is divided into several map sheets to make the data easier to download and browse. You can also browse the contents in advance when planning your excursion, or afterwards at home to bring back the memories.

Previous text is the short description of application called MobiRanger, available for free in application stores of Android, Windows and iOS –devices. Summer 2015 is the first season for this brand new pilot-type mobile guiding service. During the summer and autumn seasons customer feedback will be collected in order to analyze how the contents, the technical solution and the service as a whole fills the needs of national park's visitors and how the mobile service could be developed further.

The service promotes geological sights, as the geodiversity was one of the main reasons for establishing the Pyhä-Luosto national park. The geological sights are situated along the summer hiking trails and the existing infrastructure in the park like campsites and wooden walkways as well as information boards support strongly the visits guided by mobile application. Most of the visitors of national parks do carry mobile devices with gps-function with them. Pyhä-Luosto national park is a popular destination among families. With this new service Metsähallitus would like to attract for example more youngsters to learn in nature by using the mobile device they are most familiar with anyhow.

This mobile service was made in ABCGheritage – Arctic Biological, Cultural and Geological heritage –project, which was funded by EU's Kolarctic Enpi –programme. The project had altogether 10 partners from Norway, Russia and Finland. The project aimed at increasing knowledge about nature protection areas along Green Belt of Fennoscandia and enhancing sustainable usage of NPAs. The target groups were pupils and teachers, visitors, staff in environmental education and tourism, and local people. In the field of geological heritage, Finnish and Russian geologists cooperated intensively. For example cross-border booklet called Barents tour for Geotourists was made to highlight geological easy-access sites close to roads in all the three countries.

PALEOART AND GEOPARKS PROMOTION - THE JOURNEY OF MAGYAROSAURUS DACUS FROM CANADA TO ROMANIA

Alexandru ANDRÃŞANU[1*], Antoneta SEGHEDI[2], Brian COLEY[3] & Anna KNAUER[4]

[1]University of Bucharest, Romania; [2] The National Institute of Research and Development for Marine Geology and Ecology – GeoEcoMar, Romania; [3]Paleoartist, Calgary, Canada; [4]Bakony Balaton Geopark, Hungary

* Alexandru Andrãşanu (alexandruandrasanu@gmail.com)

Keywords: *geopark, paleo-art, dinosaurs*

Haţeg Country Dinosaurs Geopark is working towards a museum dedicated to the Dinosaurs of Transylvania, as a unique opportunity to draw the attention of the public to the importance of scientific research, art and the role Geoparks can play in sustaining both.

An international partnership of universities, research institutes, geoparks, the great enthusiasm and fine art of two Canadian paleoartists and the financial support of 127 backers were the first steps for a big transcontinental adventure. A full-size scientific accurate replica of *Magyarosaurus dacus* travelled in June and July 2014 from Canada across Europe and Romania to reach its "home" in Haţeg Geopark. The seven meter long sauropod started its cross-continental excursion in Antwerp then received an enthusiastic response from Parisians and a strong support from Patrick J Mc Keever at the UNESCO, then started to visit other two of the 64 Global Geoparks in Europe. Arriving from France the dinosaur made a short stop at the World Heritage Site Messel Pit in the German Bergstrasse-Odenwald Geopark. A few days later it entered the Hungarian Bakony–Balaton Geopark where it was introduced to the public in Balatonfüred, The replica also stayed for one day at the Eastern Gate of the Geopark, the Lavender House Visitor Centre in Tihany where visitors could participate in a dino-workshop. The dinosaur continued its journey via Budapest where it was photographed in front of the beautiful Art Nouveau-style building of the Hungarian Geological and Geophysical Institution.

Entering Romania *Magyarosaurus* has a warm welcome by media and fans and was invited by Asociatia OviduRo to visit a childhood education centre in Budila. Children than never been to a museum and many of them didn't even know what a dinosaur was started to touch the dinosaur in seeming disbelief, some hugged the legs then jumped up and down in happiness. The trip continued to an aspiring geopark area, Buzau Land Geopark then reached Danube Delta and Black Sea coast to take a refreshing dip and visit research facilities of GeoEcoMar, one of the main sponsor and project partner. Short stops in Bucharest in front of the National Geology Museum and University of Bucharest allowed press and people to find out more about the trip and geopark projects.

On July 23rd hundreds of children, tourists and media offered a very warm welcome to *Magyarosaurus dacus* in Haţeg Geopark and instantly accepted it as symbol of the future Transylvanian Dinosaur Museum. The journey of the *Magyarosaurus dacus* will be the subject of a documentary film made by a Canadian tv crew. Apart of its scientific, cultural and educational impact the project was an excellent example of the power of European Geoparks Network and was a great opportunity to draw the attention of the public to the world of Geoparks.

TIANZHUSHAN GLOBAL GEOPARK: NEW IDEAS FOR INTERPRETING GEOHERITAGE

Kejian Xu[1], Carlos Neto de Carvalho[2], Zhongdong Li[3], Zhijiu Cui[4] & Guosheng Yu[5]

[1]School of Humanities and Economic Management, China University of Geosciences, Beijing, 100083, China < kejian77@foxmail.com>
[2]Geopark Naturtejo da Meseta Meridional, Municipality of Idanha-a-Nova, Portugal <carlos.praedichnia@gmail.com>
[3]Sichuan Bureau of Geological Exploration and Mineral Resources Exploration, Chengdu, China <25175121@qq.com>
[4]College of Environmental Sciences, Peking University, Beijing 100871, China <czj@urban.pku.edu.cn>
[5]Tianzhushan Geopark Administrative Committee, Qianshan, China <tzsgeopark@126.com>

The interpretation of geoheritage is considered the art of explaining the meaning and significance of geosites to the visitors. Well-done interpretation of geoparks can improve the quality image of the geopark and enhance the visitor experience. It may also strengthen the relationship between the geosite and those who live around it. Therefore, providing effective means for geoscience education and broader environmental issues to the public is a must for a geopark to be qualified under UNESCO's network. Currently, the problems that arise around Chinese geoparks are mainly from miscommunication or inefficient interpretation, and Tianzhushan Global Geopark was no exception. This paper demonstrates the results of an international project coordinated by the China University of Geosciences in Beijing that has been developed by Tianzhushan Global Geopark. The aim of the project was to refresh the interpretation of the remarkable geoheritage of Tianzhushan, from the Palaeocene fossil sites, the amazing granite landform scenic areas, to the didactical UHP metamorphic routes. The team had multidisciplinary members, such as geologists, geomorphologists, designers, illustrators, Chinese and English editors, using new ideas, in keeping with the saying, "Think like a wise man, but communicate in the language of the people". New methods including QR codes with links to information about geosites and cultural heritage, mascots to tell geological stories, cartoons of geosites and illustration to show how geosites form were used. The effectiveness is monitored by feedback from visitors through the post-travel surveys or activities. It shows that Tianzhushan Geopark is an example for geoparks to provide a better interpretation of geoheritage with a new perspective.

Management and user conflicts

ROKUA ESKER AQUIFER: A DIVERSE HYDROGEOLOGICAL STUDY SITE FOR BETTER GROUNDWATER MANAGEMENT

P.M. Rossi[1]*, P. Ala-aho[1], E. Isokangas[1], R. Eskelinen[1] & B. Kløve[1]

[1] Water Resources and Environmental Engineering Research Group, University of Oulu, Finland
* Pekka Rossi (pekka.rossi@oulu.fi)

Keywords: *hydrogeology, groundwater, management, groundwater dependent ecosystems, Rokua esker*

Rokua, part of the Geopark network and under Natura 2000 protection, is an important hydrogeological study site. It represents esker areas, which are the most common groundwater resource type within Northern Europe. Rokua esker is a diverse hydrological system where lakes intertwine with pine-lichen forest on dry sandy soils. This mosaic formed by the last glaciation melt is surrounded by postglacial fens and has been under intense hydrogeological, geophysical and sociological studies. The goal of these studies has been to understand better the groundwater-surface water interaction mechanisms and to improve the management of groundwater and the ecosystems dependent on groundwater.

The interdependence between groundwater, lakes and fens at Rokua has been studied by applying a wide variation of different methods. Environmental tracers (e.g. stable water isotopes and silica) combined with numerical modelling and aerial thermal imaging have revealed the quantity of groundwater flowing into a particular lake and also the points from which groundwater seeps into the lake in the shoreline. Stable water isotopes from 67 lakes on the Rokua esker were used to calculate the groundwater inflow rates of the lakes based on an isotope mass balance method. Furthermore, a new measure of groundwater dependence was developed for lakes (G index). The sandy soil of the Rokua esker withholds phosphorus which gradually dissolves to the groundwater. Older groundwater traveling through long flow paths has therefore relatively high amounts of phosphorus. Based on modeling and tracer analysis the length of groundwater flow paths and the amount of this groundwater lake gains, explains the variability of lake types in Rokua. Lakes vary from clear watered to highly eutrophic within less than a half a kilometer distance between them. The naturally eutrophic lakes receive older groundwater and the clear watered lakes receive newer groundwater with less phosphorus.

Groundwater from Rokua esker aquifer discharges to the surrounding fens. The fen areas are used by forestry and operations such as logging and ditching, have their own impact on groundwater. Drainage ditches needed to improve forest growth have changed the groundwater discharge patterns in fens. A risk assessment method for detecting areas where drainage might influence groundwater discharge was developed. Logging on the other hand can influence groundwater recharge on top of the sandy esker: areas with nature conservation plans have an older and therefore larger tree stand which results as less recharge compared to clear cut areas. However the status of Rokua groundwater is more dependent on climate conditions than land-use practices. The forestry and protection of the esker area for its natural values and tourism have had conflicting interests. The conflict especially rose as forestry was first suspected for reducing groundwater quantity. Multicriteria decision making process was used to discuss the conflict and find a way for agreeable future management. The multidisciplinary approach in Rokua has resulted in successful research outcome that has benefited the locals as this groundwater-surface water system is better understood but also scientific community as new ideas and knowledge on groundwater management have been developed.

THE STRATEGY OF MANAGEMENT OF CILENTO AND VALLO DI DIANO GEOPARK

A. Aloia[1]*, D. Calcaterra[2], A. De Vita[1] & D. Guida[3]

[1] National Park of Cilento, Vallo Diano and Alburni Geopark, Italy; [2] Department of Earth Sciences, Environment and Resources, Federico II University of Napoli, Italy; [3] Department of Civil Engineering, University of Salerno, Italy
* Aniello Aloia (a.aloia@cilentoediano.it)

Keywords: *Ecological network, caves, geoconservation*

Since its designation, the Cilento, Vallo di Diano and Alburni (hereafter, CVDA) Geopark payed due attention to integrate assessing, planning, programming and managing both natural and cultural landscape, considering its previous UNESCO designation as Biosphere Reserves (Man and Biosphere - MAB – Program) and successive inclusion in the Cultural Heritage of the UNESCO. As MAB Reserve, CVDA Park programmed initiatives on the Ecological Network and experienced the first Environmental Survey and Biodiversity Observatory among the Italian National Parks. Successively, the CVDA Geopark has addressed the geo-scientific knowledge to the multi-level educational system using as a "tool" the Italian Geopark Week and, as "locations", the Educational Local Center Network. So, in May 2011, CVDA Geopark organized, in collaboration with MIDA Foundation and Chamber of Professional Geologists of Campania Region, the official public presentation of the Geopark at the Focal Geosites of Angel Cave (Pertosa-Auletta towns), and the Morigerati WWF Oasis, involving researchers experts in Cilento geology, undergraduate students in geology from Salerno University and professional geologists from Campania and Lucania regions. During this event participants visited the Angel Caves with geomorphologists, speleologists and expert guides and the MIDA Museum System dedicated to site promotion (i.e. a gastronomic uniqueness: *the Pertosa white artichoke*), geo-tourism fruition (i.e. rafting) and environmental education (Spelaeologica Museum). In May 2012, the CVDA Geopark organized the second educational geo-event, also in collaboration with Castelcivita Cave Management, Chamber of Professional Geologists of Campania Region and Campania Regional government; it was a seminar on the new geological mapping of the Cilento (CARG Project) in the fascinating underground landscape of Castelcivita caves. Students in geology from university courses enjoyed new geological knowledge on karst cave system in the perspective of their future involvement as professional or scientific operators and stakeholders. During this event the participants also enjoy the same interesting and fascinating underground world of the Castelcivita Caves with hydrologists, speleologists and palaeo-ethnology experts. In May 2013, the CVDA Geopark organized the third educational geo-event, called *Bussento Karst System Week-End Field Trip*, also in collaboration with the municipalities of Caselle in Pittari, Morigerati, Casaletto Spartano and Tortorella, as the experimental program "Geopark-supporting Outside Educational System", involving students from the Department of Civil Engineering and Environmental Sciences of Salerno University and using the Bussento Educational Local Center Network: the MU.VI (Karst-Lab and Virtual Museum) and Bussento sinkhole path system in Caselle in Pittari, the "*Capillus Veneris*" Bio-Geo Laboratory in Casaletto Spartano, Otter WWF Oasis and Bussento Resurgence in Morigerati and Bussentino Little Canyon near Tortorella village. The participants embraced in a few hours the main geopark "*experiment*" at basin scale, taking geo-conservation, geo-research, geo-promotion, geo-education and geo-dissemination into account, as an occasion for a durable and sustainable local development.

The proposal of the scientific Geopark management is to change the cultural approach of the scientific community to improve conditions for a transition from disciplinary to trans-disciplinary researches, from single real domain to system-based modeling, from one-way "hard" factual knowledge to "soft" participatory processes.

Regional and global Geoparks networks and collaboration

COOPERATION OF GLOBAL GEOPARKS, WHS AND LOCAL COMMUNITIES: THE INTERCULTURAL PEONY PROJECT - A FLOWER AS A NATURAL AND CULTURAL BRIDGE BETWEEN CONTINENTS

J. Weber[1*], Zhu Dong E[2] & G. Dewald[3]

[1] Global Geopark Bergstrasse-Odenwald, Lorsch, Germany, [2] Global Geopark Mt. Lushan, China, [3] City of Lorsch, Germany
* Jutta Weber (j.weber@geo-naturpark.de)

Keywords: *intercultural project, peony, art exhibition, cultural bridge*

Peony – the flower, which grows nowadays mainly in botanical and private gardens – has a fascinating place in the cultural and medicinal history of China and Germany.

In both countries the peony was used in herbal medicine. The 8th century "Lorsch Pharmacopeia" (included in UNESCO's Memory of the World Register), the oldest collection of classical remedies used in the early Middle Ages in Europe, refers to the medicinal use of the peony. The Benedictine Monks of Lorsch Abbey, now a WHS, introduced this plant from southern Europe, therefore the peonies are named as "Benedictine rose". The City of Lorsch celebrates this connection by creating an international peony garden and by naming a new variety, *Paeonia lactiflora laureshamensis* after the Lorsch Abbey.
In China, the peony, which is still used as important ingredient in herbal medicine, has inspired artists and poets for more than 3000 years. Known as the "emperor of flower" the peony is a symbol for prosperity and nobility.
Based on this shared background, the Global Geopark Bergstrasse-Odenwald and the City of Lorsch have developed an intercultural project in partnership with Global Geopark Mt. Lushan (China) and the WHS Lorsch Abbey (Germany). The project consists of four phases: 1 peony arts exhibition; 2 peony garden in Mt. Lushan according to the Lorsch peony garden; 3 exchange of experience, plants and research; 4 development of thematic touristic travel packages following traditions in both countries.
As first phase, the peony arts exhibition took place from June to August 2014 in the city of Lorsch. During the months before, the Global Geopark Mt. Lushan organized a competition and collected 70 art works, created by 33 contemporary artists. They include poetry, calligraphy, ink drawings and paintings targeting the importance of the peony in China during the centuries. The art pieces have been conducted in Germany to an exhibition, which was opened during the Geopark and WHS Day on the 1st of June. The ceremony was attended by representatives from the Federal Government of Hessen, the Global Geopark Mt. Lushan and the Chinese Council for Culture. During the three month long exhibition, the visitors have been provided with unforgettable insights into traditional and contemporary Chinese arts as well as the peony's role as a bridge between continents.
The project is continued in 2015 with the implementation of a peony garden in the Global Geopark Mt. Lushan. The partners are currently working on the planting concept, which includes the donation of 70 peony plants from the German partners - equivalent to the 70 art pieces presented in the exhibition including - of course - *Paeonia lactiflora laureshamensis*

DESIGNING A SHARED WEB MAP OF THE RAPIDLY EXPANDING LIST OF GLOBAL & EUROPEAN GEOPARKS NETWORKS MEMBERS, USING WEB GIS TECHNOLOGIES

S. Staridas[1*] & Ch. Fassoulas[2]

[1] STARIDAS GEOGRAPHY, Heraklion, Crete, Greece
[2] PSILORITIS NATURAL PARK – History Museum of Crete, Heraklion, Crete, Greece
* Spiros Staridas, (info@staridasgeography.gr)

Keywords: *Web Gis, Web Map, Geoparks, Global, European, Network, Embed, Code*

Currently the Global Geoparks Network has 111 members, 64 are also members of the European Geoparks Network. All these geoparks are listed in the official websites of both networks with links to each geopark's website and a brief description of each geopark. Both websites contain very small scale fixed image maps, where the geographical locations of the members are illustrated as points. When visiting each individual geopark member's website one will discover that the vast majority do not provide an easily accessible and usable map showing their location or, as in most cases, no map is provided. The drawback of this present situation is that one cannot have a clear perception of each geopark's location or of the overall distribution of these areas on the World Map.

In order to address this important issue, Psiloritis Natural Park initiated the design of a powerful, interactive web map, which depicts the complete list of the Global and European Geoparks Networks, on one single and easily accessible web map application. This web map features all 111 geopark members as points on the map, with distinct symbols, labels with each geopark's name, pop-up window for every record which links to each geopark's official website or to the corresponding pages for the websites of both networks, the capability for printing a selected area of the map, dynamic zoom in-and-out and a geolocation option to find each user's current position. When zooming to large scales the web map changes automatically and the symbols for the geoparks change from points to polygons, thus the exact boundaries of each geopark are used to define their area on the map (at the moment this feature functions only for the four geoparks in Greece).

The web map is completely free to be used by any geopark member or any other associated body, without any subscription or membership fee. The code for embedding the web map as an iframe, on any website, is generated by clicking on the share dialog at the top-right-hand- side of the application, enabling geoparks and associated bodies to copy the code and paste it on their webpages. Alternatively an additional embedding code for a simpler version of the web map is provided on the "Details" panel at the top-left-hand- side of the application. There is also an option for sharing the web map via social networks like Facebook or Twitter or to send it by email.

The web map can be found at http://www.staridasgeography.com/worldgeoparks/ and it is offered to all Global and European Geoparks as a solution to compensate for the absence of location maps for their territories.

"EXCHANGING MEMORIES": A NETWORKING INITIATIVE ENGAGING THE GLOBAL GEOPARKS

João Carlos Nunes[1,2*], Eva A. Lima[1,2], Marisa Machado[1] & Manuel Paulino Costa[1]

[1]Azores Global Geopark, Associação Geoparque Açores, Rua do Pasteleiro s/n, Angústias, 9900-069 Horta, Azores, PORTUGAL. evalima@azoresgeopark.com; marisamachado@azoresgeopark.com; manuel.ps.costa@azores.gov.pt
[2]Geosciences Departmen, Azores University, Rua Mãe de Deus, P.O. Box 1422, 9501-801 Ponta Delgada, Azores, PORTUGAL
* João Carlos Nunes (jcnunes@uac.pt)

Keywords: *Azores Geopark, GEA-Mother Earth, rock, local product, networking*

In the Azores Global Geopark master plan for the period 2013-2016 it is established to reinforce networking among all the territories of the European Geoparks Network (EGN) and to promote each and all of the geoparks of the World.

At the same time, the Global Geoparks Network (GGN) presents itself as a dynamic network (GGN, 2014), where members are committed to work together, to develop and promote joint activities, to exchange ideas of best practice, and join in common projects to promote the territories and raise the quality standards of all products and practices.

With those two insights as base-lines, the Azores Global Geopark promotes the initiative "Exchanging Memories" through which we share: i) the "Memory of Our GEA - Mother Earth" and, ii) the "Memory of Our People". These "memoirs" are included in a custom-made box, in the first case, as an Azorean volcanic rock (offered by a legal quarry, excavation or waste site), and the second one as an Azorean local product or handicraft (offered by a local entrepreneur or artisan).

Through this initiative we encourage all global geoparks to share a small part of their own tangible and intangible characteristics, promoting their territory, people and local products. With this networking activity it is also expected to contribute to the implementation and increase visibility of the "geoparks corner" and, thus strengthening the links between the geological heritage and all other aspects of the geopark's natural, cultural and intangible heritages.

NINE ISLANDS, ONE GEOPARK: A CHALLENGE AND AN OPPORTUNITY – THE EDUCATIONAL AND AWARENESS STRATEGY ON AN ARCHIPELAGIC GEOPARK

Carla Goulart Silva[1,2 *], Paulo Garcia[1], Salomé Meneses[1], Eva A. Lima[1,3], João Carlos Nunes[1,3] & Manuel Paulino Costa[1]

[1] Azores Global Geopark, Associação Geoparque Açores, Horta, Azores, PORTUGAL
[2] Services for Conservation of Nature and Environmental Awareness, Regional Directorate of Environment, Lajes do Pico, Azores, PORTUGAL
[3] Geosciences Department, Azores University, Ponta Delgada, Azores, PORTUGAL
*Carla Goulart Silva (carla.sg.silva@azores.gov.pt)

Keywords: *Azores Geopark; archipelagic networking; environmental education; formal and non-formal education*

The geological and anthropological uniqueness of the archipelago of the Azores allowed to be created the first truly archipelagic geopark in the world: the Azores Geopark - Nine Islands, One Geopark. As in other geoparks, the action plan is supported by three main pillars – geoconservation, environmental education and sustainable regional development.

Being an ultra-peripheral archipelagic region, a territory with a non-continuous nature and with a wide dispersion of population among the islands, this may cause limitations in the application of uniform politics of sustainable development and the implementation of educational and awareness tools that would be effective in the entire territory. The Azores Geopark surpasses this problem and reaches the resident population and visitors through the synergy of different players, by building partnerships and bringing together regional and local stakeholders dispersed through the archipelago, allowing an adapted and effective strategy. This strategy reflects a diversification in actions, organizations and subjects, as well as the optimization of human and financial resources used in environmental education and distributed along the 9 islands.

The key actors for the Geopark's strategy for environmental education are: the Regional Network of "Ecotecas" of the Azores, one in each of the nine Island Natural Parks; the Environmental Interpretation Centres; the Regional Network of Science Centres, the Regional Network of Museums and several other institutions that also promote natural and cultural heritages among the local population and the tourists.

The educational and awareness tools used by all the players that work alongside the Azores Geopark staff for promoting not only the natural heritage, but also its close connection to the cultural heritage, are differentiated according to different target groups and different practices, covering all the three forms of Environmental Education: formal, non-formal and informal education/learning.

The numerous and important actions are only possible due to the synergetic approach to involve general population (from senior citizens to children), visitors and the local and regional organizations, all working for a collective goal.

This gives a meaning to our motto "Nine islands, one Geopark"!

PARTNERSHIP BETWEEN NATIONAL FORA OF GEOPARKS: REINFORCING THE GLOBAL GEOPARKS NETWORK

E. Silva[1]*, S. Marcos[2] & A. A. Sá[3]

[1]Portuguese National Commission for UNESCO, Portuguese National Forum of Geoparks, Ministry of Foreign Affairs, Lisbon, Portugal; [2]Terras de Cavaleiros Global Geopark, Macedo de Cavaleiros, Portugal; [3]Department of Geology and Geosciences Center, University of Trás-os-Montes e Alto Douro, Vila Real, Portugal.
* Elizabeth Silva (elizabeth.silva@mne.pt)

Keywords: *Partnerships, Networking, National Fora of Geoparks; Global Geoparks of UNESCO*

The new Programme "Global Geoparks of UNESCO" includes a wide range of challenges and procedures involving national bodies and structures. In order to address these issues within the framework of the National Fora of Geoparks (NFG), the Coordination of the Portuguese National Forum of Geoparks, in partnership with the Portuguese NatCom for UNESCO and the Portuguese National Committee for IGCP, organised the first technical meeting of the NFG. This event took place in the Global Geopark Terras de Cavaleiros (Portugal) from 31st of January to 1st of February 2015. National Fora representatives from Brazil, Canada, Germany, Ireland (also representing the United Kingdom), Norway, Portugal and Slovenia also participated. UNESCO was also represented and the Portuguese Global Geoparks attended as observers. This meeting allowed: *i*) discussion of the level of development of the purposed Programme "Global Geoparks of UNESCO" and a debate about the NFG role in this new Programme; *ii*) to share knowledge about the internal functioning of the National Fora and best practices and to discuss possible joint activities; and *iii*) to discuss thoroughly the guidelines and the statutes of the Programme prepared by the Working Group of UNESCO, giving particular attention to the NFG role in this process, especially regarding new applications and revalidations of Geoparks. Also important in this discussion was the significance of economic studies concerning the impacts achieved by Geoparks. Participants also recognized the benefits of UNESCO membership and stressed the relevance of this type of studies between all members of the Global Geoparks Network, in order to have better indicators reflecting the sustainable regional development achieved in these territories. The organization of joint proposals and activities, such as a joint TV documentary, a "Fair" of the National Fora of Geoparks during the General Conference of UNESCO (Paris, November 2015), in the framework of the 70th anniversary of UNESCO, and a common school photo contest (online) will help to establish a partnership between NFG members. It was recommended that this type of meetings should be included in parallel sessions during future Geoparks conferences, to provide an opportunity for all the existing National Fora, to meet, share experiences and activities and to discuss pertinent issues related to their roles within the framework of the proposed Programme "Global Geoparks of UNESCO".

SYNERGIES BETWEEN GEOPARKS AND OTHER INTERNATIONAL RECOGNITIONS THROUGH A CASE STUDY

Pablo Rivas Palomo

Member of the Global Geopark Association, Cartagena, Spain.
(privaspalomo@gmail.com)

Keywords: *Geoparks, UNESCO, multiple designations, synergies, Reserve of the Biosphere*

Since the creation of the European and Global Geoparks Network (2001 and 2004, respectively), Geoparks have coexisted with other international and UNESCO recognitions with an ample range of overlapping. Some examples of these recognitions are Natura2000 Network in Europe, World Heritage and Reserve of the Biospheres (UNESCO), Ramsar or European Charter for Sustainable Tourism, among others.

The forthcoming 38th UNESCO's General Conference will decide about the creation of the International Geoscience and Geoparks Programme (IGGP) including the new designation "UNESCO Global Geopark". This represents a major step forward for the Geopark initiative, which since its creation in 2001 have maintained a strong relationship with the Division of Earth Sciences of UNESCO; the subsequent declaration of Madonie (2005) officially recognized the European Geoparks Network as the European branch within the Global Geoparks Network and as a reference for the creation for future development of Geopark's networks in other continents. Although not yet an official initiative within UNESCO, the Global Geoparks Network is being considered under the auspices of UNESCO and under that umbrella has developed a fruitful relationship with UNESCO and developed a successful array of activities.

The foreseeable official recognition of Geoparks by UNESCO will place these territories in an already open debate about the management of protected areas with multiple designations by UNESCO (2012 IUCN World Congress), and it is worth considering the opportunities that may arise in this new context and the particularities and differences of Geoparks regarding this matter.

The approach and strong bottom-up structure of Geoparks allows a great flexibility and adaptability to the reality of each territory. One of the consequences of such adaptability is that the Experience in territories with a Geopark coexisting with other designations shows the creation of synergies and benefits for the territory and even for the development of these recognitions (experiences from French Forum of Geoparks and Spanish Committee of Geoparks). But the creation of the International Geoscience and Geoparks Programme (IGGP) brings the need to clarify how Geoparks are already working on such matters and we can use as a guide the example of one of the most representatives Geoparks coexisting with multiple designations: Cabo de Gata-Níjar Geopark in Spain.

Cabo de Gata-Níjar Geopark is at its core a Natural Park (declared in 1987 by the Andalusian Government) and also Reserve of the Biosphere, RAMSAR, Natura2000 Network, Special Protected Area (SPA), Specially Protected Areas of Mediterranean Importance (SPAMI) and Global Geopark; and more importantly the management is directly carried out or coordinated under the same management structure, the Natural Park office.

This case shows one example capable of integrating various awards ranging from national to international and thus providing valuable experience for future studies.

Responsible use of Geoparks and similar areas

WHO IS RESPONSIBLE? LOCAL PARTNERSHIP IN ACTION

Zena Hoctor

Burren & Cliffs of Moher Geopark, Clare County Council, Ennistymon, County Clare, Ireland
zenahoctor@burren.ie

Keywords: *Community, Partnership, Management, Responsibility*

Partnership is key to the management of heritage sites in the Burren & Cliffs of Moher Geopark in County Clare, Ireland. We strive for equal participation between community members and statutory agencies in the planning, development and monitoring of our natural and cultural heritage.

The Burren is a world renowned landscape and as a result, a busy tourism destination. In October 2014 the visitor centre at the Cliffs of Moher welcomed its one millionth customer of the year. An estimated 210,000 visited our iconic megalithic tomb at Poulnabrone in 2014 and 20% of our visitors walk through the landscape exploring the flora, fauna and geology of the region. This volume of tourists has an impact on the fragile landscape that is the Burren. To conserve our landscape and maintain its integrity for future generations, we aim to monitor and manage this impact while encouraging the local tourism economy.

In order to achieve our goal, we are currently developing a best practise model for conservation management under a LIFE+ project. Nine heritage sites have been selected within the region. They include sites of natural, built and cultural importance. Each site has been assessed in terms of its intrinsic interest, how the visitor accesses and uses the site (physically and mentally) and site sensitivities to recreational impact. From these assessments monitoring programmes and management plans are being developed in partnership with our heritage agencies and local community.

The Burren & Cliffs of Moher Geopark's tag line is '*People, Place, Learning, Livelihood'*. Central to this focus is the local community, local economy and local landscape. We perceive the people who live and work in the Burren as the custodians of the landscape and as such they must play a vital part of its present and future management.

Through practical conservation projects, local businesses, landowners, schools and state agencies are actively involved in the development of our conservation management model. They are taking responsibility. This talk will explore how they are being enabled to manage this process; developing plans; undertaking conservation works and planning future monitoring and management strategies.

Science and future research needs

CANYONS AND GORGES AS POTENTIAL GEOTOURISM DESTINATIONS IN SERBIA: COMPARATIVE ANALYSIS FROM TWO PERSPECTIVES – GENERAL GEOTOURISTS' AND PURE GEOTOURISTS'

S. Božić[1*], N. Tomić[1] & T. Višnić[1]

[1] Department of Geography, Tourism and Hotel Management, Faculty of Sciences, University of Novi Sad, Trg Dositeja Obradovića 3, 21000 Novi Sad, Serbia
* Sanja Božić (sanja.bozic.89@gmail.com)

Keywords: *geotourism, market segments, geosites, canyons, M-GAM (Modified Geosite Assessment Model), Serbia*

Serbia represents one of those countries which have not yet differentiated themselves on the world tourism map. However, it has an immense but still unrevealed potential for geotourism development. In this paper we analyzed several remarkable canyons and gorges of great scientific importance and geotourism potential. These sites include the Djerdap Gorge and Lazar River Canyon, located in Eastern Serbia and the Ovčar-Kablar Gorge and Uvac Canyon located in Western Serbia.

One of the main goals of this paper was to analyze and compare the current state and tourism potential of these geosites by using the M-GAM model for geosite assessment. However, the principal aim of the paper is to analyze how important is each subindicator in the assessment process for different market segments. This is based on the fact that not all criteria in the assessment can be equally important for different market segments. In order to ascertain the attractiveness of the geotourism product to different markets, we introduced the evaluation of importance of each subindicator in the M-GAM model by two major market segments that visit geosites in Serbia – general geotourists and pure geotourists. The major distinction between these two segments is in their main motivation for visit of geosites as well as the existence or absence of previous knowledge about geology and geomorphology.

In this paper, we also analyzed how giving different importance to subindicators can influence the position of the geosites in the M-GAM matrix indicating different assessment done by two chosen market segments. The research showed that general geotourists appreciate considerably different values when assessing a geosite in comparison to pure geotourists. Furthermore, the management of each geosite should focus on a specific market segment shaping and directing the development of the site towards the specific needs and preferences of tourism segments. Thus, this research indicates what is important for different segments when visiting a geosite so it can be used as framework for tourism planning. Having said this, the management of each geosite should develop a tourism strategy depending on whether it pretends to become a destination of massive tourism or it wants to attract smaller specific tourism segments such as pure geotourists and thus base the tourism development of a geosite according to their needs and preferences.

HOW TO TELL THE HISTORY ABOUT THE STRANGEST VOLCANO EVER – WHEN THE VOLCANO IS NOT THERE ANYMORE?

K. Rangnes[1]

[1]Gea Norvegica Global Geopark, Porsgrunn, Norway

Keywords*: communication, carbonatite volcano, Fen volcanic complex,*

The idea of volcanoes producing carbonate rich lavas was published in 1921, by the Norwegian geologist Waldemar Christopher Brøgger. The publication caused a huge international scientific debate and most geologists argued that magmatic limestones would not be possible in nature. The area Brøgger investigated and where he discovered some peculiar rocks, is today within the borders of Gea Norvegica Geopark (Norway) in Nome municipality. For geologists all over the world the area is known as "The Fen volcanic complex". Brøgger discovered and described a whole suite of new rocks, magmatic carbonate rich rocks, and named them after local farms and places. Some of the rock names and even the geological process fenitization, are official names today.

The theory of formation of such rocks, the carbonatites, was not proven until early 1960ties, when the African volcano Ol Doinyo Lengai erupted. The result of the eruptions was indeed a carbonate rich volcanic rock – soevite, named after the Norwegian farm Søve, described first from Fen by Brøgger.

The geology at Fen is very complex with a variety of deep magmatic rocks. After 580 million years of erosion, the volcano itself has disappeared and what is left is a deep transect of the main vent. Although the geology is quite difficult, the results of the volcanism have had a great impact on the local society. The volcanic activity created limestones suitable for fine building material since medieval times, iron ores brought wealth and work, and today prospecting for thorium and rare earth elements create big interest.

The once so great Fen volcano is not eye catching for the visitors anymore. So how can a geopark turn a unique locality with high scientific value into an attractive place to visit for everybody? It is about creating the good stories. The stories about the rich soil and vegetation, about the medieval churches with ornamentation made of soevite, about the iron works, mines, wealth, wars, poor workers and rich landowners. And of course about the strange volcano itself and the unique rocks resulting from processes deep down in the Earth's crust.

NEW FOSSIL FINDINGS IN THE PETRIFIED FOREST OF LESVOS ALONG THE NEW KALLONI - SIGRI ROAD. "THE FOREST UNDER THE ROAD" A NEW TRAVELLING EXHIBITION OF THE LESVOS GEOPARK

N. Zouros[1], I. Valiakos, G. Gribilakos, A. Plougarlis, K. Mpentana, V. Rozakis, M. Agiasoti, O. Tsalkitzi

[1]University of the Aegean, Department of Geography, Mytilene, Hellas;
Natural History Museum of the Lesvos Petrified Forest, Sivri, Lesvos, Hellas
nzour@aegean.gr; lesvospf@otenet.gr

Keywords: *Fossil findings, new road, Petrified Forest, Lesvos, travelling exhibition*

The construction of the Kalloni-Sigri Highway on Lesvos island, Greece involves the upgrading of the existing Kalloni-Sigri road which is 48.5 km in length. This new road will eliminate the geographical isolation of western Lesvos by improving connections between the settlements of western Lesvos and central and eastern Lesvos with a modern highway, providing good access to the visitors of the Lesvos Geopark. This project is funded as part of the Operational Programme "Improvement of Accessibility" NSRF 2007 - 2013.

The Kalloni - Sigri highway runs through the protected area of the Petrified Forest.

A research and fossil excavation sub-project related with the main one is implemented by the Natural History Museum Lesvos Petrifi ed Forest in the Memorandum of Understanding signed between the Museum and the Ministry of Infrastructure, Transport and Networks.

The Museum's research and excavation work began in the area of the village of Sigri, the center of the protected Petrified Forest, in October 2012 and continued intensively until December 2014.

Work was carried out according to the approved study "Fossil Research" and included the following stages:

• conducting field research
• monitoring the excavation works
• conducting rescue excavations in the case of fossil discoveries
• preserving and enhancing fossils remaining in original locations
• transporting and installing movable fossils in a safe place
• cleaning, preserving, drawing, mapping, recording, photographing, digitalization, identification and study of the movable fossils
• cleaning, preserving and protection of fossils to remain in place along the alignment and the drawing, mapping , recording, photographing, digitalization, identification and study of fossils.

The route of the new road runs through important fossiliferous sites, as indicated by the number of fossils visible on the surface, some of which are mentioned in the study for the road projects. During the excavations, a much greater number of fossils were revealed all along the alignment. Specifically, dozens of fossilized tree trunks were discovered, standing or decumbent and in an excellent state of preservation. Horizons of leaves, branches and tree root systems were also identified.

Large fossil concentrations have been observed in identified pyroclastic flow channels. Here the petrified trunks lie scattered, overlapping one another. The orientation of the petrified trunks coincides with the direction of the pyroclastic flow movement. Fossils found in the path of the roadway are transported carefully to the Museum after cleaning and the necessary protective measures.

In other places there are clusters of standing petrified trunks. Efforts have been made to preserve these fossils in their natural positions.

There is no doubt that this rescue excavation of fossils is the largest of its kind so far in Greece, both in area and in terms of the number of findings. Accordingly, this is an area of particularly high scientific and technical value and of paramount importance for the study of plant fossils.

Findings of the excavations and the conservation of fossil sites which will be preserved along the road are presented in the travelling exhibition "The forest below the road" which is produced by the Museum.

PARTICIPATORY SCIENCE & PALEONTOLOGY : AN EXEMPLE IN QUERCYNOIS PALEOKARST (S.W. FRANCE)

T. Pélissié[1]*, A. Kühnel[1]

[1] Parc naturel régional des Causses du Quercy, 46240 Labastide-Murat, France
*Thierry Pelissie (thierry.pelissie@wanadoo.fr)

Keywords: *paleokarst, paleontology, Quercy, participatory science, Oligocene*

The "Causses du Quercy" – a group of Jurassic limestone plateaus in S.W. Massif-Central (France) subjected to erosion since the Late Cretaceous – have a unique paleokarstic heritage. There are a wide range of fillings (i.e. sandy, clayey, ferruginous, etc.), although the phosphate ones are the best-known and have been mined in the late 19th century. But their main value is a paleontological one: more than 200 fossil sites are covering a period starting from Lower Eocene (52 Mya) to present. This exceptional continental sequence is labelled « natural laboratory for evolution » by CNRS.

Since the 19th century, those fossils deposits are being studied; today, this study is ongoing as a part of a participatory science program called *Graines de paléontologues* ("budding paleontologist"). Materials collected from a site called Valbro are delivered to voluntary elementary and high schools. Scientific workshops are organized to do the screening and the sorting. Then, all the collected fossils are returned to be studied by paleontologists.

In over 4 years, about 3000 pupils from 34 schools have already participated in the program. Pupils have been very proud to be involved in a research program and they also became more aware of the fragility and value of this heritage. Their one-off work on Valbro is finally put in perspective through the conduct and review of cenograms, which enable them to grasp the continental paleoenvironnemental and biological changes in Quercy during several tens of millions of years. Also, many important and actual issues, like global climate change or biodiversity adaptation, may be correlated with the observed changes.

The advantage is obvious for paleontologists: the number of collected fossils is considerably increased, providing a better statistical processing of data. Many species discovered at the site were only found by schoolchildren. This program has significantly improved the knowledge og these deposits and has produced outstanding scientific results. With over 60 taxons, Valbro is considered the richest paleontological site of early Oligocene in Europe. Also, new issues are emerging, especially the disproportionate overrepresentation of carnivorous species (about 20% of identified species in a biochoronological timescales limited to reference-level MP22).

Initiated in 2010, this successful partnership between schoolchildren and research laboratories should eventually be extend to other paleokarstic sites of Quercy.

THE EFFECT OF GEODIVERSITY ON VASCULAR PLANT SPECIES RICHNESS ACROSS A GRADIENT OF HUMAN INFLUENCE

H. Tukiainen*, T. Järvinen[2], R. Field[3], R. Lampinen[4], J. Alahuhta[5] & J. Hjort[6]

[1] Department of Geography, University of Oulu, Oulu, Finland, [2] Department of Geography, University of Oulu, Oulu, Finland, [3] School of Geography, University of Nottingham, Nottingham, UK, [4] Botanical Museum, Finnish Museum of Natural History, Helsinki University, Helsinki, Finland, [5] Department of Geography, University of Oulu, Oulu, Finland, [6] Department of Geography, University of Oulu, Oulu, Finland

* Helena Tukiainen (helena.tukiainen@oulu.fi)

Keywords: *Geodiversity, Biodiversity, Land use, Variation partitioning*

In recent years, the concept of geodiversity has been developed and put forward as a novel complementary and potentially useful approach to explore biodiversity. Geodiversity is commonly defined as the variety of earth materials, forms and processes and it displays the abiotic richness of the Earth surface. The connection between geodiversity and biodiversity is found to be strong in natural state environments but more research is needed to examine the connection in environments that are anthropogenic or more human impacted.

The aim of this study was to examine the effect of geodiversity, i.e. geological, soil, hydrological and geomorphological diversity on biodiversity, i.e. vascular plant species richness on a landscape scale in environments of different human impact. Specifically, we aimed at comparing the performance of geodiversity, climate and spatial variables in modelling plant species richness.

The study was based on a system of 1x1 km grid squares which were located across the boreal vegetation zone in Finland. The land use of the study grid cells was divided to three classes: urban (high human impact), rural (moderate human impact) and natural state (low human impact) environments. There was a total of 467 1 km^2 grid squares from each of the land use classes. The data were statistically analyzed with variation partitioning method to find out the proportion of the environmental variable groups (geodiversity, climate and spatial variables) in explaining the variation in vascular plant species richness in the three different land use classes.

The results showed that the explanatory power of climate, geodiversity and spatial variables for species richness patterns varied between the three land use classes. The contribution of geodiversity decreased and the contribution of climate and spatial variables increased as the land use became more strongly human impacted. Hence, the results indicate that the connection between geodiversity and biodiversity is strongest in natural state environments. The results advance theoretical understanding of the determinants of biodiversity in boreal landscapes and can be further utilized e.g. in land use and conservation management purposes.

TRACES OF GEOLOGY IN WINES: NEW INSIGHT FROM THE APUAN ALPS GEOPARK

G. Ottria[1,2], A. Amorfini[2*] & A. Bartelletti[2]

[1] CNR, Istituto di Geoscienze e Georisorse, Pisa, Italy, [2] Apuan Alps Geopark, Seravezza (Lucca), Italy
* Alessia Amorfini (aamorfini@parcapuane.it)

Keywords: *geology, wine, terroir, isotope geochemistry, traceability marker*

The conceptual framework in which it is commonplace to talk of "geology and wine" is the "terroir", a specific area with its own characteristic geology, climate and methods of grape production and wine making. Starting from France, the "terroir" model underpins the geographical demarcation of viticultural areas as quality recognition systems in European and non-European countries. The nature of the bedrock influences the shape of the landscape, it controls the geomorphology (slope) and the drainage of rainwater and, above all, it influences the soil type (except where the soil is alluvial), where the vine roots penetrate and grow. Nevertheless, the relationships between the geological properties of a "terroir" and the characteristics of the wine produced in that "terroir" are still qualitative, limited to the observation that the same grape variety planted in "terroirs" with different geological substrates (rocks and soils) produces grapes with different characteristics and therefore wines different from each other in structure and flavour.
A possible answer for quantifying the "geology and wine" relationship comes from isotope geochemistry, in particular from the isotopic analysis of strontium (Sr), an alkaline earth metal of which "traces" (μg/l) are found in the wine. The abundance of the radiogenic isotope ^{87}Sr is determined by the $^{87}Sr/^{86}Sr$ ratio that varies from rock to rock according to their chemical composition and age. Since the soil mineralogy primarily depends on the nature of the source rocks, the $^{87}Sr/^{86}Sr$ ratio of soils varies as a function of the rocks from which they originated.
As it has been demonstrated that the $^{87}Sr/^{86}Sr$ ratio remains unaffected during the rock-soil-vine grapes path and it is not influenced by the winemaking process, if any source of 'external' strontium is added, the Sr isotopic ratio in wines faithfully records the isotopic footprint of their source.
For a better understanding of the potentiality of the $^{87}Sr/^{86}Sr$ ratio as a traceability marker for wines, it is crucial to perform studies that allow to compare the strontium isotopic ratio of the wine directly with the $^{87}Sr/^{86}Sr$ ratio of the bedrock and soil or soils of the area where the vineyard is planted.
This type of scientific approach is being developed within the Apuan Alps Geopark where a multidisciplinary project has been started to characterize a new "terroir" following an experimental micro-vinification from grapes cultivated at an altitude of 850 m on the inland side of the Apuan Alps. The project includes the geological and geomorphological characterization of the vineyard area, the pedological definition of the occurring soils and the high-precision determination of $^{87}Sr/^{86}Sr$ ratios of bedrock, soils and wine.

USING ANCIENT DNA FROM SEDIMENT AT TRAETH MAWR PEAT BOG, FFOREST FAWR GEOPARK TO INVESTIGATE THE EFFECTS OF CLIMATE CHANGE AND HUMAN ACTIVITY ON BIODIVERSITY

Tony Ramsay [1*], Camilla Ryan [2] & Mike Bruford [2]

[1]Fforest Fawr Geopark &School of Earth and Ocean Sciences, Cardiff University, CF103YE, UK,
[2]School of Biosciences, Cardiff University
[*]Tony Ramsay (tonhel@btinternet.com)

Keywords: *metabarcoding, ancient DNA, biodiversity, climate change*

Traeth Mawr, the site of a peat bog and a former proglacial lake in the Fforest Fawr Geopark, developed as a depression within an ice scoured bedrock surface (Humpage 2007). Coring at the site in the late 1970s recovered 4.50 metres of interbedded organic and minerogenic deposits which accumulated during temperate and cold climate conditions respectively. Radiocarbon dating of the organic components showed that the sequence represents approximately 14,000 -15,000 years of sediment accumulation. Prehistoric and historic field monuments in the Traeth Mawr area reveal a history of human activity ranging from the Neolithic (~6000 -3,000 years ago) to the agricultural practices of the present day. An investigation of the pollen stratigraphy in the 1980s revealed temperature related temporal changes in plant communities at depths below 210 cm. Variations in biodiversity patterns (fauna and flora) in response to climate change and the impact of human activities are currently unknown. DNA is capable of binding to sediment, once bound it is protected and can be preserved for thousands of years, if this DNA is subsequently extracted and sequenced it can provide us with a proxy measure of ancient biodiversity.

A study by Giguet-Covex *et al.* published in the Journal Nature Communications in 2014, showed that the metabarcoding of ancient DNA extracted from lake sediments (sedDNA) provides a new and promising method for the high-resolution reconstruction of plant cover and livestock farming history since the Neolithic Period. The climate change related sequence of sediment types at Traeth Mawr provides an ideal record for investigating temporal variations in sedDNA. A core recovered at the site in March 2015 is currently the subject of research which aims to extract ancient sedDNA from different sediment layers, and using universal primers, amplify all mammal and plant DNA. A metabarcoding approach using next generation sequencing will then be used to sequence all amplified DNA. The data set produced will be used to identify species and assess any changes in biodiversity between and within the minerogenic (cold climate) and organic sediments (temperate climate). As well as attempting to assess the impact of human activities, such as livestock farming, from the Neolithic Period.

The use of molecular methods will be explained and the results of the investigation of fluctuations in biodiversity patterns related to climate change and human activities will be presented.

Other themes

ASSESSMENT OF THE INSTITUTIONAL FRAMEWORK AND GAPS IN DEVELOPMENT PLANNING FOR THE PROTECTION OF GEOSITES – THE GREEK EXAMPLE

A. Papathanasoglou[1*]

[1]Interdisciplinary Programme of Postgraduate Studies "Environment and Development", National Technical University of Athens, 9 Iroon Polytechneiou st, Zografou 157 80, Athens, Greece - Senior investigator at Greek Ombudsman, 17 Halkokondyli str, Athens, 10432, Greece

* Antonina Papathanasoglou (ton_papa@yahoo.gr)

Keywords: *Geosites, development planning, geoenviromental protection, Greece*

Greece, compared to other regions of the world, presents high geodiversity with outstanding environmental, scientific, educational and cultural value. Protection of this wealth is essential in maintaining sufficient quality of life. Geoenvironmental destruction commonly occurs throughout the country.

The purpose of this study was to investigate the inadequacy of the institutional framework and the gaps in development planning for the protection of geosites in Greece with the aim to contribute to their protection and their sustainable promotion.

The regulatory framework was investigated and the standpoints through which each law addresses the geoenvironment were illuminated. Geotopes are examined from a range of potential perspectives, including as property items, as part of the biotic environment, as landscapes, as cultural heritage and as factors affecting spatial planning. Alternative approaches were proposed.

The uniqueness and potential of geotopes based on their site have not been highlighted in the current legislative framework and administrative practice. Furthermore, the framework and its implementation have not taken into account the needs and capabilities of residents. Therefore, there is a risk for several protection and development plans to become either utopian or suffocating, uprooting the protected site from its direct and native patrons. The provisions on

Geoparks represent development approaches inspired by the protection of Cultural World Heritage, but they do not constitute national legislation. This implies that these provisions have no legal status so state endorsement is hindered. Although the ensuing flexibility bears some benefits, these are outweighed by serious drawbacks. Legal managers of geoparks are deprived essential authorities and rights and their role in local development planning participation it's not warranted.

Geoenvironmental destruction in Greece may be associated with regulatory gaps, administrative problems and the failure of local development planning approaches to serve both environmental protection and to sustain geotopes for the benefit of communities. This analysis suggests alternative legislature approaches to address these gaps based on a comprehensive framework. The need for adaptable development planning of geosites in order to both implement the appropriate legal provisions and to respond to the physical and social characteristics of regions is emphasized.

CONNECTING PRACTICE: LINKING APPROACHES TO CULTURAL AND NATURAL HERITAGE IN THE WORLD HERITAGE CONVENTION, AND PARALLELS WITH THE WORK OF GEOPARKS

Tim Badman[1*], Kristal Buckley[2], Leticia Leitao[3] & Peter Larsen[4]

[1]Director, World Heritage Programme; International Union for Conservation of Nature (IUCN); Director, World Heritage Programme, Gland, Switzerland; <tim.badman@iucn.org>
[2]Deakin University, Melbourne, Australia; <kristal.buckley@deakin.edu.au>
[3]IUCN, and Independent Consultant; <minimal_maximal@hotmail.com>
[4]University of Lucerne, Switzerland; <billelarsen@yahoo.com>
*Tim Badman (tim.badman@iucn.org)

Keywords: *UNESCO, World Heritage, Geoparks, nature, culture, theory, practice*

This paper discusses current joint work between IUCN (International Union for the Conservation of Nature) and ICOMOS (International Council on Monuments and Sites), in their roles as Advisory Bodies to the UNESCO World Heritage Convention. This joint work seeks to address issues that can arise when natural and cultural values and issues are considered separately within World Heritage processes. This work is coordinated through the Connecting Practice programme, which has conceptual and practical dimensions, and intersects with related work on approaches to conservation that are based on the recognition of human rights (rights-based approaches). Focusing on the importance of improving conservation outcomes, we propose a way forward situated in a 'middle ground' that links both theory and practice, and emphasises the critical importance of a joint approach – 'connecting' natural and cultural heritage practice.

The paper will share initial results of the project, their implications for the World Heritage Convention, and the parallels between the lessons learned from the Connecting Practice project and discuss the parallels with work being done in the international programmes on Geoparks, and possibilities to strengthen partnerships in this area of work.

GEOVISUAL: MAGMA GEOPARK VIRTUAL EXHIBITION

S.Gentilini[1*], P. Thjømøe[2] & M.Birkenes[3]

[1] Magma Geopark, Norway; [2] Magma Geopark, Norway; [3] Doublethink AS, Norway.
* Sara Gentilini (sara@magmageopark.com)

Keywords: *Virtual reality, exhibition, innovation, interactivity*

The GEOvisual project followed a pre-project conducted in late 2013/early 2014 to assess and evaluate benefits and development options associated with implementation of state-of-the-art digital consumer technology and custom software and content to promote Magma Geopark's (MG) marketing and activity goals for the next three years and beyond. The pilot project was initiated by one specialized ITC Company in order to lay the groundwork for an expanded and more comprehensive demo in 2015-2016, and monetary grants by the Norwegian UNESCO Commission were used in full to fund the pilot. Of the total grant, close to 10% was spent on physical test equipment, technical. The technology suggested was virtual reality (VR) – a technology that has gained substantial media attention and development momentum in recent years. The decision was also made to create a VR experience based on a combination of live 360-degree film and digital effects. VR technology has been tested, developed and explored for more than 20 years, but failed to gain commercial or scientific momentum until the early 2010s. Since then, versions of the technology have been applied to a wide array of installations, gaming platforms, art projects and science applications. GEOvisual is becoming a world first project aimed at fusing cutting edge VR technology with natural phenomenon millions of years old to promote geological knowledge, tourism, learning and audience interactivity.
Visitors will have the possibility to enter in the Geopark virtual world simply wearing the interactive glasses: “oculus” sitting indoors and with the only use of the head´s movements, make it easier for people with body disabilities.
As far as we know it has never been introduced to a project of such potential scale and scope as the GEOvisual project. Hence thorough and meticulous research and testing was needed and is needed to adapt the technology for this purpose. The pilot project has been presented in Jærmuseet last 18th of March proving enthusiasm on the audience.
Magma Geopark has applied to different sources in order to secure the finance for the project development. Once that the virtual platform will be optimized the idea is to implement it with more information on Geoparks and World Heritage Sites in Norway and in Europe and Worldwide. The final product will be easily movable and it can be duplicated infinite times.
The opportunities for the content´s implementation are enormous and it opens new opportunities for tourist accessibility in remote areas of the Planet.

GLOBAL GEOPARKS AND PHYSICAL ACTIVITY IN NATURE: SEEKING FOR ADDITIONAL HEALTH BENEFITS IN THE MANAGEMENT OF DIABETES

H. Moreira[1,2,3], R. Gabriel[1,2,4*], A. A. Sá[1,5,6], A. Alencoão[1,5,7], E. Cabecinha[1,3,8], A. Faria[3,9,10] & E. Silva[11]

[1] University of Trás-os-Montes e Alto Douro, Vila Real, Portugal, [2] Department of Sport Sciences, Exercise and Health, [3] Research Center in Sports Sciences, Health Sciences and Human Development (CIDESD), [4] Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB), [5] Department of Geology, [6] Geosciences Center of the University of Coimbra, [7] Center for Geophysics from the University of Coimbra, [8] Department of Biology and Environment, [9] University of Beira Interior, Covilhã, Portugal, [10] Department of Sport Sciences, [11] Portuguese National Commission for UNESCO, Ministry of Foreign Affairs, Lisbon, Portugal.
* Ronaldo Gabriel (rgabriel@utad.pt)

Keywords: *Natural environment, physical activity, glycemic control, healthy lifestyles*

In Europe, diabetes affects about 56.3 million individuals between the ages of 20 and 79, estimating that in 2035 this number will reach the 70 million mark, thus more than 10% of the European population. The deficiency in the production of insulin and/or the resistance to the action of this hormone results in the elevation of the plasma levels of glucose. Hyperglycemia combined with dyslipidemia, hypertension and tobacco use leads to the increase in the risk of cardiovascular diseases and dysfunctions of the nervous system.
The increase of adipose tissue, especially visceral, favours the development of Type 2 diabetes, derived from the altered production of adipokines, including the reduction of visfatin and the increase of interleukin-6 and the tumor necrosis factor alpha.
The exposure to green open spaces promotes the maintenance of a healthy weight and encourages the practice of physical activity, reflecting a lower cardio-metabolic risk. Breathing essential oils, derived from trees and plants, and the reduction of hormones produced by the adrenal glands increase the activity of the NK cells, thus improving the immune function. The presence of vegetation and water decreases stress and sunlight stimulates the synthesis of vitamin D, reducing the insulin resistance.
The presence of trails that allow the practice of cardiovascular activities involving the major muscle groups, such as walking, prove to be important in the control of Type 2 diabetes, where a minimum of 150 minutes per week of moderate intensity should be met. Additional benefits in the glycemic control may be obtained increasing the exposure time to nature and with the implementation of vigorous intensity levels, where the natural space grants a decrease in the perceived exertion.
Global Geoparks, while natural areas with a distinct geological value and with a sustainable development strategy, can constitute as a privileged environment of promoting health and physical activity in diabetics, through the diversity of the pedestrian trails connecting the geosites, by the broad vegetation and through the possibility of developing support infrastructures for physical exercise with specialized supervision.

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WHO PAYS FOR NATURE? – NATURAL CAPITAL INVESTMENT PLANNING FOR GEOPARKS AND PROTECTED AREAS

C. Woodley-Stewart

North Pennines Area of Outstanding Natural Beauty (AONB) and Global Geopark
1 Martin Street, Stanhope, County Durham, UK. DL13 2UY
Chris Woodley-Stewart (chris@northpenninesaonb.org.uk)

Keywords: *Natural Capital, investment, valuation, ecosystem services*

Geoparks are concerned with the conservation of a wide range of natural features beyond geodiversity; these features can be described as our Natural Capital, from which flow a range of ecosystem goods and services that sustain wider society. So woods, rivers, grasslands etc. are aspects of natural capital; carbon storage, clean water, pollination and recreational opportunities etc. are just some of the ecosystem services they provide.

Traditional economics sees nature as being limitless and free – traditional economics is wrong on both counts.

At least 40% of Gross Domestic Product in northern European countries relies on a high quality natural environment, yet there has been a market failure to sustain the natural world; this makes it increasingly difficult for the environment to sustain the economy and wider society. With our wildlife and wild places in decline, and as public sector investment in conservation falters, there needs to be a new approach to investing in our natural capital, for all that it does for us.

The North Pennines AONB/Geopark Partnership and partners in neighbouring protected landscapes in the North of England, are leading on the development of a Natural Capital Investment Plan, aimed at generating investment in nature conservation on a large scale. The work is aimed partly to drive income from the private sector, but also to influence public sector spending decisions in a time of austerity.

The work involves using high quality local environmental data and applying economic models to produce a valuation of aspects of an area's natural capital. Value chains can then highlight the costs and benefits of different kinds of investment and identify likely beneficiaries and investors.

This presentation will look briefly at the concept of natural capital, before outlining the process of producing a Natural Capital Investment Plan and the benefits it may bring to investment in nature and thus to wider society. Managers of Geoparks and protected areas can engage in processes like this to sustain their environment, sustain their work and further emphasise the value that these special areas provide to society.

Poster presentations

ANNUALLY LAMINATED (VARVED) SEDIMENTS OF THE WESTEIFEL VOLCANIC FIELD, GERMANY

Bernd Zolitschka*

University of Bremen, D-28359 Bremen, Germany
*Bernd Zolitschka (zoli@uni-bremen.de)

Keywords: *varves, climate archive, land use change*

The Eifel area is dotted with maars, a local term for a small-sized volcanic crater. Some of these craters contain lakes which are exceptional natural archives for two reasons: (1) their deep water bodies have a relatively small surface area and promote the formation and preservation of annually laminated or varved sediments. Such lacustrine sediments precisely record past environmental and climatic conditions in calendar years and offer exceptional high temporal resolution. (2) Volcanic activities related to the formation of these lake basins date back in time mostly much more than 10,000 years. Thus, the lake deposits not only provide information about forested conditions of the postglacial (Holocene) but also of permafrost-dominated environments of the last glacial period (Weichselian) not available in such detail from anywhere else north of the Alps.

The probably best studied lake records of Central Europe are those from Meerfelder Maar and Holzmaar. Both are composed of annually laminated sediments: clastic varves dominate during the last glacial period. They result from seasonal snowmelt-runoff and consist of a silt-sized spring/summer layer and a clay-sized fall/winter layer. Starting with the Lateglacial warming chemical weathering and soil formation began followed by the development of forests. This initiated the process of natural eutrophication of the lakes and the formation of organic varves which consist of a spring/summer diatom layer and a fall/winter layer composed of organic detritus with minor contributions of minerogenic matter. Since the pre-Roman Iron Age (ca. 800 BC) intensive anthropogenic deforestation triggered soil erosion which increased the clastic sediment component to the lakes: mixed organic-clastic varves were formed since that time. In combination with other independent dating methods, e.g. radiometric and luminescence dating, a robust calendar-year timescale was established.

Precisely dated volcanic ash layers from these records (Ulmener Maar Tephra, Laacher See Tephra) provide isochronous marker horizons for regional correlation with records from other Eifel maar lakes or supraregional correlation with other Central European lacustrine sediment archives. Furthermore, the robust varve chronology serves as a backbone for meaningful climatic (A) and environmental (B) reconstructions based on multiproxy sedimentological, biological and geochemical analyses. (A) Among many other climate variations, the Homerian solar minimum was documented by an increase in 10Be flux in combination with an increased varve thickness attributed to a related change in windiness during late winter to early spring. (B) Human impacts are archived since the start of the Neolithic. Not only pollen analytical data indicate a change in vegetation as the result of anthropogenic deforestation, but also the subsequently accelerated soil erosion is recorded by increased varve thickness and sedimentation rates.

Altogether, varved sediment records of Eifel maar lakes provide a very well-dated natural archive – an annual diary of the Earth.

APPLIANCE OF ENVIRONMENTAL EDUCATION IN TEACHING THE MEANING OF BIO- AND GEODIVERSITY

M. Kiuttu[1*] & A. Pellikka[2]

[1]Rokua Geopark, Kiviharjunlenkki 4, 90220 Oulu, Finland
[2]University of Oulu, Faculty of Education, Department of Educational Sciences and Teacher Education, P.O.Box 2000, 90014 UNIVERSITY of OULU, Finland
*Mikko Kiuttu (mikko.kiuttu@humanpolis.fi)

Keywords: *education, sustainability, local pride, geodiversity, biodiversity*

Sustainable way of life is becoming increasingly noticeable and integral part of the Finnish educational system and national curricula. Rokua Geopark and the University of Oulu, Faculty of Education have cooperated in the field of environmental education for two years to produce new materials and methods related to the themes in curricula. Recently common research have been carried out to investigate the possibilities of environmental education methods as well as Rokua Geopark´s unique nature sites for school teaching.

In this research we study the experiences of lower secondary school pupils and subject teacher students in order to find out how environmental education is best put into practice in teaching natural sciences. The research takes place in Liimanninkoski Rapids geosite in western part of Rokua Geopark (Finland). Liimanninkoski Rapids is situated in a deep ravine-like valley of River Muhosjoki and offers wide range of geomorphological and biological features for teaching several topics of nature sciences, especially the dimensions and values of bio- and geodiversity.

Our research question is: On what extend are the methods of environmental education applicable when teaching the meaning of bio- and geodiversity to the 8th graders in lower-secondary school?

The research is carried out during an Environmental Education Course for subject teacher students organised by the University of Oulu and Rokua Geopark in May 2015. During the course the students plan outdoor education sessions for 8th graders with objectives and methods of environmental education and with topics of national curricula. The outdoor education sessions take place in Liimanninkoski Rapids geosite in a form of environmental education theme day.

ASPIRING GEOPARK OF CAUSSES DU QUERCY (S.W. FRANCE): A STONY LAND WITH HIDDEN (PALEOKARTIC) TREASURES

A. Kühnel[1]* & T. Pélissié[1]

[1] Parc naturel régional des Causses du Quercy, 46240 Labastide-Murat, France
*Agathe Kühnel (akuhnel@parc-causses-du-quercy.org)

Keywords: *aspiring geopark, Quercy, paleokarst, geotourism*

The "Causses du Quercy" are a group of Jurassic limestone plateaus in S.W. Massif-Central (France). This rural area has limitated economic resources or development potential but a built and natural well-preserved heritage and outstanding landscapes. Actually, tourism and agriculture are both the most important economic sectors in Causses du Quercy territory.

A Regional Nature Park has emerged and developed on these foundations since 1999. Largely, implemented and promoted by local actors and partnerships, its territory project has been structured on natural and cultural heritage enhancement and preservation.

A potential geopark unaware of it: the Causses du Quercy nature park has a dual identity, strongly linked with its karstic features:

- A unique paleokarstic heritage with a great scientific interest, since the Causses du Quercy have the responsibility to home one of 4 world's longuest paleontological continental continuous sequences. Labelled “natural laboratory for evolution” by researchers, this exceptional heritage will be soon classified National Nature Reserve in order to insure its protection.
- A cultural and local identity built on a long-term link between man and stone. Stony land, the whole area is mainly shaped by a network of dry stone walls, dovecotes and stone huts; many small hamlets and traditional peasant architecture; countless dolmens and painted caves; myriad of cliffs, pits and overhangs, etc. “Here, we are growing rocks!” may become one day Causses du Quercy motto…

Historically, there is a local form of tourism focused on Causses du Quercy geological curiosities of and several important national tourist sites including Padirac chasm, Pech Merle prehistoric painted caves, Rocamadour pilgrimage village, picturesque village of Saint-Cirq Lapopie, and Cloup d’Aural phosphate mines. Those major sites contribute to the renown and attractiveness of Causses du Quercy and the Regional Nature Park helps to increase tourism spread from those sites to the whole territory.

Step-by-step towards an application for European Geopark Network: first discussions about apply for integrating EGN began in 2005. At that time, several exchanges and encounters with neighboring Geoparks convinced us that the project was not yet sufficiently “mature”.

Since then, numerous actions were implemented: establishing a global “geostrategy” formalized in the new Regione Natural Park Charter; setting up educational activities; editing various booklets and more ambitious publications; inventorying geosites; developing local partner networks; activating the local government representatives; etc.

There is more work to be done, but our project is cleary more defined; we therefore wish to join EGN to collaborate and benefit from the other European Geoparks.

CONCEPT FOR ENVIRONMENTAL EDUCATION IN VULKANEIFEL NATURE- AND GEOPARK

Achim Herf[1], Birger Führ[1], Dr. Andreas Schüller[1]* & Julia Franzen[1]

[1]Natur- und Geopark Vulkaneifel GmbH, Mainzer Str. 25, 54550 Daun
*Andreas Schüller (geopark@vulkaneifel.de)

Keywords: *regional identity, demographic change, geo- and natural competence, inclusion*

One of the main concerns of the Vulkaneifel Nature- and Geopark is to increase the skills of the local population in natural and geosciences. Environmental education as a tool to stimulate interest and curiosity for the biological and geological environment is therefore a central field of work. Environmental education means information and links on habitats, flora and fauna but also to prepare the geological heritage of the region to specific target groups. The conscious experience of nature and landscape, visualizing and explaining the geological features, lead to a responsible attitude and enthusiasm for the uniqueness of the region.

Environmental education is always as a part of sustainable **Inwertsetzungsmarketing** (raise of idealistic and economic value of the landscape) because this is based on knowledge of the region and its special features.

To implement the ideas and obligations formulated in the Masterplan of Vulkaneifel Nature- and Geopark, the education and training starts with the residents of Vulkaneifel. The imparting of know-ledge about our home and its natural amenities promotes the awareness and enthusiasm of the locals, triggers their regional identity and creates value.

The concept focuses on children and young people and takes advantage of their inherent thirst for knowledge. Children are the service providers of tomorrow and should absolutely be kept in the region (action to **mitigate the effects of demographic change**). Hence the Environmental Education concept aims in particular at the children and their caregivers. In order to reach the children, those who are in direct educational exchange with the children, the teachers and educators, as well as of course the parents, need to be encouraged and trained.
Teachers and educators in schools providing general education need to gain the necessary skills and methods to develop geo- and natural competence with the students. The first step is the training of educators and teachers and to train them in regional environmental and geological topics.
The second step is the didactic application of knowledge and the development of appropriate teaching units by the educators and teachers under the **professional guidance and assistance from experts of the Nature- and Geopark**.
The third step is the implementation of the developed units and projects in a tandem of a teacher and an expert from Nature- and Geopark Vulkaneifel, the Geopark-Guides.

A modular structure with the same or similar basic structure for each processed topic is sought for content. The modules are designed so that the issues could be addressed repeatedly in all levels of the education system. Permeability through all levels of education also means the consideration for **children with disabilities**. Especially in environmental education, it is easily possible to raise social skills by including disabled people.

CONNECTING MAN AND EARTH IN BUZĂU LAND ASPIRING GEOPARK

D-A. Popa[1*], R-G. Popa[2,1], & A. Andrășanu[3]

[1] Institute of Geodynamics of the Romanian Academy, Bucharest, Romania, [2] Institute of Geochemistry and Petrology, ETH Zurich, Switzerland, [3] University of Bucharest, Romania
* Diane Alice Popa (diana_alice_baratu@yahoo.com)

Keywords: *nature, culture, heritage, story, material, immaterial*

Buzău Land, located in the Carpathians Bend Area comprises 18 communes (1036 km^2) from the highlands of Buzău County in Romania. What makes it special is the relation between natural and human heritage that mirrors how geodiversity shaped Man's perception over the natural elements and environment and the way he translated their meaning into his own understanding. Buzău Land abounds in spectacular natural elements like aquatic fossils, amber, salt mountains, mud volcanoes, natural gas combustion, mineral and oil springs.

Their origin and cause intrigued the local population that tried to find explanations and give different meanings and practical uses to these natural elements. While trying to understand the environment, Man created a reality of his own, starting from the natural elements that surrounded him. This reality unfolds in a material and an immaterial dimension.

The material dimension relates to how the inhabitants use the geological elements. For example, they made rock-hewn settlements in Kliwa sandstone, and shaped it into everyday objects like tables, chairs and counterbalances for fountains. They carved messages in sandstone using an unknown endemic alphabet (similar to Anatolian alphabets). They use saltwater from natural springs to prepare food and chisel amber into jewels.

The immaterial dimension relates to how the inhabitants granted wondrous properties to geological elements and to how they explained some phenomena. Amber became a magical talisman and an instrument for soothsayers, protecting the household of those who stumble upon it, but brings poverty to whoever desperately searches for it. Fires rising from beneath the ground and burning without being lit by anyone and mud heaps or ponds that appear overnight in people's yards or on grazing fields, become related to the spirits of the place (*genius loci*), to dragons pouring mud through their wounded necks or to ogres placing traps.

The stories Man created, the interpretations he attributed and the way he used these elements in everyday life reveals a strong connection between Man and Earth, for Earth gave Man the necessary resources, and Man gave Earth a new meaning in return. It therefore goes without saying that portraying and presenting one without the other would turn them into pieces of a world that cannot be fully understood. In Buzău Land a stone is not only a stone, it might as well be a portal leading the traveller into another world, and a mud volcano stretch is not only a field covered in mud but the home of a frightened dragon or a cleverly placed trap of a hungry ogre.

The research leading to these results has received funding from the EEA Financial Mechanism 2009-2014, under the GeoSust project contract no 22 SEE/30.06.2014.

FOCUSED SPELEO-EXPLORATIONS IN LEYE-FENGSHAN GEOPARK

J. Bottazzi[1*]

[1] Leye-Fengshan Geopark, Hechi city, China*Jean Bottazzi (jean.bottazzi@gmail.com) **Keywords**:
Underground river, flow measurement, cave exploration

Leye-Fengshan Geoprak's deepest roots are in karst caves.The position on the border of the Yungui plateau, the humid subtropical climate, the drainage by deep gorges, the quality of the permian limestone, the proximity of Triassic impervious, a several step uplifting history and fractures make this area particularly favorable to the formation of big caves and complex cave network.After a phase of extensive explorations (76 km of new cave survey in the past 3 years) is coming the time for focused researches.1) chasing the underground riverSanmenhai is the resurgence of an important underground river. According to hydrogeological maps, it is a nearly 40 km long drain with 4 important tributaries in the lower course. But there is very few part of this network that can be accessed and studied. Two years ago, we discovered one of them in the higher third of the course and were surprised by the high water flow.During our last international exploration camp (Italy/French/Chinese, April 2015), we decided to measure the water flow of each river discovered and to compare it to the resurgence, increasing the significance of the discovery of three important parts on the main drain.2) observe the smallest to understand the biggestOur longest cave network is Jiangzhoudong, It includes 51,8 km of caves. But although it drains 3 major sinkholes and is relatively nearby the resurgence, it is extremely difficult to understand the current and the former organization of the drainage.By focusing the speleological researches on this question, we could discover a phenomenally eroded gallerw with thousands scallops less than 1 cm long. The length of erosion scallops is linked to the speed of water flow. So, we asked the collaboration of a canadian caver to develop a palm application to let us make in situ an evaluation of the speed of the water during erosion process using the curl abacus method. The gallery proves to be eroded by a 100 m3/s flow rate. This information gives us a new understanding of the way the cave formed and what can be the current position of the underground river below Jiangzhoudong.As a conclusion, this expedition showed that with simple measuring processes it is easy to increase the significance of discoveries and make more lively the geological heritage.

FOSTERING THE GEOSITES KNOWLEDGE IN THE MAESTRAZGO GEOPARK (TERUEL, SPAIN)

L. Alcalá[1,2*], L. Mampel[1,2] & A. Hernández[1,2]

[1] Fundación Conjunto Paleontológico de Teruel-Dinópolis/Museo Aragonés de Paleontología. Teruel, Spain.
[2] Maestrazgo Cultural European & Global Geopark. Molinos, Teruel, Spain
* Luis Alcalá (alcala@fundaciondinopolis.org)

Keywords: *Maestrazgo, Geoheritage, Education, Scenic viewpoints*

After detecting some Conservation Strategy issues during the revalidation process in 2011, the Maestrazgo Cultural Geopark took initiatives to improve the links between geodiversity and cultural, biological and other associated heritage.

Thus, Maestrazgo Geopark Viewpoints Network was established to renovate, boost or place new scenic viewpoints. The starting point was based on the diagnosis of the places with geological and palaeontological interest at Maestrazgo Cultural Park carried out in 2007 (*Diagnóstico de los Puntos de Interés Geológico y Paleontológico del Parque Cultural del Maestrazgo.* Alcalá, L., Mampel, L., Espílez, E. 2007. *Dirección General de Patrimonio Cultural del Gobierno de Aragón*, 82 pp.). From this document it can be deduced that the main attention is focused on the palaeontological geosites (30%), followed by the tectonic (18%), the stratigraphic (16%) and the geomorphologic ones (14%). With lower than 10% there are geosites of hydrogeological, regional geology, mineralogical, petrologic and geochemical, metallogenic, and other related to the Quaternary interest.

Several scenic viewpoints, trying to cover most of the Geopark, have been placed or renovated in the following localities: a) Aliaga ("Scenic Viewpoint at Valle de Aliaga" and "Scenic Viewpoint at Estrecho de la Aldehuela"), b) Alcorisa ("Progressive angular unconformity of Alcorisa"), c) Aguaviva ("Fluvial dynamics of the River Bergantes in Aguaviva"), d) Bordón ("Anticline of Bordón"), e) Cañizar del Olivar ("Scenic Viewpoint of Cuevas del Río Estercuel"), f) Crivillén ("Scenic Viewpoint at Alto de Santa Bárbara"), g) Cuevas de Almudén ("Picuruta–Barranco del Cerro Path"), h) Cuevas de Cañart ("Scenic Viewpoint at Salto de San Juan"), i) Galve ("Las Cerradicas Palaeontological tracksite"), j) La Cañada de Verich ("Scenic Viewpoint at Mezquin Valley"), k) La Mata de los Olmos ("Nevera Scenic Viewpoint"), l) Mas de las Matas ("Scenic Viewpoint at Santa Flora"), m) Miravete de la Sierra ("Miravete de la Sierra dinosaurs tracksite"), n) Molinos ("Geological setting of Molinos"), and ñ) Villarluengo ("Geomorphology, stratigraphy and tectonics of Órganos de Montoro Natural Monument").

New billboards contain didactic information, presented in English and Spanish, aimed at a public without previous knowledge on geology in order to educate visitors at large in geosciences. Sometimes they focus on some specific geological or paleontological content (b, c, d, g, i, m, n and ñ). Others the geological heritage is dealt with from a transverse point of view and the information is directed to the natural and/or cultural heritage features (a, e, f, h, j, k and l) which are also a key factor to achieve a holistic view of the Maestrazgo Geopark.

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GEOCONNECT- ONE PLACE FOR EVERYTHING

A. Lõbus* & J. Schmidt

Development, FuncSys OÜ, Tallinn Estonia, Development, FuncSys OÜ, Tallinn, Estonia.
* Annes Lõbus (annes.lobus@email.com)

Keywords: *IT solution, integrated system, mobile application, cloud service, all-in-one.*

Our company is developing IT system, which is committed to geoparks and to help the progress of the Geoparks Network, to be more popular. The solution, which is under active development right now, is carrying all the principles of geopark networks and is helping geoparks to achieve these goals inside digital world.

The integrated IT system GeoConnect is including and binding together: Smartphone application, geopark web pages, working environment as cloud service, tourism selling environment and games creation solution. Of course this is not the finale list of services. By the time, the list of services is growing.

The main idea, why this whole solution is special, is the idea of one insertion and instantaneous data spreading into every solution. This is saving time in geopark workers working hours. The other main point is integration of all applications. They are exchanging information on-line, with each other and doing that, this is giving comfort for the geopark in every day's tasks. And of course, data access and manipulation form lot of devices, Smartphone's, pads, multimedia devices and so on.

In conclusion, working from anywhere and working with anything.
Please feel free to visit the project's website: www.geoconnect.solutions

The IT solution is developed in collaboration with Saarte Geopark from Saaremaa. The first phase will be launched in first week of august. We wish to introduce this solution to geoparks as oral presentations with video animation and also wish to present this as poster presentation.

GEOLOGY AND WINE: RECOVERY OF THE VINEYARD IN PALLARS

G.Puras

Department of local economic development, agricultural engineer, Tremp City Council, Tremp, Spain (gpuras@tremp.cat)

Keywords*: rural development, agro food, geology, wine, Geopark, Pyrenees*

In 1860 the Tremp Basin had 8600 hectares of vineyards. All production was manual and therefore the region lived from the vineyard. The Tremp Basin was the cellar of the Pyrenees. In 1905 the phylloxera epidemic devastated vineyards and left without resources entire region. This situation led to the exile of much of the population at the Pampa Argentina, and the area remained desolate.

In 1986 it was set up a winery in Tremp municipality, later the Tremp Basin was included in the Designation of Origin (D. O.) *Costers del Segre*, which was not effective until 1995. This quality mark for Spanish wines attracted companies looking for new areas in the north and in uphill to cope with climate change. Currently there are new nine wineries totaling 270 hectares of vineyards. The owners of the wineries are young, active entrepreneurs. Recently the have made trips to share best experiences and created fairs and exhibitions of wines and it is gradually recovering the ancestral landscape and the local society is closer and appreciate this forgotten wine culture.

How can a Geopark to support the winery sector? For many producers, wine is the result of the influence of climate and soil on the plant and its fruit. Based on the demand of the sector, it's necessary to bring them the know-how, how to cultivate, interpret and communicate how this soil affects the final product. In this respect, with the help of the *Institut Geològic de Catalunya* (Geological Institute of Catalonia), in 2013 started the Project "Geology and Wine" and currently it has been analyzed the 14 main soils of the region, and have also installed devices to monitor temperatures and humidity probes temperature and some seminars on possible effects of climate change has been held.

With the aim of giving tools to the grower to improve the competitiveness of the wine sector and of integrating this agro activity in a zone with a rich geological, mining and paleontological heritage, currently are taking place some actions of advisory on soils in order to elucidate the mechanisms that cause physical and chemical absorption of nutrients for the plant and what practices are harmful to the crop. It is expected in a year or two wineries have enough knowledge to explain visitors the main features of the geology of the area, the distribution of soil types (gravel pebbles at 1200m high, sandstone, slate, Garunna clay, etc.) and how the soil and climate of the area affect in their wines.

GEOTOPES-GEOPARKS IN GREECE, CONTRIBUTION TO SUSTAINABLE DEVELOPMENT

E. Moraiti[1*]

[1] NCSD/IGMEM
* Eugenia Moraiti (moraiti@igme.gr)

Keywords: *Geoheritage, Geotourism, Geopark, Geosite, Georoute, Greece*

Geotopes compose the geological history of each region. Geotopes are the "books of the Earth". In every area of our planet are geological sites, named "geotopes" which inform us the story of Earth in the mentioned region.

Perhaps here, the question arises how many sites are characterized as "geotopes" that we must maintain as sites which consist "geological heritage" forming the geological history of each one of these sites, telling a small snapshot or greater than the long history of the earth. Geotopes are a dynamic concept and also educational and informative material. The interpretation thus is a crucial concept to showcase geotopes, conservation and management.

Something similar happens with Geoparks, under some further conditions, wich will analyze the definition of Geoparks. In other words, geotopes and geoparks include in their definition, not only the geological and geomorphological element found in nature, but also the interpretation, for protecting and conservating them.

Our country due to its location, in the convergence space of two tectonic plates have a variety of geological formations, landforms, geological processes of past or "nascent" that are of particular scientific or educational interest. On the other hand many of them have high cultural and tourist value. So both need to record and preserve the scientific, educational, environmental value, secondly to highlight many areas with conditions and potential for creation and promotion geotrails, thematic networks geotopes, alternative proposals tourism, Geoparks. The interpretation of the geological history of each is related to development and the environmental, tourism and cultural affairs.

The Registry of geotopes currently under construction will function as a source of information for every use: Public or private sector projects at a national and international level, for the development, planning and conservation of nature, environmental education, and for tourism

Development and management proposals for geoparks in selected areas, could be implemented by the local councils or other relevant entities, providing social and economic benefits to local communities, creating the right products will result in the designation of the geological heritage and the establishment of new forms of alternative tourism, a modern tourism trend for the social and economic development of each region.

Designating geotopes will also have a positive impact on the awareness and knowledge of geological history at all levels of education, in our country and internationally.

HOW CAN GEOPARKS CAPITALISE ON THE POTENTIAL OF SOCIAL MEDIA? – PART 2

J. Bouwsema[1*], L. Hamlet[2] & R. Barton[3]

[1] Social Media and Marketing Coordinator, Scottish Geoparks Partnership, Fort William, Scotland, [2] Information officer, North West Highlands Geopark, Unapool, by Lairg, Scotland, [3] Project Officer, Geopark Shetland, Lerwick, Scotland
* Jennifer Bouwsema (geoparkshetland@gmail.com)

Keywords: *geoparks, social media, marketing, tourism, community engagement*

This is the second of two linked presentations that will demonstrate how Geoparks can make best use of cost-effective, powerful and wide-reaching social media communications.

Social media has evolved immensely over the past ten years. Once the equivalent of an online college-yearbook, it is now a major part of modern life and an invaluable tool for businesses and organisations seeking to engage with diverse audiences. As social media has moved to occupy more and more traditional marketing territory, organisations are realising the importance of maintaining an engaging on-line presence, but often do not have the time or resources to develop this.
Geopark Shetland, North West Highlands Geopark and aspiring Lochaber Geopark have been working closely over the past two years through a Scottish Geoparks Partnership to raise the profile of the Scottish Geoparks and the wider network locally, nationally and internationally. As part of this process they have employed a Social Media and Marketing Coordinator to develop and implement a coherent and efficient social media strategy. In this context, we present a pair of linked presentations, outlining how Geoparks can captialise on the potential of social media for marketing.
In the second of these two presentations, we demonstrate some of the key tools available for analysing an organisation's existing social media and audience, focussing on the most effective, least time consuming methods we have discovered. Understanding the audience is vital to producing engaging content with lasting resonance. We tackle the question of whether it is worth paying for promoted posts in social media, as well as how Geoparks can invest in ensuring they have a good social media marketing strategy. We suggest that Geoparks may wish to consider whether financial investment in social media may bring worthwhile returns. Finally, as social media is a constantly changing field, we present the current trends, as well as giving an overview of tools and reports that can be used to monitor changes in social media trends, ensuring that marketers are up-to-date.

IZU PENINSULA GEOPARK AS AN ASPIRING GGN MEMBER

K. Yoshikawa[1*], Y. Suzuki[1], M. Koyama[2] &A. Chakraborty[1]

[1] Izu Peninsula Geopark, Ito, Japan, [2] Shizuoka University, Professor, Shizuoka, Japan
*Kaoru Yoshikawa (k.yoshikawa@izugeopark.org)

Keywords: *Island Arc Collision, Submarine Volcanism, Philippine Sea Plate, Natural Hazards, Izu Peninsula, Japan*

Izu Peninsula Geopark, a member of the Japanese Geoparks network and currently an applicant to the GGN Geoparks program, is a unique place where ongoing collision between two island arcs can be seen. This is because large volcanic islands formed on the Philippine Sea Plate (Izu Bonin Arc) have collided repeatedly with the plate boundary of Japanese archipelago, located on the Eurasian and North American Plates. Izu was born as a submarine volcanic island in the area where Iwojima Island is now located. The journey of this volcanic island and its collision are documented by geosites such as the Shimoshiraiwa where fossils of marine organisms that lived in warmer southern seas can be found inside calcareous sandstone deposit. There are many fascinating geosites where a great range of natural diversity can be seen, such as tuff cliffs (Dogashima), submarine volcanic necks and dikes (West coast), terrestrial volcanic mountains and hydrothermal mineral deposits (central Izu), small-scale monogenetic volcano field (central Izu and east coast) which is active today. It is thus possible to observe the geological mechanisms that formed the peninsula in different locations. The peninsula is ideal to observe the geological processes ranging from submarine volcanism, land volcanism due to the collision of landmasses and ongoing volcanic activities. Izu was repeatedly struck by large tsunami waves and in 1989 a small explosion occurred in the Teishi Sea Knoll near the current geopark headquarters. Therefore our geopark is recognized as a tool for natural disaster prevention. As a geopark, Izu Peninsula is attempting to collaborate with other geoparks and raise awareness on natural disasters as results of tectonic level processes, while preserving local nature, culture and history. Two of our unique initiatives are—the “geogashi” geological cookies modeled after real geological landforms and “geo-ikebana” replication of geological landforms through traditional Japanese flower art.

In March 2011, 13 cities and towns came together to form the core of the geopark. In September 2012 the geopark was accredited by the Japanese Geoparks Network. In December 2014, we applied for GGN membership. We have participated in several geopark network meetings such as the 2013 APGN meeting at Cheju, the 2014 UNESCO Geopark Conference in Stonehammer Geopark Canada and we will be organizing the next Japanese Geoparks Annual Meeting in 2016.

LAVRION: ONE GREAT TERRITORY WITH UNIQUE GEOHERITAGE AS A PROSPECTIVE GEOPARK

E. Moraiti[1*] & S. Staridas[2]

[1] NCSD/IGMEM
* Eugenia Moraiti (moraiti@igme.gr)

Keywords: *Lavrion, WebGis, WebMap, Geoheritage, Geotourism, Geopark, Geosite, Georoute, Greece*

The broader territory of Lavrion, also called Lavreotiki, is located SE of Attica, at a distance of 55 Km from Athens, and covers a surface of approximately 200 Km^2. Its morphology is hilly and the highest altitude is approximately at 372 m. The area is dry, partly covered by pine trees, crossed by numerous valleys and surrounded by the sea. The surrounding area of Lavrion with the natural Sounion National Park is a remarkable center of cultural tourism and leisure. Access to Lavrion is normally through paved roads which are relatively easy to travel. The history of the area, its sights, its natural beauty, its proximity to Athens and its hotel infrastructures make Lavrion peninsula an ideal spot for brief or longer visits.

On the other hand, intense mining and metallurgical activity was developed in Lavrion and the wider area of Lavreotiki (Kamariza, Plaka, Thorikon, Botsaris Valley, Cavity Soureza Valley, Megala Pefka, Dimoliaki, etc.) in ancient times (from 3500 B.C. reaching its peak in the 5th and 4th centuries B.C.). Consequently, that activity brought about economic and cultural development. In 1860, after 19 centuries of rest, the modern history of the exploitation of the deposits began, introducing innovative methods in mining-metallurgical activity (plants, machine shops, mining galleries, shafts, etc.). The monuments of the mining-metallurgical science and art which flourished twice in Lavreotiki are heirlooms from our ancestors and we should protect, conserve and highlight them.

The natural environment, the long-term history and cultural heritage, as well as its valuable geological heritage, make Lavrion a great territory for the development of Geotourism and the designation of the area as Geopark.

In order to address the processes for Lavrion to become a Geopark, NCSD/IGMEM created a web based interactive map (http://geoparks.igme.gr/lavrio/) where the overall natural, cultural and geological heritage are presented as map layers together with numerous other operations for the end-user of the web map. The web map also comprises the Geosites of Lavrion, which include locations for the geology of the area as well as abundant mines and sites of mining activity. In addition, seven Georoutes are depicted which connect the Geosites and encourage the visitor to follow them and get to know Lavrion's long history.

MOLINA ALTO TAJO GEOPARK DINAMIZING AGENT EMPLOYMENT WORKSHOP: AN INITIATIVE TO IMPLEMENT THE PRINCIPLES OF ECONOMIC DEVELOPMENT PROPOSED BY THE EUROPEAN AND THE GLOBAL GEOPARKS NETWORKS

J.A. Martínez[1], J.M. Monasterio[2], M. Perruca[2] and L. Carcavilla[3]

[1]Molina and Alto Tajo Geopark staff, Museo de Molina. Plza. San Francisco s/n. 19300 Molina de Aragón, Guadalajara. Tlf. 949 83 1102, <j_albireo@hotmail.com>
[2]Asociación de Amigos del Museo de Molina de Aragón. Plza. San Francisco s/n. 19300 Molina de Aragón, Guadalajara. Tlf. 949 83 1102, <geoparquemolina@gmail.com>
[3]Instituto Geológico y Minero de España. C/Ríos Rosas 23. 28003 (Madrid). <l.carcavilla@igme.es>

Keywords: *Employment Workshop, Entrepreneurship, Geopark Dinamizing Agent, Geopark Resources,*

The Employment Workshop Program is funded by the European Social Fund, which aims to improve the possibilities of integration in the job market for disadvantaged people. It may be requested by public or private institutions and it is based on a theoretical and practical training educational project that prepares to take a place in the business frame of the territory where it take place, as well as, during their training, these students develop activities of community interest.

This employment workshop, promoted by Molina Alto Tajo Geopark and the Municipality of Molina de Aragón, aims to take advantage from the possibilities offered by the integration of Molina Alto Tajo Geopark in the European and the Global Geoparks Networks, with forming professionals who build businesses and touristic products based on the sustainable use of geological, natural and cultural heritage, as well as the attention to national and international visitors, derived from belonging to these co-operational networks.

The theoretical and practical training offered is based on a project created by the Geopark and the Provincial Government, those who have investigated the possibilities offered by the integration into the European and Global Geoparks Network, for it includes the following items:

- Deep knowledge of natural and cultural heritage of the Geopark;
- Knowledge of the European and Global Geoparks Networks of and its operational guidelines;
- Entrepreneurship basic notions;
- Investigation of new possibilities for tourist development of this Geopark;
- Attentions to national and international visitors;
- Dissemination using of communication media, especially Internet;
- Design and publishing of educational, informative and tourist material; in virtual and graphical support.

Also it is expected to act on elements of geological heritage in which has not yet been carried out its proper use, geoconservation measures and enhancement.

As a result of this workshop, which lasts for six months and is currently in action, will train 10 professionals to create businesses that stimulate local economy by harnessing the geological heritage.

It is scheduled that at the end of the workshop a multidisciplinary team advices students and tracks their business projects, to ensure their optimal development.

MONITORING GEOSITES OF THE AZORES GEOPARK: 2014/2015 RESULTS

Jorge Ponte[1]*, Eva A. Lima[1, 2] & Marisa Machado[1]

[1]Azores Geopark, Centro Empresas da Horta, Rua do Pasteleiro s/n; 9900-069 Horta PORTUGAL. jorgeponte@azoresgeopark.com; evalima@azoresgeopark.com; marisamachado@azoresgeopark.com

[2]Geosciences Department, Azores University, Campus de Ponta Delgada, Apartado 1422; 9501-801 Ponta Delgada PORTUGAL / Azores Geopark, Centro Empresas da Horta, Rua do Pasteleiro s/n; 9900-069 Horta PORTUGAL. evalima@uac.pt

* Jorge Ponte (jorgeponte@azoresgeopark.com)

Keywords: *Geoconservation, monitoring, geosites, Azores Geopark*

The Azores archipelago, with a unique geodynamic framework, presents a huge geodiversity and important geological heritage and is considered a natural laboratory of volcanic geodiversity.

Given the insular nature of the region, the Azores Geopark is supported on a geosites network dispersed by the nine islands and the surrounding seafloor, i) that ensures the representativeness of the geodiversity that characterizes the Azorean territory, ii) that reflects its geological and eruptive histories, iii) with common conservation and promotion strategies, and iv) based on a decentralized management structure with support in all the islands.

One of the principal geoconservation strategies applied is the monitoring of the terrestrial geosites, ensuring better conservation of geological heritage and improving the management practiced in a given geosite. A monitoring plan aims to apply an adequate conservation of geological heritage, improve management practiced in a determined geosite, follow the evolutionary state of geosite, identify the threats (anthropogenic and natural threats) that endanger the integrity of the geosite and quantify the loss of its relevance over time.

In 2013 this strategy started with an experimental monitoring of the geological heritage of the Azores Geopark with several tests that conduced to a final checklist and monitoring table to be applied in all terrestrial geosites in all Azorean islands. During 2014 the monitoring started with a monthly frequency in all islands. We present the results obtained in 2014/15.

The monitoring record includes parameters such as the geosite status (cleanliness, condition of access, signaling), its geological conditions of interest (conservation, threats, natural evolution) and the characterization of the public (direct counting and behaviors observation).

Given the number of geosites and dispersion through the archipelago, the monitoring of all geosites is conducted with the collaboration of the Nature Guards Corporation of the 9 Island Natural Parks (Azores Geopark partners).

The next step, in the near future, included in the Azores Geopark activities plan, is monitoring of the shallow submarines geosites in partnership with regional dive companies.

NATURAL HAZARDS MANAGEMENT IN ISLANDS GEOPARKS: THE CASE OF EL HIERRO (CANARY ISLANDS, SPAIN)

J. Medina[1]* & J. Poch[2]

[1] Cabildo El Hierro Road Transit Authority & El Hierro GPK Team, Chief in charge -Scientific Coordinator, Valverde, Spain, [2] Dept. of Geology, Universitat Autònoma de Barcelona & El Hierro GPK Team, Barcelona, Spain,
* Jose Medina (jmedina@el-hierro.org)

Keywords: *Volcanic island, small territories, landslides, rockfalls and floods*

The planning process in small areas, like volcanic oceanic islands, does not usually include measures to reduce natural hazards and, as a consequence, natural disasters cause needless human suffering and economic losses. From the beginning, planners must implement infrastructures: roads, public settlements etc. in areas subject to natural hazards. Adequate planning can minimize damage from these events, but in such territories it is a difficult matter.

The core of this presentation shows how intricate and satisfactory can be the work on natural disasters in the El Hierro isle, due to their individual characteristics: territory, established infrastructures, etc. and how the role of the new geopark framework may assist in hazard reduction. This includes scientific work on the assessment of natural hazards (including earthquakes, volcanic eruptions, landslides and various hydrological risks). Activities include the strengthening of traditional knowledge and hazard management by local communities, increasing in geophysics, geochesmistry and geomechanics monitoring (Seismic, GPSs, etc.), and others, plus the better local design and setting up of reliable early warning systems and dissemination of mitigation measures, and proper information education and public awareness.

Traditional awareness and hazard management from our local communities give us experience and wisdom that combines with the state –of-the-art scientific techniques that help to remediate the risk from natural hazards.

Past, recent and ongoing work includes contributing to the 2007 flood in El Pinar, 2011 La Restinga eruption, 2011-2014 earthquake series and several important landslides across El Hierro island.

NEW METHODOLOGIES FOR THE PROMOTION OF GEOLOGICAL HERITAGE USING MULTIMEDIA TECHNOLOGY, 3D AND AUGMENTED REALITY

Ivaneide Santos[1,2], Renato Henriques[1], Gorki Mariano[2] & Diamantino I. Pereira[1,3*]

[1] Institute of Earth Sciences, Pole of the University of Minho, Braga, Portugal, [2] Geology Department, Federal University of Pernambuco, Brazil, [3] Terras de Cavaleiros Global Geopark, Portugal
*Diamantino I. Pereira (insuad@dct.uminho.pt)

Keywords: *Geological Heritage, 3D, Panoramic Photography, Augmented Reality*

The Internet and several hardware and software options that are currently available are very efficient ways for the promotion of geoparks, geoheritage and geosciences.

The aim of this paper is to present a new and interactive way of gathering data into a website, based on several new web and photogrammetric technologies, applied to the Terras de Cavaleiros Global Geopark (Portugal).

For this purpose, the open source language WebCL was used to make available a three-dimensional and fully interactive 3D model of the area, which allows the insertion of layers representing features such as geology, geomorphology, hypsometry, slope and many other layers. This model allows the access to several levels of information, with geographical context, made available by using clickable hotspots. Those layers include real landscape panoramic images, from which several embedded levels of information can be accessed through overlaid clickable hotspots and visual interpretation guides. These images, covering the entire surrounding environment, can be used on the field, pointing to the real observed features and, interactively, gather more knowledge about them. The point of view can be synchronized with the real landscape by using sensors from most nowadays-portable platforms. These sensors include GPS, accelerometers, gyroscopes and magnetic compasses. This way, these panoramic images can be used as augmented reality technology, acting like a virtual guide for the landscape. The information from both the 3D terrain model and the panoramic images, include text, videos, animated interpretative models, links to websites, etc. In some cases, were also produced 3D digital surface models, using photogrammetric 3D restitution techniques from images collected in field by using Unmanned Aerial Vehicles (UAV's). These models can be textured with real image information and are fully interactive, allowing the visualization from several viewpoints. This can represent a new way of visualize geological features that are not clearly or visible, or even impossible to see, from a ground viewpoint.

All this experience is easily accessible from locations were the network signal is stable and fast. Problems can occur in remote locations, common in geoparks, were there's no network signal or this signal has not enough quality to provide a pleasant experience. In this case, offline data can be provided or, in the case were there's a limited network signal, the placement of small QRCodes can allow the access of links with the contextual partial information about each site.

PALEONTOLOGICAL MAMMAL OR MAMMAL FOOTPRINTS SITES IN THE LUBERON GEOPARK (FRANCE)

B. Ménouret[1], C. Balme[2] & S. Legal[2*]

[1] 3 rue de l'Amouroy - 13680 Lançon de Provence – France.
DAR Paleontology, University Claude Bernard Lyon 1
[2] Parc naturel régional du Luberon, 60 place Jean-Jaurès - 84400 Apt - France
* Stephane Legal (stephane.legal@parcduluberon.fr)

Keywords: *mammal, paleontology, Eocene, Oligocene, Miocene, Luberon*

The purpose of this study, conducted by Bernard Ménouret, is to make a list of deposits that provided remains of mammals or showing mammal footprints and establish an updated and supplemented list of fossils.
This study highlights the richness of the Luberon area for mammal paleontology both by their number and by their diversity.
Currently thirty-five locations in a third of the Geopark municipalities are concerned by mammal paleontology:

- two Eocene deposits, including "La Débruge" site, type-locality of the MP 18 zone, and where 18 taxa have been defined. In the 19th century, this site has provided abundant material distributed in major European museums;
- fourteen Oligocene deposits covering MP 23 to MP 26 and MP 30 reference-levels; some of them are type-localities of several taxa: the perisodactyl *Plagiolophus huerzeleri*, two rodents, two insectivora… The Vachères site yielded a complete Bachitherium skelton from platy limestones;
- eight Oligocene mammal footprints slabs that are rare evidences of behaviors and presence of faunas where no or few body fossils are known. The footprints are attributed principally to rhinoceros and even-toed ungulates (deer, entelondon…). In total, the worldwide record of mammal footprints is scarce, with less than 80 known localities: this makes the Luberon an exceptionally rich region of this kind of record;
- eleven Miocene deposits including the well-known place of Cucuron that yielded 1200 fossils to Albert Gaudry, in the 19th century, corresponding to 32 mammal taxa and two turtle species. The genus *Hipparion*, has been defined in Cucuron.

This study highlights the importance of mammal fossil sites in the Luberon that make this area an exceptional territory at an international level.

PHYSICAL ACTIVITY AND HEALTH PROMOTION IN OBESE ADULTS: THE POSITIVE ROLE OF GLOBAL GEOPARKS

H. Moreira[1,2,3], R. Gabriel[1,2,4*], A. A. Sá[1,5,6], A. Alencoão[1,5,7], E. Cabecinha[1,3,8], A. Faria[3,9,10] & E. Silva[11]

[1] University of Trás-os-Montes e Alto Douro, Vila Real, Portugal, [2] Department of Sport Sciences, Exercise and Health, [3] Research Center in Sports Sciences, Health Sciences and Human Development (CIDESD), [4] Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB), [5] Department of Geology, [6] Geosciences Center of the University of Coimbra, [7] Center for Geophysics from the University of Coimbra, [8] Department of Biology and Environment, [9] University of Beira Interior, Covilhã, Portugal, [10] Department of Sport Sciences, [11] Portuguese National Commission for UNESCO, Ministry of Foreign Affairs, Lisbon, Portugal.
* Ronaldo Gabriel (rgabriel@utad.pt)

Keywords: *Exercise, fat mass, health promotion, healthy lifestyles, Global Geoparks*

In 46 of the 53 Member States of the World Health Organization of the European Region more than 50% of adults (≥ 20 years) revealed excess weight or obesity. The high adiposity, particularly the visceral, is associated to an altered production of adipokines and chemical mediators that promote the development of a proinflammatory and prothrombotic state, forerunner of illnesses such as cancer, osteoporosis and cardiovascular diseases.
The increase in total and intra-abdominal fat is reinforced by the presence of reduced levels of physical activity. Data from the most recent Eurobarometer of Sport and Physical Activity indicates that 59% of Europeans do not exercise or play sports and among these less than 11% meet the minimum level of weekly moderate activity recommended in literature. In this context, must be noticed that Parks and other natural open spaces are the places most valued by Europeans (40%) to practice physical activity.
Combining the protection and promotion of the geological heritage with the development of local sustainability, Global Geoparks can become an excellent environment to promote exercise and weight control, with association to the energy expenditure obtained in the completion of the trails and routes that connect geosites and other places with scientific, educational, cultural and scenic values inside these territories.
The interaction with nature encourages drawing closer to an ecological approach to human health. The presence of natural contexts that have green spaces and water, autochthonous flora and fauna, and pathways that enables the execution of various activities (e.g. aquatic, equestrian, walking and running) prove to be effective in the adoption of regular physical activity in the obese.
The aroma of essential oils released from the trees and other plants improves immune function, incrementing the activity of the NK cells. The synthesis of adiponectin by the fat tissue is increased, reducing the apoptosis, the inflammation and the oxidative stress. The natural environment also contributes to the increase in social capital.
In conclusion, Global Geoparks can contribute to the maintenance of a healthy weight in obese adults, facilitating their commitment with healthier lifestyles.

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PROMOTING SOCIAL AWARENESS. THE PARTICIPATION INITIATIVES IN VILLUERCAS-IBORES-JARA.

J. López[1*]& J. M. Barrera[2]

[1]Geography Department, University of Extremadura, Cáceres, Spain.
[2]Villuercas-Ibores-Jara Geopark, Director, Cáceres, Spain
* Javier López (javier@aprodervi.com.es)

Keywords: *Social awareness, Villuercas-Ibores-Jara, LEADER Group*

Promoting awareness of the local population about the concept of geopark is a crucial aspect in their development. Social participation actions that were carried out in Villuercas- Ibores –Jara during the last years are described in this communication.

The LEADER Group "APRODERVI", a Villuercas- Ibores-Jara Geopark's local partner, was in charge of this task. It has driven different initiatives with social groups such a women associations, seniors, disabled people, institutional managers, professionals working in the territory, primary sector entrepreneurs, accommodation managers, restaurants and tourism companies and young students. Activities for general public and visitors have been also available. These activities were recorded in the Geopark Journal that is periodically delivered in paper and digital formats.

The activities' design was aimed at the recipients. Evaluation provides qualitative data by means of interviews to the participants. Quantitative data were collected in order to be contrasted with the expected participation.

For the youngest, fun workshops consisting in fossil replicas and rock paintings were organized. Scholar join-together days (Geoconvivencia) and short field trips were successfully celebrated. Finally, flashcards adapted to their ages have been used in the classroom.

Locals have appreciated the field trips to the geosites in the nearby to their hometowns. While similar to their ordinary walks, they wandered them with a new perspective that led them to understand the uniqueness of their geological value. Disabled groups have also had a very active part in tours, workshops and interpreted visits to the geological sites.

It was very important to schedule meetings with some economic and social sectors that were traditionally in opposition to whatever that might threaten their livelihoods. Meetings with farmers, hunters and fishermen were useful to built confidence and to assure that the Geopark does not threat their way of life and their economical activities.

Institutional support has been continuous throughout the process. Their representatives were present in seminars and activities organized to improve their own knowledge about the Geopark. They have supported the process by placing Geopark banners in all the town halls. The design of merchandising material has helped to spread the Geopark image.

Participation has had a remarkable success in social media. In facebook (GeoparqueVilluercas, 1900 fans) updated information is found supplemented by the citizenship advices and their posts, images and proposals. The diffusion is daily renewed on Twitter: @VilluercasGPark (2640 followers).

The results can conclude that the targeted people understand the reasons of being a Geopark and, moreover, they feel they are an important part of it.

PROMOTION OF GEOPARKS AND GEOTOURISM THROUGH A NEW THEMATIC MAP SERIES ABOUT NATURE AND GEOLOGY

F. Huber[1] & F.W. Eder[2*]

[1] Huber Kartographie, Dürrstrasse 1, D-80992 München, Germany
[2] Earth Science Matters Foundation, c/o Univ. Göttingen, Dept. Earth Sciences, Goldschmidtstr. 3 , D-37077 Göttingen, Germany
[*] Franz Wolfgang Eder (w.eder-geo@hotmail.de)

Keywords: *Geoparks, Geotourism, Thematic Maps, Geology, Nature*

One traditional challenge of many international organizations, like UNESCO, IUGS or IUCN is the promotion of knowledge and understanding of our Planet Earth and to further elucidate the importance of earth sciences to society – thereby also fulfilling an educational mission. *Geoparks* have been selected by these and other bodies as an excellent theme to meet the anticipated goals on an international agenda.
A prominent tool to reach out to decision makers, the public and tourists (and to develop a 'Respect of Nature') are **excellent maps**, providing best information available in the source countries of tourists in a well balanced manner within a geo-scientific and socio-cultural realm.

'Huber-Kartographie' and *'Earth Science Matters'* (ESM) subscribe that - more than ever - Geoparks are necessary, but:

- How their impact could be enhanced?
- How they can be better promoted?
- How people worldwide shall be informed about Geoparks and attracted to visit them?
- How Geoparks can increase their revenues to be able to fulfill their tasks?

'Huber Kartographie' proposes a new, harmonized thematic map series about nature and geology that might be of interest for the global Geoparks community. While respecting the individual (and most probably rich) practices of each Geopark in producing information including maps to their visitors, we would like to invite all Geoparks to consider the following:

- All Geoparks which are interested to join in will be provided with maps of the same high quality, generated by elevation models of satellite images.
- All maps will have the same appearance, symbols, title, etc.
- The maps will be frequently updated; of course, in cooperation with the Geoparks.
- The maps are nearly worldwide available in the bookselling trade and other distribution channels like Amazon. Smartphone apps will be world-wide available.
- Geoparks can use the maps on their homepage.
- Because of the high quality of the maps they can be sold profitable by the Geoparks as well.
- More tourists expected for the Geoparks.
- No need for the Geoparks to spend money in the future on maps and to bother about own maps and how to distribute them effectively.
- The Geoparks will be promoted by publishers in many countries.
- The corporate identity will be strengthened, because of the same appearance of the maps according to the rules of the Geoparks.
- Each finished map will be advertised in the magazine “natur".
- Relevant information will be published as well in several hiking and biking magazines and other media.

Funding of the maps:

- Kartographie Huber GmbH and her project partners will fund the maps.
- Geoparks support their own map with 5.000 Euro, each Geopark will be provided with 1.000 copies in return for free. Retail price will be about Euro 8,90.

RECREATION AREAS IN LAKE SAIMAA AREA

H. Ollikainen[1*], S. Poutamo[2] & M. Kähtävä-Marttinen[3]

[1] South Karelian Foundation for Recreation Areas, Lappeenranta, Finland, [2] Saimaa Recreation Area Association, Mikkeli, Finland, [3] Imatra Region Development Company Ltd, Imatra, Finland
* Hanna Ollikainen (hanna.ollikainen@ekarjala.fi)

Keywords*: Saimaa, Recreational areas, Boating, Canoeing, Nature harbours*

Lake Saimaa is the largest lake in Finland and the fourth largest in Europe. Lake Saimaa flows via River Vuoksi into Lake Ladoga in Russian Karelia and all the way via the River Neva into the Gulf of Finland. The complete waterway system, of which Lake Saimaa forms the main part, consists of a vast net of lakes in Eastern Finland.

The counties of South Karelia and South Savo cover the most southern parts of the water system including the main lake basin Great Saimaa and the outlet River Vuoksi. Here the landscape contains a big percentage of water of the surface. Additional visible geographical elements are bigger and smaller eskers formed during Ice Age, ancient bedrock coming out in between. The two large Salpausselkä ridges created also in the end of the Ice Age give a distinct character for the area. They can be detected easily on the southern shore of Lake Saimaa and on Kyläniemi island, in the centre of Great Saimaa. This lake area is intended to form Saimaa Geopark.

The diverse environment of Lake Saimaa provides opportunities for both living and recreation. There are hundreds of kilometres signposted fresh water waterways connected to the Baltic Sea trough Saimaa Canal. It is an outstanding way to spend leisure time boating and canoeing in the lake labyrinth and refressing oneself on beaches and cliffs in clean nature. According to "everyman's right" it is possible to go ashore almost anywhere in pure willderness.

The most convenient way is to enjoy facilities in maintained recreational harbours where there are jetties, barbecue shelters or open fire places and composting toilets available for common use on islands in the middle of the lake. If you don't prefer going on the water, you can always enjoy open lake landscape and have picnic in recreation areas onshore - free of charge for everyone. Eather in pure nature or when using free facilities there is convention not leave any mark after one's stay and to save environment clean for the next visitors.

The Municipalities in South Karelia and South Savo have ensured and financed the accessibility to natural destinations in the big lake area. In both counties there are organizations who's task is maintaining excursion harbours and recreational spots: **South Karelian Foundation for Recreation Areas** and **Saimaa Recreation Area Association in South Savo.**

The plenty of nature spots allready offer visitors great possibilities to explore marks of the geological processes and cultural heritage in the scenery of the Lake Saimaa.

THE ART, CULTURE AND TOURISM CENTRES, A CHANCE TO DISSEMINATE AND INTERPRET THE GEOLOGICAL HERITAGE OF THE ISLAND TO THOSE WHO VISIT THE GEOPARK

E. Mateo[1*] & I. Betancort[2]

[1] House of Volcanoes, Cabildo de Lanzarote, Arrecife, Spain
[2] Art,Culture and Tourism Centres, Cabildo de Lanzarote, Arrecife, Spain
*Elena Mateo (elenamateo67@gmail.com)

Keywords: *Art,Culture and Tourism Centres1, -Geological Heritage2, Geopark3*

The Lanzarote and Chinijo Islands Geopark has among its facilities for visitors, the Art, Culture and Tourism Centres (hereinafter referred to as CACT). The way in which the tourism centres are managed is public and it is also one of the geopark's means for financial support, as it generates employment for local people, and raises funds in ticket sales offices, gift shops and restaurants, also providing indirect employment.

These centres were created in 1966 by artists César Manrique and Jesús Soto, who knew well how to combine their work with the art and nature they were surrounded by, in a sustainable, respectful and artistically valuable manner. They have been individually declared Heritage of Cultural Interest under a special system of guardianship and protection. The CACT work as a network and are spread around the geopark. There are seven centres: Mirador del Río, Cueva de los Verdes, Jameos del Agua, Jardín de Cactus, Monumento al Campesino, Castillo de San José and Montañas del Fuego. In 2014, 2,605,238 visits were registered in the CACT, out of which 870,372 were visits to Montañas del Fuego.

As part of the process of the Candidature to geopark, the Island Government of Lanzarote, through the Geological and Mining Institute of Spain, conducted the first inventory of geosites. The final result added up to 63 geosites, six CACT were included on that list.

The Mirador del Río is in Risco de Famara, a cliff that originated from a debris avalanche. Cueva de los Verdes and Jameos del Agua are part of the Corona-Atlántica volcanic tube, a more than 7.6-km-long tube out of which 1.6 km is under water. At the Monumento al Campesino is possible to appreciate the contact between materials previous to the Timanfaya eruption and this eruption. The Montañas del Fuego are on one of the most original islets, or Kipukas, with the highest thermal anomalies in the Canary Islands. Castillo de San José is a low-altitude coastal area situated on the fossil beaches around 5 to 10 metres above sea level.

The process of the Candidature to geopark has increased the awareness of both locals and visitors, regarding the preservation, interpretation and dissemination of the significant geological legacy at hand. As a result, the implementation of an information and training system has been scheduled to be put in place at all CACT. This is a difficult challenge, due to the level of protection and control necessary when intervening in the centres, that will be supported by training courses on geological heritage. In order to check the effectiveness of these measures, customer satisfaction surveys shall be given to visitors to the CACT.

THE DEVELOPMENT OF A NEW ASPIRING GEO-PARK AT THE EASTERN PART OF CRETE, GREECE: THE SITIA GEO-PARK

E. Perakis[1*], S .Staridas[2] & C. Mavrokosta[2]

[1] Municipality of Sitia, Sitia, Crete, Greece, [2] Social & Cultural Development Organization of Sitia Municipality, Sitia, Crete, Greece
* Evangelos Perakis (perakisv@sitia.gr)

Keywords: *Aspiring geopark, Sitia, Crete, Geotourism*

The Sitia Nature Park is located in eastern Crete. It includes the wider region of Sitia and the coastal areas from North to South. The boundaries of the Park have been formulated clearly and include an area of 517 Km^2. The Park is characterized by a wide variety of elements of abiotic and biotic environment and is a unique geo-touristic destination recognized since many years in Crete.

By the implementation of the project "Geotourism and Local Development of Itanos and Troodos Mountains, the Operational Programme Cross-Border Cooperation" Greece - Cyprus "2007-2013", the basic infrastructure for the operation of a geopark, its management by the Management Committee (that has already been set up), and the initiation of tourism (geo-tourism) and environmental education activities have been established.

There have been designed 16 geo-trails through which visitors can wander and get to know closely the physical, geological and cultural wealth of the region. Those geo-trails also include road, biking and hiking trips. They are fully supported by modern technologies of Geographic Information Systems (GIS) and by a network of information boards (signage and directions).

Within the Park, visitors can find two information centers: the Natural History Museum of Zakros and the Centre of Speleological Research in Karidi. In these two centers, training programs are implemented about the environment and geo-diversity of the Park, while in Karidi there is also the possibility of hosting research missions. The educational programs are supported by printed material, interactive games and equipment for experimentation. An ecotourism guide book and a geotouristic map have been printed where visitors can find all the necessary information for their tour in the Park. The exhibition in Zakros consists of 12 thematic posters, interactive displays with micro-dioramas and rock samples, video projectors and a video room, where a documentary about the park is presented. The information centers of the Park provide thus all necessary information and materials produced for the region, like the various maps, the geo-trails, the geo-sites and all other useful information for the territory.

The park's web site (http://www.sitia-geopark.gr/en.aspx) hosts all products of the Sitia Nature park in pdf and other file forms, providing information on other interactive tools (like the geotrail and geosite web presentation) and connecting visitors with the Park authorities and local activities.

The aspiring Sitia Geopark is in close collaboration with Hellenic Geoparks Forum and has developed collaboration with the existing Greek geoparks and the aspiring geopark of Troodos.

THE EARLY EVOLUTION OF TRACE FOSSILS AND BIOTURBATION, VILLUERCAS-IBORES-JARA GEOPARK, SPAIN

S. Jensen[1], T. Palacios[1], J.M. Barrera[2*] & I. Cortijo[1]

[1] Área de Paleontología, University of Extremadura, Badajoz, Spain.
2Villuercas-Ibores-Jara Geopark, Director, Cáceres, Spain
* Jose M. Barrera (jmbarrera@dip-caceres.es)

Keywords: *Villuerca-Ibores-Jara Geopark, trace fossils, Ediacaran, Cambrian, Ordovician*

Trace fossils provide the earliest widely accepted evidence for bilaterian animals, from about 560 Ma onwards. The appearance of trails, burrows and other types of animal-sediment interactions (bioturbation) had far-reaching impact on sediment properties and benthic ecology and has been considered an early example of ecosystem engineering. The Villuercas-Ibores-Jara Geopark provides a unique opportunity to follow the rise and early diversification of infaunal activity from the late Ediacaran to the Ordovician (ca. 550 to 470 Ma).

Late Ediacaran sedimentary rocks in the Villuercas-Ibores-Jara Geopark yield rare simple horizontal trace fossils in sandstone and mudstone in the lower and middle Ibor Group. Characteristic for Ediacaran trace fossils, these are superficial forms, made a few millimetres into the sediment, and there is no real evidence for bioturbation. Also typical for rocks of this age, it is genuinely challenging to tell what is a simple un-branched trace fossils and what is a three-dimensionally preserved filamentous organism, such as a vendotaenid.

In rocks of Cambrian age (younger than ca 542 Ma) infaunal activity is more prominent, with complex burrow system, vertically orientated burrows and relatively large trace fossils, some more than a centimetre wide. Compared with younger sediment the extent of disruption of depositional sedimentary structures remains low, but now is noticeable. In the Villuercas-Ibores-Jara Geopark Cambrian-type trace fossils appear in sandstones overlying *Cloudina*-bearing carbonates of the Ibor Group. This includes *Treptichnus pedum*, a Cambrian index fossil.

In Ordovician rocks trace fossils often are visually striking objects and the disruption of depositional sedimentary structures can be extensive. Perhaps the best know Ordovician trace fossil are the various species of *Cruziana*, well represented within the Villuercas-Ibores-Jara Geopark by *Cruziana furcifera* and *Cruziana goldfussi*, common fossils in the Armorican Quartzite. Although *Cruziana* is generally attributed to trilobites exactly how it was formed remains a mystery; the explanation as a walking trace almost certainly is incorrect and definitely so for those *Cruziana* made deep within the sediment. *Daedalus*, typically consisting of a vertically oriented spirally coiled burrow system is another prominent trace fossil in these tocks, and one that may completely obliterate depositional sedimentary structures, imparting a structure of bedding surfaces that is completely dominated by the trace fossil.

Ordovician trace fossils area readily observable in several geosites in the Villuercas-Ibores-Jara Geopark. The presentation of Ediacaran and Cambrian trace fossils provides a greater challenge both on account of these being rather subtle objects and because the best outcrops are in locations that are not suited for geotourism, such a road cuts. We are therefore currently preparing material for display in information centres. This will include properly illuminated rock specimens and informative text.

THE TOURIST VALUES OF THE DESIGNED GEOPARKS IN SE POLAND AS VIEWED BY TOURISTS

Wojciech Zgłobicki*, Sylwia Kukiełka & Agata Pankiewicz

Department of Geology and Lithosphere Conservation, UMCS, al. Kraśnicka 2cd, 20-718 Lublin
*Wojciech Zgłobicki (wojciech.zglobicki@umcs.pl)

Keywords: *education, geoparks, Poland, tourism*

The subject of Poland's tourist assets attracts more and more attention in scientific literature. The first geoparks have been established, and designs of new ones are being prepared. The scientific basis for the development of geotourism is getting better and more complete. However, there is a lack of reliable popular science information on the geotourist values of the particular regions, lack of promotion and shortage of developed tourist products.

The study objective was to identify the level of knowledge and rating of geotourist areas located in south-eastern Poland, for which geopark designs have been prepared. These regions are characterised by valuable geoheritage that formed the basis for preparing the designs of two Geoparks: "Kamienny Las na Roztoczu" ("The Stone Forest in Roztocze") and "Małopolski Przełom Wisły" ("The Małopolska Vistula Gap"). A total of 369 survey questionnaires have been collected from tourists visiting the areas above.

The analysis of the results indicates a medium level of knowledge of the key concepts associated with geotourism as well as a a poor promotion of the designed geoparks (about 15% of tourists are familiar with this term). Only 20% of the respondents think that these areas are characterised by valuable geoheritage. Some geosites are highly rated by tourists, and these are mainly river valley gaps, gullies and viewpoints. Many valuable geosites, however, are very little known and, consequently, poorly rated. The lack of sufficient accessibility and infrastructure is another obstacle to the development of geotourism. The results obtained indicate the need for a more intensive promotion of the region's geotourist values, primarily via the Internet that represents a basic source of information to tourists.

VIKOS - AOOS GEOPARK: GEOSITES AND THEIR SPECIAL CHARACTERISTICS

P. Paschos[1*], E. Nikolaou[1] & H. Papaioannou[2]

[1] IGMEM, Geologist, Preveza, Greece, [2] Epirus S.A.
Biologist, Ioannina, Greece
*Panagiotis Paschos (panospaschos@yahoo.gr)

Keywords: *Vikos - Aoos, sedimentary rocks, karstic field, Pindos*

Vikos- Aoos Geopark is one of the four Greek Geoparks and was delighted to become a member of the European and Global Geopark Networks in 2010. It is located in the region of Epirus, Ioannina, NW Greece.

It occupies the NW part of the Pindus Mountain Range and is characterized by a high rugged relief and an impressive landscape which includes Mt. Smolikas (alt. 2637m) the second highest mountain in Greece and Mt. Tymfi (alt. 2497m) and the two spectacular gorges of Vikos and Aoos.
The contribution of geological processes is fundemental to the configuration of physiognomy of the environment and to the development of features in the landscape.

The area is formed of sedimentary rocks assigned to the Ionian geotectonic zone, and secondarily to the Pindos geotectonic zone. Part of the Geopark is constructed from ophiolite complex on Mt. Smolikas which is obducted on the Pindos Zone.

Twenty million years ago, due to the collision between the African and the Eurasian plates, powerful compressive movements prevailed in the Greek area, resulting in the thrusting of the Pindus zone onto the Ionian zone. The sediments were deformed, creating folds and faults.

At present, the extensive area contains an upland high karst area, which was covered by glaciers at intervals during the Pleistocene. The alternating glacial and interglacial environments, combined with geodynamic processes and rapid uplift, resulted in the development of an upland karst in which favorable conditions for intense erosion, produced the area's distinctive relief. Copious amounts of runoff following discontinuities caused by the faults and have eroded the limestone, creating the deep gorges. These deep gorges revealed the stratigraphy of the rocks which make up the geological structure and history of the area. Thus taking a good look at the Aoos or Vikos gorges, we can observe on a large scale the succession of limestones that were created millions of years ago in a deep sea which, after complex geological processes, were elevated to altitudes reaching 2,400 m.
The geological heritage of the Vikos-Aoos Geopark is characterized by the following important features of geological interest:

- The Landscape
- Stratigraphy of sedimentary Rocks
- Lithology and tectonics of ophiolites
- Tectonic features (thrusts, faults, folds)
- Erosion and deposition of limestone by groundwater
- Groundwater systems
- Karstic landscape
- Glacial Landforms
- Neotectonic evolution
- Prehistoric Archaeology

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