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Conference themes

Aspiring Geoparks

Conservation, Science and Research

Education, Interpretation and Communication

Engaging Communities

Geotourism, Cultural Tourism, Sustainable Development and local products

Health and Well being through Creative and Active Engagement

Mature Geoparks – sharing success and challenges

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Aspiring Geoparks

Oral Presentations



THE APPALACHIAN GEOPARK PROPOSAL: HERITAGE AND HOPEFUL FUTURE IN THE MOUNTAIN STATE OF WEST VIRGINIA, USA

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Keywords: aspiring, Appalachia, West Virginia, USA, heritage

Although the United States currently has no Geoparks, it clearly possesses areas that would be appropriate for Geopark status, and a prime candidate is the Appalachian region of southern West Virginia (WV). The Appalachian region is rife with deep gorges and ancient rivers that drove the rise of the US industrial revolution of the late 1800s—primarily through coal, timber, and from the waters of the many rivers that mark the landscape. The southern WV coal mining communities produced the fuel that transformed rural America into an industrial power, and the area includes an exhibition coal mine and National Park Service coal mining exhibits and communities. There are also heritage aspects linked with railroad, historical and military history, rural communities, WV State Parks and US National Forests. Recreation opportunities include innumerable trails, biking, climbing, bird watching activities, and some of the best and most notorious white-water rapids in the world. Locally produced and coal related geoproducts, including “coal candy” and “coal jewellery” can be found at the “Tamarack,” a showcase of Appalachian arts and crafts. Tourism in the area is well developed and the proposed setting is strategically located. Over 60% of the US population and virtually all major cities in the eastern half of the US is within a day’s drive on a high quality road network.

The geosites inventory will determine the boundaries, and within the confines will be the three National Parks of southern West Virginia, and numerous rural communities in between. While West Virginia offer is a beautiful, mountainous setting, its future can be brightened only through sustainable development, education, and the preservation of the setting. With this Project, the Geopark concept can be linked to a revitalization effort in southern WV, offer new opportunities to develop the communities, and forge a sustainable future.

ARAS ASPIRING GEOPARK: CONTROLLING AND FINE-TUNING RAPID DEVELOPMENT

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Keywords: *Aras, Iran, geopark, development, local community*

One of the world's rarest and the most famous locations for visiting the Permian-Triassic Boundary is in the Aras Area in northwest Iran. This attraction and the other geological sites, along with natural and cultural attractions, especially the old, historical churches, provide a unique collection of geological and cultural heritage in this part of the country.

The nominated area is in the Aras Free Zone, which is currently being rapidly developed because of its tax-free status. Numerous industrial and commercial projects are underway. With these development projects, the protection and conservation of the existing attractions (geological, natural and cultural) is essential. The geopark concept is an obvious solution for controlling and fine-tuning the development programs to make them sustainable.

Another important issue involves the local communities, which are not directly involved in the development programs. There are no tangible benefits for them, and most of the investors are from other areas. One of the main aims of this aspiring geopark is to get locals involved and define a role for them, especially in tourism and protection programs. This is part of the planning and is included in different strategies and policies.

Regarding the role of geoparks in local community livelihood improvement and the protection of cultural heritage, AFZ Organization has run different programs in recent years to achieve the recommended measures and meet the geopark standards, and is getting close to reaching its goals. These programs include developing and improving geosites and interpretation facilities, educating and training locals, supporting local production and handicrafts as geo-products and negotiating legal protection for the main geosites.

If this area is granted the UGG label, it can receive more support from the local and central governments to follow up on the geopark aims and targets and continue to make progress on this road.

THE ASPIRING GEOPARK ESTRELA, PORTUGAL: A LAND OF SCIENCE, EDUCATION AND CULTURE

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Keywords: *Aspiring Geopark Estrela, Serra da Estrela, development, geological heritage, landscape*

Serra da Estrela is geographically, a well-defined territory, with features of geological and geomorphological interest, not always properly valued. The diversity of glacial marks, the richness of its heritage and the character of its landscape give this area a unique geography that, with a structured approach will create a strong brand, with scientific, cultural and tourist potential.

The Aspiring Geopark Estrela consists of the municipalities of Guarda, Seia, Gouveia, Celorico da Beira, Fornos de Algodres, Manteigas, Belmonte, Covilhã and Oliveira do Hospital, in Center of Portugal, just 90 kms from Coimbra and 150 km from Oporto, with a total area of 2737.72 km² and 171,668 inhabitants. In addition to the municipalities, two higher education institutions, the Polytechnic Institute of Guarda and the University of Beira Interior are also part of this area.

Serra da Estrela, the most imposing mountain of mainland Portugal, is characterised by its geological diversity, granite being the predominant rock. However, in this area we can also observe other lithologies such as shales and greywackes, aged between 500 and 650 million years, and recent sedimentary deposits. However, the great feature of this Aspiring Geopark lies in its glacial and periglacial remains, mostly from Würm, as can be abundantly observed. The Aspiring Geopark Estrela has about 100 geosites, predominantly related to the glacial and periglacial remains, highlighting the towering shapes of glacial valleys, the pits or deposits of glacial origin, in addition to granitic forms and existing lithological influence.

However a Geopark is not constituted only by its geological heritage. Populations are a reflection of their places and communities that give it identity and personality. The sense of belonging of a geopark lies precisely in the way that its residents and visitors interpret the heritage around them. Serra da Estrela is a territory with an ancient history, where the identity of its landscape reflects the values and traditions of its people.

THE ASPIRING GEOPARK LAUHANVUORI REGION: FROM WOLF CAVE TO HUMMOCKS AND PUDDLES

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¹Metsähallitus

Keywords: *aspiring geoparks, Finland, Lauhanvuori region, mire, wolf cave*

The aspiring Geopark Lauhanvuori Region is located approximately 300 kilometres North-West of Helsinki, Finland. The landscape consists primarily of quaternary deposits. Geological features vary from steep-ridged eskers to supra-aquatic moraine. Various beach formations resulting from post-glacial land uplift taking place during the last 11 000 years are also well displayed. Striking for Finland with recurrent glaciations is the 500 million year old sandstone, preserved and exposed in Lauhanvuori. The whole area is underlain by a partially exposed nearly 2000 million years old crystalline basement.

The newest geological features in Lauhanvuori Region are mires. Mires began forming when new land rose from the sea during the post-glacial land uplift. The current mires form an unusually large oasis of wilderness and quietness: nowhere else in Southern Finland have mires been preserved or restored in natural state at such extent. They are also easily accessible for a day trip from the busy capital.

An interesting addition to the exotic nature of Lauhanvuori Region is the Wolf Cave. It features very old granite that has been horizontally cracked to form a network of caves. During prehistoric times, humans took shelter in the crevasses and as of today, the Wolf Cave is the only place in the world, where evidence of human inhabitancy has been found in a place that was later covered by a continental glacier.

Lauhanvuori Region submits its application to UNESCO Global Geoparks in 2018. A large amount of actions are now taking place in order to improve the area's geological, natural, cultural, educational and touristic performance and to establish an efficient management structure with comprehensive connections to the area's key players.

ASPIRING GEOPARKS IN THE UNITED STATES – MICHIGAN’S KEWEENAW PENINSULA

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Keywords: *geoheritage, US geoparks, geosite inventory, Keweenaw Peninsula, geodiversity*

Michigan’s Keweenaw Peninsula is imbued with a deep sense of place owed to its rich geologic history and the extraordinary passage of people through this region. As one of the oldest metal workings in the Western Hemisphere, and the site of the Keweenaw copper boom in the late 1800’s enticing a vast mosaic of European cultures to the region, the Keweenaw is unquestionably endowed with a fascinating cultural, mining, and industrial heritage. Underpinning the human story is the less interpreted geohistory - one billion years of vastly different geologic processes that have shaped the landscape and a rich geodiversity. This compelling intersection of geologic and human history makes the Keweenaw an exemplary aspirant for a geopark designation.

The geodiversity of the Keweenaw is comprised of massive flood basalts associated with the Late Mesoproterozoic Midcontinent Rift and interbedded red bed fluvial sediments. The Keweenaw Fault, a massive thrust fault, uplifted these layers bringing one of the world’s largest native copper deposits to the surface. The area has also been affected by dramatic continental glacial features and is surrounded by the world’s largest freshwater lake, Lake Superior. A Keweenaw geosite inventory has been created through a qualitative and quantitative assessment to illustrate this geodiversity. The inventory has been instrumental in identifying geosites that best exemplify the most significant and representative sites of the Keweenaw for a geopark designation.

The benefits of geoheritage and a geopark designation are being explored and developed in the Keweenaw through an evolving community partnership. As geoheritage advances through a prolific education and outreach program, sustainable economic opportunities and conservation efforts are also being explored and developed in the Keweenaw. There is an escalated momentum in our community aimed at advancing this concept; as such, the Keweenaw Peninsula could be the first geopark designation in the United States.

ASPIRING GLOBAL GEOPARK WITH THE GIANT COLUMNS: MUDEUNGSAN AREA NATIONAL GEOPARK (KOREA)

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Keywords: *Mudeungsan Area Geopark, Mudeungsan, columnar joint, Korea*

The Mudeungsan Area Geopark is the attractive Geopark with key geological sites from the Mesozoic era located in southwestern Korea Peninsula. There is 23 geological sites in this geopark which can be divided into two major sections, the mountain of Columnar joints and the huge sedimentary layers. The Mount Mudeung is known for its huge, broad occurrence of columnar jointed colonnades in the Cretaceous Mudeungsan Tuff (Lim et al., 2015). Most Colonnades in the Geopark are located more than 700 metres above mean sea level and show elevation-dependent variations in the mean face width of the columns. The sedimentary layers made in Mesozoic era are found in the area of Hwasun and Damyang, where the stratification is well-developed. The Hwasun Dolmen Site is a recognised World Heritage Site made from tuff and its stratification. Also, this Geopark includes the dinosaur footprint fossil site and the study of the accelerating phase of a theropod trackway had performed in this site for the first time in the world. Besides, this Geopark include the wonderful geological sites such as Jeok-byeok where the out crop shows well-developed stratification and Unjusa(Temple) which include the various figures of Buddha hewn out of the stratific tuff. These various geological sites have been protected by the local government and local residents for a long time. Especially, in 1988, the part of the military unit which located on the top of the mount Mudeung and dining facilities were moved and the local government restored vegetation in its places during 10 years since 1996. All this seems to be have been possible thanks to the civic group which loved mount Mudeung established nearly 30 years. The activity of the local residents surrounding Mudeungsan Area Geopark is essentially in agreement with the purpose of the Geopark.

ASPIRING TROLLFJELL GEOPARK – PROMOTING SUSTAIBALE TOURISM BASED ON EXCEPTIONAL GEOLOGICAL FEATURES

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Keywords: *aspiring Geopark, geotourism, sustainable development, nature-based experiences, tourism strategy*

The aspiring Trollfjell Geopark, central Norway, is established upon the knowledge and impression of a rich and unique geological heritage. Trollfjell Geopark offers its visitors new experiences by linking nature and culture, in addition to providing our children and youth knowledge of science and history.

The need for local tourism to preserve the “wilderness feeling” and avoid “mass tourism” is a perfect match with geotourism. The geological attractions in the area are unique and diverse. In the ophiolite complex at the island of Leka, designated as the geological Monument of Norway, you can walk on 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 aspiring geopark intends to assist the region in its efforts to provide sustainable, world-class experiences in line with the vision for the regional tourism strategy (“Tourism Strategy for South Helgeland 2020”). The strategy involves providing enjoyable nature-based experiences, such as nature safaris, theme-based tourism and new product concepts, and adding content to them in line with the objectives of a geopark.

In this presentation, we aim to present the aspiring geopark, the geological features and nature-based experiences we have, and our strategy for sustainable regional tourism development.

AUSTRALIAN GEOTOURISM – PATHWAYS FOR FUTURE DEVELOPMENT REVEALED

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Keywords: *Australia, geotrails, geotourism, geoparks, pathways*

The serious pursuit of ecotourism in Australia emerged nearly 25 years ago through the establishment of an industry grouping, Ecotourism Australia. Whilst the potential for geotourism was first recognised in Australia in 1996, the concept was only conceptualised locally by the convening in Western Australia of a Global Geotourism Conference in 2008, with the subsequent establishment of geotourism constituencies, firstly by the Geological Society of Australia in 2011, and then by Ecotourism Australia through the creation of a Geotourism Forum in November 2013.

As well as noting the rapid emergence and growth of geoparks overseas, in Australia however, the concept of ‘geotrails’ is thought to offer, as a first step, a universally acceptable mechanism for delivering geotourism experiences through a journey linked by an area's geology and landscape ‘as the basis for providing visitor engagement, learning and enjoyment’. Geotrails can offer the advantages of relating directly to the tourism experience of a journey linking destinations and should incorporate and package in the biodiversity and cultural components (including mining heritage) of the region through which the geotrail traverses.

For geotourism to reach its potential nationally, new pathways for development such as geotrails need to be implemented, having regard to government interest in nurturing regional development and new job creation through celebrating geotourism, geological and mining heritage. Various iconic national landscapes and the development of a range of existing and proposed geotrail projects also offer exciting new opportunities for geotourism growth, whilst not overlooking Australia’s extensive protected areas as venues for enhancing geological and landscape interpretation and education as part of the overall ‘nature-based’ tourism mix.

Recently, several exciting geopark/geotrail proposals (offering UNESCO Global Geopark potential) have now emerged within two Australian regions under the auspices of supporting government agencies. These proposals are addressed in the presentation.

BARINGO ASPIRING GEOPARK IN KENYA: AN EXAMPLE OF A COLLABORATIVE INITIATIVE BETWEEN LOCAL STAKEHOLDERS AND THE KENYAN NATIONAL COMMISSION FOR UNESCO

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Keywords: -

Local stakeholders of Baringo County (Kenya) have been working to use the huge geological heritage potential of the county as a tool for sustainable development. Thanks to the efforts of a few community leaders, the county government has recognized the geopark initiative as a way to realise this potential and has included the development of a geopark in the county's strategic plan. To take this forward, the Kenyan National Commission for UNESCO, the UNESCO Nairobi Office and an expert from the Global Geopark Network (GGN) undertook a preliminary assessment visit to the county in May-June 2016. Baringo County is endowed with beautiful landscapes resulting from the development of the East African Rift Valley system. The Bogoria salt lake with its flamingos and numerous geysers, the Baringo fresh water lake with its surrounding economic activities, the Bartabwa area with its rich fossils (fish, reptiles and mammals) and its community fossil museum, the Equator crossing at Mogotio with a tourist information centre in construction, the Chebloch gorge, the community involvement in greening the county, and the strong organisation of socio-economic activities around community structure are some of the important assets for a geopark in the region. A stakeholder workshop at the end of the reconnaissance visit has revealed the community's in-depth knowledge of linkages between their environment and the potential economic, social and cultural benefits. The commitment of local stakeholders to work towards the development of a geopark in their county through a bottom-up approach and in partnership with the Kenyan National Commission for UNESCO is an example that can inspire many other initiatives in the region.

BUSINESS SECTOR ROLE IN THE GEOPARK DEVELOPMENT: CASE STUDY OF PT BIO FARMA (PERSERO) IN THE DEVELOPMENT CILETUH GEOPARK

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Keywords: *community development, Ciletuh National Geopark, business sector, Bio Farma, aspiring geopark*

Ciletuh Geopark located in Sukabumi Regency, West Java, Indonesia was established as one of Indonesia's National Geoparks on December 22, 2015. This achievement cannot be separated from the role of Bio Farma, a WHO pre-qualified life science company, in the development of the region. Bio Farma's competency in life science is not only focused on manufacturing vaccines, but also in developing socio-economic sustainability of society. Based on this principle, Bio Farma has a commitment in the implementation of Corporate Social Responsibility programmes based on "create shared value".

Since Ciletuh region is located in a remote area, which has limited sources of economic income, community development programmes were needed in this region to increase the standard of living. These programmes were implemented in collaboration with stakeholders in the region, hosted within an institution, Ciletuh Geopark Development Coordination Team formed by West Java Province and Sukabumi Regency administration. It contains representatives from of Government, Academia, Local Community, and the Business Sector (Bio Farma).

Activities on community development programmes held by Bio Farma in 2013-2015 at Ciletuh Geopark included introducing the geopark concept to the local community; capacity building of local community; clean water supply piping for the community; local homestay and tour guides coaching; development of environmental friendly batik art (The Batik Pakidulan); preservation of endemic plants, mangroves and coral reefs; and facilitating access to medicine and healthcare services. From those activities, 40 households, 2 homestays, and 21 micro business have become the beneficiary of clean water supply. In the tourism sector, 23 homestays were developed, and there were 18 tour guides who have had an increase of 1,133% in salary compared to the year 2013. As many as 706 visitors came to Geopark Ciletuh until mid-2015, an increase of 100 times compared to the year 2013.

CAO BANG – AN ASPIRING GEOPARK IN A TROPICAL MATURE KARST LANDSCAPE

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Keywords: *mature karst, cave, turlough, fault, landscape*

Located on the Northern border between Vietnam and China, the Cao Bang aspiring Geopark occupies more than 3,000km² within eight districts of Cao Bang Province. A substantial central part of the Geopark is mature karst developed on Paleozoic limestone, demonstrating broad interconnected valleys, isolated towers, rigorous fossil and active caves with magnificent speleothems, underground and surface rivers, including a "turlough" system of lakes and the world's fourth largest waterfall on an international border. This mature karst of international significance contrasts radically with, but complements, the young karst terrain in Dong Van UNESCO Global Geopark, Ha Giang Province, which is 250km to the west. Added to this mature karst system, the western part of the Geopark features granitic intrusions rich in minerals and hydrothermal alterations. The Geopark is moreover dissected by a deep-seated fault with pillow basalt dating back more than 330 m.y., indicating the closure of an ancient ocean that once existed in the area. A series of lakes existed along this fault ca. 50-60 m.y. ago, resulting in beautiful stratigraphic cross-sections. The Geopark also includes an extensive natural forest cover protected as a national park and several nature reserves which are important wildlife habitats of endemic plant and animal species. On top of this geo-diversity and bio-diversity, and in addition to much evidence of pre-historic cultures dating back at least 30 k.y., the Geopark is home to several ethnic minority groups who have settled, adapted to the environment and further developed the area, displaying rich traditional cultures. Harmonious inter-relationships between the people and environment have created a range of distinctive cultural landscapes with many historic and religious sites of national significance. A tourism master plan for the whole province has been prepared and the Geopark encompasses all the major tourist destinations mentioned in this plan.

CHANGING CONCEPT AND STRATEGY OF NATIONAL GEOPARK TO BECOME AS UNESCO GLOBAL GEOPARK – THE EXAMPLE OF SAKURAJIMA-KINKOWAN NATIONAL GEOPARK (JAPAN)

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Keywords: *aspiring geopark, concept of UNESCO Global Geopark, boundaries, strategy*

Transform process from Japanese National Geopark into a candidature for UNESCO Global Geoparks needs great changes in strategy and definition of our territory. Thanks to support from GGN and JGC, Sakurajima-Kinkowan Geopark (an aspiring UNESCO Global Geopark that is located in Kyushu Island, southern Japan) is now on a process to consider a new solution in terms of territorial strategy to become as an adequate candidature.

The first essential change of concept is a definition of boundary, which was previously considered based on geological context such as making limit by a distance from volcanic crater. UNESCO Global Geoparks are not simple “geology parks” and should provide sustainable development for local residents. Thus a boundary of the new geopark should be changed based on administrative border of Kagoshima City.

This conceptual change will strengthen partnerships of the previous National Geopark by integrating new museums partners (archaeology, art, ethnology, etc..) and a great quantity of stakeholders (restaurants, hotels, handicraft makers, tourism companies, etc..).

Once a vision of Sakurajima-Kinkowan Geopark has regenerated, it will stimulate and diversify sustainable development of the areas which do not developed inside municipality.

Therefore, this conceptual and strategic challenge will benefit not only the Geopark itself but also all population of this area.

CHARACTERISTICS OF KIRISHIMA ASPIRING GEOPARK, SW JAPAN

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Keywords: *active volcano, caldera, eruption, vegetation*

Kirishima aspiring Geopark has a cluster of active volcanoes. The local residents at the foot of mountains have lived with natural environments, cultures and histories closely related to the volcanoes. We hope to join the Global Geoparks Network in order for the sustainable developments of local communities and the investigation of how to live with active volcanoes. A topographic feature of this area is that more than 20 volcanoes gather in a narrow range. Especially, landscapes including many crater lakes are very characteristic. This region is located in the volcano-tectonic rift with many calderas and as such has multiphase layers of ignimbrites, which show the history of super eruptions repeatedly occurred around there. Different vegetation for each volcano is also an attraction of this region. We are able to see a variety from poor vegetation of new volcanoes to a deep forest of advanced vegetation transition of older volcanoes. In particular, the latter has experienced the Last Glacial Maximum about 20,000 years ago, so you can feel the history of the global climate change. In addition, a lot of elements such as various hot springs, spring water and shrines and festivals, which are related to the mythology and volcanic faith, have influenced this region in terms of its nature and human geographical aspects.

CHECINY- KIELCE GEOPARK – A PROMISING ASPIRING GEOPARK IN POLAND

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Keywords: *geoparks, Poland, Holy Cross Mountains, sedimentary rocks, Earth heritage*

The area of the aspiring Checiny-Kielce Geopark is situated in the southwest part of the Świętokrzyskie - Holy Cross Mountains in central Poland. The core of the geopark is Checiny-Kielce Landscape Park, which was established in 1996 as the first geological-landscape park in Poland (Urban, Wróblewski, 2004). The Chęciny-Kielce area plays an important role in geological research and earth science education at the international level. It has exceptional geo-diversity, reflected in different sedimentary rocks representing almost all the geological periods from the Cambrian to Quaternary in the relatively small Checiny-Kielce area.

Checiny-Kielce Geopark has the following important features:

- Outcrops of different sedimentary rocks representing almost all the geological periods from the Cambrian to Quaternary, the most important of which are middle and upper Devonian sedimentary rocks with abundant fossils and numerous displays of geological phenomena, such as microtectonic and karst forms and hydrothermal mineralisation;
- Over 60 geosites, including 11 representative geosites featured in the Polish Database of Representative Geosites, together form an integral part of the IUGS Global Geosites project; the majority are protected by law as nature reserves, monuments or documentary sites;
- Structural morphology with interesting relief elements;
- A close relationship between the local people and geology: historical mining and quarrying, local stones in architecture, etc.;
- Numerous sites which show the cultural, archaeological and biological heritage of the area; and
- Environmental, cultural and socio-economic elements strongly connected with the earth's heritage.

The management structure of geopark is consortium, relying on local authorities (five districts) as the managing body, and different institutions and organizations representing local communities and educational, scientific and government sectors as affiliated partners. This approach ensures strong local involvement and sustainable social and economic development of the geopark.

THE COMMUNITY ENGAGEMENT IN SATUN ASPIRING GEOPARK

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Keywords: *Satun Aspiring Geopark, Thailand, Stromatolitic limestone, Southern Thailand, community engagement*

Satun province, Southern Thailand has long been known as the destination of paleontologists and stratigraphers from around the world since 1951. This region was a part of the Shan-Thai (Sibumasu) paleocontinent during the Lower and Middle Paleozoic. The Lower to Middle Paleozoic rocks with a variety of fossils outcrop in this area. The paleontology including biogeography and Paleozoic stratigraphy of the successions in Tarutao Island and adjacent mainland in this area has been published. In 2013, Thung Wa Subdistrict Administrative Organization, Kamphaeng Wittaya School and stakeholders started the First Satun Fossil Festival to promote the fossils and geohéritages to the public. It was successful. Then in 2014, local communities, local government and the Department of Mineral Resources realized that this area must be conserved and opened to the public for education and tourism internationally. Therefore, Satun geopark project was started and has become Satun Aspiring Geopark. It covers approximately 2,597 km², and is located in Thungwa, La-ngu and Manang district, including Tarutao Islands National Park and Phetra Islands National Park. More than 25 geosites have been identified. Some geosites relate to stromatolitic limestone, cave and karst landform, a limestone waterfall, a multi-layer cave, including Paleozoic fauna sites and a 3 km long natural tunnel where a stegodon specimen was found. Some geosites are protected by the National Park Act B.E. 2504(1961) and some are managed by communities. Fossils are protected by the Fossil Protection Act, B.E. 2551(2008). Local communities, local governments, schools, universities and stakeholders have supported all activities, including conservation, management, geotourism, local products, education, facilities and infrastructures. More visitors, students and tourists are travelling to the geopark, bringing more income returns to the communities. The communities are proud to protect their heritage globally.

CULTURAL DIVERSITY OF KRONGNO VOLCANO GEOPARK IN DAKNONG PROVINCE, THE CENTRAL HIGHLANDS OF VIETNAM

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Keywords: *cultural diversity, cultural heritage, ethnic groups, indigenous, migrants*

Krongno Volcano Geopark (KVG) in The Central Highlands is the second geopark, but the first volcano geopark of Vietnam, which has been officially established in February 4th 2016 by Daknong Province Committee. According to 2013, 2014 statistic data in KVG area, there are 25 ethnic groups, with total population approximately of 70,000 people, who consist not only of indigenous people but also migrants from Central and Northern mountainous parts of Vietnam. Hence, on the cultural aspect, KVG is much more diversified than Dongvan Karst Plateau Global Geopark – the first global geopark of Vietnam, well-known with 17 ethnic groups in Northern Part of the country.

Indigenous ethnic groups have come and lived in the area for a very long time, so they seem to live most adaptable, and own their good living skills in the volcanic region. Through the time, they have created their unique and abundant spiritual and cultural values/heritages. They are very owners of “The Cultural Space of Gong in The Central Highlands” recognized as “Masterpieces of the Oral and Intangible Cultural Heritage of Humanity” by UNESCO in 2005.

Migrant ethnic groups such as Dao, Thai, Nung, Tay etc. in some last decades, left their old homeland in northern mountainous places for Krongno area, where they started their new life with favourable conditions. Generally, their life in the fertile basaltic weathering KVG area is much better than in their old homeland in remote northern mountainous limestone regions. It also gives them favourable conditions to maintain their customs and traditions in KVG – their new homeland. As result, KVG consists of mixed cultures of indigenous and migrants. Both create an interesting integration and attractive interaction of two cultural flows, need to be conserved and integrated comprehensively for sustainable development thanks to an optimum solution – a geopark.

THE DEVELOPMENT OF GEOTOURISM EDUCATION PROGRAMS IN THE ASPIRING CHEONGSONG GEOPARK, SOUTH KOREA

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Keywords: *Cheongsong Geopark, geotourism, educational program, South Korea*

The purpose of this research is to design geotourism routes in the Cheongsong Geopark in South Korea, while developing an educational guidebook for elementary students along these designated routes. The Cheongsong Geopark has not only established 24 main attraction points that include diverse geomorphological, geological, ecological, and cultural values, but also designed several routes for geotourism purposes. This study introduces one of the main routes, showcasing a wide range of geographical features, such as the columnar joints, pot hole, waterfall, plunge pool, canyon, and the cave. The route also contains cultural elements for interesting storytelling. Therefore, the route effectively synthesizes valuable physical and human factors. The attraction points, which are well connected along the even-surfaced route, offer great accessibility for visitors.

In addition, we demonstrate the educational guidebook for elementary pupils. The guidebook provides educational resources through texts, photographs, and cartoons, as well as various pedagogical activities, including sketching landscapes, writing essays, and suggesting environmental policies. The guidebook was developed by taking into consideration the students' psychological development and interest. Geospatial technologies, such as Google Earth and Google Maps, were also utilised to offer digital versions of the contents. Visitors can easily access the digital information with their smartphones via QR codes. The Cheongsong Geopark has received positive responses from visitors' experiences of using the guidebook and enjoying digital QR code activities.

ENGAGING COMMUNITIES IN THE ASPIRING BUZĂU LAND GEOPARK, ROMANIA

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Keywords: *Buzau Land, community, engagement, geoparks, participation*

Buzău Land is a territory located in Romania, at the convergence of hills and mountains. It is a rural area set in a dynamic landscape described by landslides, mud volcanism, eternal flames, salt diapirism and emergence of mineral waters and oil springs. Some of these phenomena prove to be hazardous, but all of them are closely connected to the local human imagination and culture, through crafts, stories and fairy-tales. This strong connection between geodiversity and cultural diversity creates a spectacular landscape.

However, as a rural area Buzău Land faces the struggles of an aging population, migrations towards urban centers, loss of cultural identity and loss of social dynamics. Natural factors such as topography and landslide hazards isolate certain communities, which become economically underprivileged and rely strongly on exploiting the natural environs. The Buzău Land Aspiring Geopark initiative aims to create an alternative sustainable economy based on a balanced principle between using and preserving the environment, addresses the needs to rejuvenate the local social dynamics and to protect the spectacular natural and cultural heritage of this area.

The Buzău Land Geopark initiative is built around an interdisciplinary approach that addresses environmental, cultural, social and economic issues and is centred on engaging communities. We engage the community on three levels:

- (i) By actively involving them in the process of identifying and selecting key elements defining the local natural and cultural identity, which forms the basis of the landscape resource economy;
- (ii) Through active participation in creating cultural and natural interpretation points, and in assisting our environmental studies;
- (iii) On an awareness level, by disseminating ideas in local magazines.

We consider that community engagement ensures a long-term support from the locals, it anchors the Geopark concept within the local community and it creates a local dynamic group.

EROSION, CULTURE AND GEOHERITAGE; THE MIXTECA ALTA ASPIRING GEOPARK

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Keywords: *geoheritage, geosites, geocultural sites, Mixteca, Mexico*

The interaction that always exists between man and the land is rarely as dramatically displayed as it is in the Mixteca Alta Region (MAR) in Oaxaca, México. The MAR is a geographically diverse region in terms of its geology, topography and biotic resources. The name of the region derives from the Mixteca civilization, which flourished between the fifteenth and second centuries BC and ended at the beginning of the sixteenth century AD with the arrival of the Spanish conquistadores.

Based on its geological, geomorphological and cultural attributes, the Mixteca Alta Geopark project was launched in early 2013. The variety of erosional features resulting from long-term use of the land and particular pre-Hispanic farming practices is considered here to represent a valuable geoheritage, linked to, and explained by, cultural practices. Geotourism here is seen as a complementary alternative to conventional tourism based mainly on pre-Hispanic archaeological sites and outstanding Dominican convents built in the sixteenth century in which magnificent examples of baroque altarpieces, wood carvings and paintings are displayed.

The Mixteca Alta Geopark project is representative of one of the most important cultural regions in Mexico and Mesoamerica—the Mixteca Alta. From the scientific and pedagogical point of view, the study area provides examples of the relationship between outstanding archaeological sites and the environment, and has high potential to promote Earth Sciences, particularly geology and geomorphology, by emphasizing their importance and relationship to society. The Mixteca Alta Geopark is a bottom-up project in which local residents and local, state and federal authorities, together with academic institutions, have been involved since its conception. The motto of the Geopark, “Erosion, Culture and Geoheritage”, aims at the outreach of Earth Sciences (geological and geomorphological processes) in a sustainable development context.

“ESCUADRON MINERO”: A CREATIVE ENGAGEMENT FOR LOCAL POPULATION

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Keywords: *aspiring geopark, mining heritage, geohazards, public awareness, education*

The aspiring Geopark “Comarca Minera” (Hidalgo State, Mexico) has an outstanding heritage that includes geology, biology, archeology and intangible cultural heritage. In order to create awareness of this richness among the inhabitants and visitors, we created the “Escuadrón Minero” (Mine’s Troop), a group of five fictional characters, inspired on native animals, that promotes among children interest in geosciences and geohazards, folk culture and environmental issues.

The chosen mascots are iconic animals for the Mexican culture and each one is used for an specific area of study or interest that is being promoted by the Geopark project: (a) Tuza (gopher), for Geosciences; (b) Camaleón (horned lizard), for Biodiversity; (c) Armadillo, for Archeology and History; (d) Vívora (rattlesnake), for culture and intangible heritage; and (e) Tecolote (pygmy owl), for education. The association to study fields is based on the skills that are attributed to the animals by local culture.

Gopher is an abundant rodent in Hidalgo; it is an unofficial emblem of the state that is linked to the deeply rooted mining activity. This animal is used to introduce explanations about volcanism and sedimentary processes in the territory.

Horned lizard is widespread in Mexican highlands, although it is rather endangered because it is illegally captured for pet trade. Thus it is used to inform about diverse biomes as temperate fir forests and desert scrubs.

Armadillos are also scarce due to poaching since they are appreciated for their meat. This animal was commonly pictured by Pre-Columbian cultures and appears in ceramic artefacts. Likewise, snakes, which are abundant and extremely diverse in Mexico, had a special place in ancient religion and mythology.

Pygmy owl is a resident bird in mixed and coniferous forests of the Comarca Minera. Like all the species of the strigiformes order, it is associated to teaching and wisdom.

EUROREGIONALPARK- ONE COMPLEX LANDSCAPE IN THREE DIFFERENT COUNTRIES

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Keywords: *Central Europe, Germany, Poland, Czech Republic*

The landscape in the three country corner between Poland, Czech Republic and Germany is quite manifold. The here outlined region represents a unique landscape in central Europe. The core of the region is represented by the Lusatia area (Lausitz, Łużyce, Lužice) an administrative unit separated into three different nations and inhibits one of the largest granitic areas in Europe. These ancient igneous rocks are surrounded by different geological units as Cretaceous sandstones, Paleozoic sediments, schists and gneisses. Tectonic evolution yielded creation of sedimentary lignite basins and intense volcanism in Tertiary times. In Quaternary the northern part was affected by the glaciers three times causing a flat landscape as part of the Middle European depression. This diverse geology and the neo-tectonic development produced the manifold landscape in a closed area. Thus it's possible to visit deeply crystallized, ancient rocks in high mountains beside young ice age sediments in low land environments.

Additionally the area represents a contact zone of the different cultures yielding a pot-pourri of architecture, land use and conventions. The initiative to create a tri-national geopark is still active since three years and is supported by specialists, authorities and tourist organizations in the three nations.

FOSTERING GEOTOURISM IN ULLEUNGDO-DOKDO NATIONAL GEOPARK OF KOREA

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¹Ulleunggun, Korea

Keywords: -

Ulleungdo and Dokdo located in East Sea, Korea are representative volcanic islands formed by volcanic activities taken place during the period ranging from 4.6 Ma to 5 ka. Ulleungdo•Dokdo geopark was certified as the first national geopark of Korea in 2012, together with Jeju-do geopark. Recently, Ulleungdo•Dokdo geopark has prepared a series of steps of certification needed to be a member of global geopark network (GGN). There are 23 geosites in the geopark composed of various geological features such as double craters, columnar joints, sea stacks, sea caves and sea cliffs. Ulleungdo•Dokdo geopark manages various helpful experience programs of geology and local culture. Especially, there are 25 geotour guides composed of local residents in the geopark, which provides visitors with helpful geotourism at seven geosites. There are more than eighty signboards installed and various kinds of leaflets, guide maps and videos, providing visitors with better information of the geopark. Leaflets written in various languages such as Korean, English, Japanese, Chinese, Russian, French, Spanish and Arabic are available for international visitors. The geopark makes an effort to attract visitors worldwide by various promotion programs and advertisements, together with attending GGN, APGN, Travel Mart, and Tour Expo events.

THE GEOHERITAGE OF GABAL QATRANI, WESTERN DESERT, EGYPT: PAGES OF EARTH HISTORY IN AN OUTSTANDING LANDSCAPE

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Keywords: *Qatrani, natural heritage, oligocene volcanic, Egypt*

The Gabal Qatrani massif consists of outstanding geological features and landscapes, such as many fascinating erosion landforms. Moreover, the outcropping rocks in the area comprise a unique record of multiple processes in the Earth's geological evolution. The first list, resulting from the preliminary inventory of the most relevant and representative geosites in the region includes four large zones of exceptional value. These are the volcanic landforms, fluvilacustrine deposits, and karst limestone morphology. The volcanic landforms are characterized by important geomorphological features, namely, sub-circular calderas, broken cones, crater lakes, and domes and basin. These geomorphosites constitute an asset for geotourism and other anthropogenic activities. The scientific values (rarity, representativeness, integrity...) and additional values (aesthetic, ecological, economic...) geomorphosites constitute an enterprise for geotourism. The Jebel Qatrani forest supported a large and varied vertebrate fauna dominated by rodents, browsing herbivores, carnivorous mammals, and arboreal quadrupedal higher primates. A large fauna of terrestrial invertebrates is recorded by trace fossils; those of wasps or bees, crayfish, ants, and subterranean termites are especially well represented. In Oligocene times, the Fayum area was a tropical to subtropical lowland coastal plain characterized by an abundance and variety of vegetation. Mangrove swamps dominated the Oligocene coastline and gave way landward to a forested interior that supported many varieties of trees, large vines, legumes, marshy plants, and aquatic ferns. Their features make the Qatrani area worthy of conservation as a natural-cultural site deserving a Global Geopark status. The protection of these geosites is compatible with their use as a cultural resource. Geoheritage-based tourism activities could be promoted under an appropriate management plan based on geoeducation and geoconservation.

GEOLOGICAL HERITAGE OF TURKMENISTAN: POTENTIALS FOR ECOLOGICAL AND GEOLOGICAL TOURISM

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Keywords: *Geopark, deep canyon, dinosaur trackway, kast caves, Jurassic limestone*

Turkmenistan is a country rich with natural and cultural resources, which has the potential to be developed further in the tourism sector. In this aspect, Geoparks play an important role aimed at achieving conservation, provide education and promote sustainable economic development through the practice of geotourism.

However the Turkmenistan still has no Geoparks. At the same time with a vast array of unique geological settings in Turkmenistan clearly possesses areas that potentially would be appropriate for Geopark status.

In this work, the Koytendag ravine (Eastern Turkmenistan) located within Mountain ecosystems of Koytendag (Kugitang) is considered as a suitable area for establishing of a first Geopark in Turkmenistan. It is a geological site of international significance in terms of its scientific quality, rarity, beauty and educational value which consists of a distinct uplifted limestone massif, a remote western outlier of the Gissar Ridge of the Pamir-Alay mountain system.

The rugged inclined plateau is dissected by many spectacular long, deep gorges or canyons, with steep towering walls and plunging waterfalls. Erosion of the limestone bedrock has given rise to a huge complex or interconnected karst caves and associated cave formations or speleotherms, with an extensive network of subterranean watercourses and associated sinkholes and springs.

Due to its natural beauty the site is a major focus for the domestic tourist industry with cultural and aesthetic attractions including the famous "Kyrk gyz" grotto and world's second longest dinosaur trackway, Hojapil. This is the longest line of theropod (carnivorous bipedal dinosaurs) footprints have been exposed naturally and the sites at Hojapil rank among the world's five most important Jurassic track sites.

GEOPARK IS A SHARED GOAL AT LAKE SAIMAA, FINLAND

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Keywords: *Lake Saimaa, South Carelia, South Savo, Finland, shared goal*

Plans have been under way to build a Geopark at Lake Saimaa, the largest system of lakes in Finland and the fourth largest in Europe, since 2011. The idea stemmed from the realisation of the three towns, six local authorities and two Regional Councils of the southern shores of Lake Saimaa that closer cooperation was crucial for increasing the vitality of the area and protecting the vulnerable characteristics of Lake Saimaa. Highlighting the geological history of the area and thereby communicating the unique story of the lake, promoting local culture and strengthening local identity were seen as priorities, along with sharing these with tourists.

A decision was made to build a new kind of partnership and operating model to get the region included in the Global Geoparks Network. Extensive geological inventories were carried out by Geological Survey of Finland, which has helped the project partners to see the significance of the region in a new light. The work has continued in the form of joint seminars and visits to other Geoparks. The learning process and cooperation have already generated added value to the project partners, despite the membership application to the Global Geoparks Network not having yet been submitted.

Building the Geopark operating model is a process that has created new opportunities for developing the fragmented archipelago. The conservation status and characteristics of the project area have already been provisionally taken into account in land use planning. The Regional Councils have also made membership in the Global Geoparks Network one of the priorities of their respective regional development strategies. The Saimaa Geopark project is one of the key initiatives in both South Karelia's and South Savo's regional tourism promotion plans.

GEOPARK PLUS

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Keywords: *REDD+, Carbon, Aspiring Geopark, Eco-Sustainability*

Propelled along an economic accelerator of colliding forces that began in the 18th century with Newcomen's steam engine and Smith's law of supply and demand, the infinite promise of the Industrial Revolution is now impacting the finite reality of planetary limitations. Whether viewed by land, sea, or air, the world's prevailing economic model of unlimited growth on a finite planet is leading to hazardous levels of environmental degradation and atmospheric saturation.

Now after two hundred years of increasing human population, consumption, and pollution, and decreasing natural resources and biodiversity, one positive and revolutionary effect of planetary change is the economic and financial value now ascribed to ecological services. Of these, the most notable is the natural carbon cycle including photosynthesis, which removes carbon dioxide from the atmosphere in exchange for oxygen.

Whether carbon offsets and carbon taxes, cap and trade and carbon credits, this new currency has entered the capitalist lexicon and created new carbon markets that generate sustainable income from carbon resources.

Geopark Plus explores the unique opportunity of combining the geo-heritage mission of UNESCO Global Geoparks with the environmental sustainability agenda of the UNFCCC REDD+ programme to create an ecologically and economically sustainable model for Aspiring Geoparks in developing countries. Its first principal is to maximize the value of natural equity and apply it to the eco-sustainability of source landscapes and adjacent communities.

GEOTOURISM RESOURCES IN ASPIRING MERANGIN JAMBI GEOPARK, INDONESIA: A RESOURCE BASED VIEW APPROACH

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Keywords: *geotourism, resources, geopark*

Merangin Aspiring Geopark in Indonesia is not as well known as other geotourism destination, such as Batur Geopark (Bali) or Sewu Geopark (Java). Merangin Geopark is located at the province of Jambi in Indonesia. The area is known for its natural resources rich in geodiversity, biodiversity and variety of cultural resources. Previously the people relied on agriculture for their daily lives and extraction of earth resources (mining etc.). But now, geotourism plays an important role in the region's economy, generating substantial revenues and contributing to employment. Merangin Geopark is currently developing many of its resources, such as human, cultural and natural resources. The local government is looking towards geotourism to help the area reach the goal of sustainable development. The purpose of this study is to find out about the geotourism resources available in Merangin Aspiring Geopark and identify them through the resources based view approach. The study have found that natural resources and cultural resources in the geopark is quite high, but human resources is still lacking. The geotourism industry in the area have the potential to become a thriving industry based on getourism resources. However, the government and community must work together with academics and business sector to develop these resources into geoproducts that support the geotourism industry.

GEOTOURISM RESOURCES IN UZBEKISTAN

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Keywords: *geotourism, geoheritage, geoparks inventory, special objects, criteria*

From the position of modern geodynamic geology, the territory of Uzbekistan is an area, formed as a result of a variety of geological processes over the long-term (over one billion years) and has survived the complex geological history of the Earth resulting in a variety of geological structures in the country. Some geological formations on its scientific, educational and cultural characteristics could be attributed to the geological heritage of Uzbekistan. Such objects could and should be the basis for the creation of a special environmental cognitive structure - national network of geoparks.

Identifying, making an inventory, evaluation of scientific, cognitive and cultural importance of geological heritage sites been performed by the original method, prepared in accordance with the principles proclaimed in the "Convention concerning protection of the World Cultural and Natural Heritage" (UNESCO, Paris, 17.12.1975). At the same time in 2016 the method of inventory, certification and monitoring of geological heritage sites of Uzbekistan has been brought into conformity with "Resolution 15 adopted by the General Conference at its 38th session" (38 C/Resolution 15).

By 2016, more than 100 geological formations of high importance for the various aspects of geology and culture on the national scale had been identified. From those, at least 30 objects could become the backbone in the organization of geoparks.

In the article there proposed certain areas, where the organization of geoparks for different geological themes is promising, in accordance with the principles adopted by UNESCO. Selection of areas carried out by geological, biological, historical, demographic, ethnographic, and other aesthetic criteria.

GYEONGBUK DONGHAEAN AS AN ASPIRING GEOPARK, KOREA: VALUES AND REASONS TO BE A GEOPARK

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Keywords: *aspiring geopark, unconformity, radiating columnar joint*

The Gyeongbuk Donghaean (refer to Donghaean) is the name of the region located along the east coast of the Gyeongsangbuk-do, Korea, being included in the four cities (Pohang, Kyeongju, Yeongdeok, and Ulgjin). There is a variety of ecological, archaeological and cultural heritages as well as outstanding geological sites in the Donghaean, by which the geotourism could be fertile and attract a lot of visitors every year.

There are many types of rocks in igneous, metamorphic and sedimentary formations ranged from the Precambrian to the Cenozoic in the Donghaean, having the diversity of the characteristics of the rocks such as columnar joint, Mafic Magmatic Enclaves, limestone cave, fossils, unconformity, and so on. Of them in particular, the Yangnam columnar joint is the typical geosites since it has distinct radiating pattern of the joint which is used as motive of logo of the Korea Geopark Network due to its global rarity and scientific importance. There are also ecologically protected river trail, traditional village, old temples, royal tomb and so on as a non-geological sites spatially involved in the geosites.

Because of the lack of integration and application of the attractions, the tourism of this region however has not activated sufficiently compared with the potential results expected from the heritages and sites. We therefore try to be endorsed for the UNESCO Global Geopark in order to maximize the tourism, through which the local economy can be raised and the nature will be conserved well by the enhanced values of the heritages and sites.

HOW A GEOPARK REVIVES? QESHM ISLAND ASPIRING GEOPARK – A DIFFERENT EXPERIENCE

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Keywords: *Qeshm, Iran, geopark, visibility, local community*

Ten years ago when Geoparks Global Network was so young, Qeshm Island Geopark joined that network. After so many up and downs, now this aspiring geopark with a high willpower and a firm intention is trying to be a UGG family member again. All the conservation, geoeducation and empowerment of local community strategies are being implemented by the local authorities support and cooperation of the local community.

Some of innovations and actions done in this aspiring geopark are among the infrequent ones in other geoparks. For instance, establishment of the geopark's own hotel, replacement the name of the most important square of the city centre to Geopark Square and installation the information panel all around the square, modifying the airport arrival hall to the specific pavilion of the geopark are among the effective activities to increase the visibility of geopark. Promoting geoheritage values along with geopark's brand in different ways is done by installation of geopark symbols and geosites information boards in the entrances of the island as well as city centers.

The number of geopark partners is now increasing; their cooperation includes activities like producing local handy crafts, offering accommodation, local cuisine, transfer service and local guiding the visitors. Geopark's partners will join the geopark's partners network after reaching the standards announced by geopark. Labeling the approved geoproducts and adding related information and content to their package is undertaken by the partners under the supervision of geopark.

It seems Qeshm Island Aspiring Geopark already has found its way through reaching Global Geoparks network's aims and policies. Acceptance in the UGG program will be the approval of its functioning and will bring the added value and the motivation to continue its way.

INTRODUCING THE BLACK COUNTRY GLOBAL GEOPARK PROJECT

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Keywords: *Black Country, industrial revolution, Silurian, Carboniferous, mining*

The Black Country is an exposed coalfield at the centre of the UK mainland. Here unique geological conditions created a super-abundance of easily accessed, shallow layers of economic minerals, in particular coal, limestone, ironstone and fireclays. Their extraction was intensive and this area became the heartland of the Industrial Revolution in the UK. Mining revealed beautifully preserved and scientifically important fossils. This drew early geologists to the area and connects the area to the history and founding of the science of geology. The ingenuity of local people led to the development of the world's first geological map, world's first practical mines drainage steam engine and modern recording seismometer amongst many other innovations. This paper will give an overview of Black Country geological, industrial and cultural heritage and will describe some of the project works that have been undertaken as an aspiring UNESCO Global Geopark.

INTRODUCTION TO THE MOUNT YIMENG ASPIRING UNESCO GLOBAL GEOPARK

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Keywords: *Mount Yimeng, geopark, conservation, development,*

Covering an area of 1160.71km², Mount Yimeng Geopark, located in Linyi City, Shandong Province, China, is composed of four areas of geological interest, namely, Mount Mengshan, Diamond, Daigu, Menglianggu and Yunmeng Lake.

Mount Yimeng is a geographic or tourist area rather than a mountain literally, with various geological heritages as geotourism objects, for instance the Taishan Complex, and a Diamond Open Mining Pit. The Taishan Complex includes very old rocks (up to 2.7 Ga), which are evidence of one of the earliest palaeocontinents. Komatiites exposed here are the only recognized Archaean ultrabasic extrusive rocks with spinifex-shaped texture in China at present. The Taishan Complex, combined with four stages of intrusive rock series and records of continent-ocean changes has given an account of the evolution of the early crust in North China. Besides that, the Chinese earliest primary ore of diamond produced from kimberlite is located here, having produced diamond as much as 1,800,000 karats.

The open mining pit named Victory NO.1 is the largest in scale in Asia, reflecting the superb techniques of diamond mining. Today, mining operations have almost finished, giving place for a mining heritage exhibition and entertainment.

Apart from the geological heritage, streams, waterfalls and other natural landscape are fascinating here. Additionally, it is the birthplace of Chinese civilization and the center of Dongyi culture, combining Taoism, Buddhism and Confucianism.

On the other hand, as a mountainous region the area suffers from natural hazards such as collapse and debris flow, plus low level of economy development. As a result, Mount Yimeng is in urgent need of the heritage conservation and local prosperity increasing. Fortunately, applying to become a UNESCO Global Geopark could be a solution for these problems through superior protection methods and worldwide geotourism. . This is a reason why Mount Yimeng eagers to be a member of the GGN.

KEKETUOHAI ASPIRING GEOPARK – A BRIGHT PEARL IN NORTHWEST CHINA

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¹Keketuohai Geopark

Keywords: *Altai Mountain, rare metal, granite, earthquake relic, aspiring geopark*

Keketuohai Geopark is located at Fuyun County and Qinghe County of Altay Region, Ili Kazak Autonomous Prefecture, Xinjiang Uygur Autonomous Region, China and covering an area of 2,337.90 square kilometers. In terms of tectonics, the Geopark is located at the suture zone of Siberian Plate and Kazakhstan-Dzungarian Plate. During the Early Carboniferous, there was a Continent-Continent collision, resulting in large-scale acidic magma activity, forming a super-large rare metal deposit, which contains 128 minerals, 29 kinds of gems and jades belonging to 9 categories. At the same time, the Geopark boasts a unique granite landforms. Irtysh Faults had been offset about 30 km by Keketuohai-Ertai Fault which formed during the Late Mesozoic. Meanwhile it also formed a seismically active belt, preserving rich earthquake remains. The Altai Mountains are also famous for natural landscapes of forests and grassland as well as high and medium-height mountain landforms and cultures of Kazak people.

The Geopark was approved as a national geopark in September, 2005 and the application for membership of UNESCO Global Geopark (UGG) was launched officially in 2012. While making continuous efforts to build its infrastructure step by step, Keketuohai is improving its own management by actively interacting with GGN members during its presence at the International Conference on Global Geoparks. In 2016, Keketuohai filed an official application to UNESCO for membership of UGG. The thesis elaborates on distinctive geological relics in the Geopark and the efforts for obtaining the membership of UGG as well as achievements.

LOCHABER GEOPARK: PAST, PRESENT AND FUTURE

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Keywords: *Scottish Highlands, terranes, volcanic centres, interpretation, visitor centres*

Lochaber, in the West Highlands of Scotland, is a thinly populated region (4648 km²) of outstanding beauty. Founded in 2004, Lochaber Geopark was a member of the EGN/GGN from 2007-2011, when we withdrew because of lack of funds. Staffed by volunteers, we continued to operate as a lively Geopark. For example, in 2010-12 we installed 20 interpretative panels on stone plinths, forming a 'rock-route' that takes visitors to points of outstanding beauty and geological interest. In 2013 we were funded by government to develop a sustainable business plan, and now have two paid project officers and two visitor centres, one with paid staff, with retail activities designed to give us a secure future. We are currently being assessed for re-admission to the UNESCO GGN.

Lochaber includes Britain's highest mountain, many lesser peaks, a ski resort and an exquisite fjord coastline. Its diverse geology, intensively studied since the early 19th century, includes three metamorphic terranes, separated by the Moine thrust and the Great Glen fault. Igneous rocks include the subduction-related Silurian calderas of Ben Nevis and Glen Coe. The volcanic islands of Eigg and Rum and the peninsula of Ardnamurchan mark the Palaeocene opening of the North Atlantic. Glaciation ended only 11,500 years ago and glacial features abound.

The smaller of our visitor centres, Darwin's Rest, is a café and shop in the village of Roybridge telling the story of the 'Parallel Roads' of Glen Roy, which Charles Darwin wrongly interpreted to be marine beaches. They are the shorelines of an ice-dammed lake. Our centre in Fort William, the tourist hub of Lochaber, explains the wider geology, with video and static displays, and activities for children. It also provides an information centre for wildlife activities. A series of Geopark 'Info Points' is being established in shops throughout Lochaber.

THE MAKHTESHIM COUNTRY GEOPARKPROJECT: GEO-TOURISM AND GEO-EDUCATION INITIATIVES

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Keywords: *tourism, cell phone application, geo-site interpretation*

A Makhtesh is a rare and unique crater-like landscape formed by erosion. The Makhteshim Country is a region in southern Israel which exhibits five such craters including the Ramon Crater which is considered to be the largest in the world. The craters expose a great variety of geologic phenomena representing two hundred million years of geological processes and environments. The arid climate of the region and its geodiversity has formed a wealth of fragile and unique ecosystems and agricultural niches that supported local societies and nomadic traders for thousands of years.

To support sustainable development and to disseminate scientific knowledge in a way that enhances the sense of place and wellbeing of our communities, the Dead Sea and Arava Science Center and the Geological Survey of Israel are leading several initiatives to better present the local natural heritage to residents, tourists and school groups. Our initiatives include the development of workshops and on-line resources for tour-guides, tour operators and educators, and development of a range of interpretive-aids for use in fieldtrips and tours. Key examples are:

A comprehensive tour-guide toolkit consisting of colourful mini-posters which present information on various phenomena and geo-sites, virtual geo-tours for helping guides and educators prepare for fieldtrips, and a 3D ammonite model to be used in a popular geo-site.

A web site to showcase and help identify common fossils found in Israel.

A cell phone application to provide scientific and helpful information for independent travellers. The application utilizes the built-in GPS of phones to direct travellers to nearby sites of interest and to offer information on related sites nearby.

These initiatives are integrated in geo-education activities in which school students collect information about sites of interest and form web-entries for the app or propose mini-posters for the use of tour-guides.

MAPPING GEODIVERSITY: DEVELOPMENT OF ASPIRING MERANGIN GEOPARK

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Keywords: *geodiversity, mapping, geopark*

Jambi Flora is one of the important geosite located in Merangin, Jambi Indonesia. Due to its uniqueness and rarity there is a need for conservation, so the fossil is preserved from human threat and river erosion. Geological mapping at the national development level has an important role to support development plan in the region. The stages of development in the region are: planning, implementation and evaluation. The purpose of geodiversity mapping is to determine the deliniation for Merangin, Jambi region, and determine the geological nature conservation area. In Merangin, Jambi the Geodiversity mapping method used geological mapping and compass traverse measures. The results of the mapping is to identify geosites, where the geodiversity of the region can be revealed.

The geodiversity is established through the 18 geosites criteria. Nine geodiversity parameters used are landscape, landform, mineral, rock outcrop, rock group, type of rock, soil, crystal, and fossils. Geodiversity mapped in Merangin consists of: Miocene-old fossil wood found in the Perm Araucarioxylon Merangin River, fossil leaves, old Coal Permian. Recommendation for development of Merangin Jambi geopark is that the government should set policies to delineate the geopark area.

MUTUAL PARTNERSHIP IN THE GEOPARK MANAGEMENT: GEOFEATURES AND GEOSITES MANAGEMENT IN THE CILETUH NATIONAL GEOPARK

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Keywords: *Ciletuh Geopark, geopark management, partnership, aspiring geopark, local community involvement*

Since Ciletuh Geopark became one of Indonesia's national geopark on December 22, 2015, it has become one of the tourism destinations in Sukabumi Regency, West Java, Indonesia. The national geopark status has increased the image and the popularity of this region. Tourism is the most effective means to improve the socio-economic condition of society in the region. Therefore, Sukabumi Regency government attempted to make Ciletuh Geopark become a prominent tourism destination in Indonesia. To achieve this objective, Sukabumi Regency Government, with support from West Java Provincial Government, has formed Ciletuh Geopark Management Board, which consists of representatives from the local community, academia and the business sector, represented by Bio Farma (Indonesia's state-owned life science company).

New legislation regarding the village government, allows a greater role for the village to develop its region and the outcomes it, to make the local community more prosperous. Village government formed village-owned enterprises that can build partnerships with various stakeholders to manage and utilize local resources as a source of sustainable economic income for the local community.

In Ciletuh Geopark, one of the village-owned enterprise activities is managing geofeatures and geosites. Therefore, Ciletuh Geopark Management Board has made a partnership with the village-owned enterprise in geopark management. This village-owned enterprise manages not only tourism, is but also geological conservation, cleanliness and environmental sustainability around geofeatures. Village-owned enterprise can assist Ciletuh Geopark Management Board in managing the geopark. By this partnership, more local communities are directly involved in the daily operation and management of geopark, and also it becomes a new source of economic income for them. Meaning this partnership has become a win-win solution in moving the geopark toward UNESCO Global Geopark status.

THE NATIONAL GEOPARK “INSELBERG – DREI GLEICHEN” IN THURINGIA, CENTRAL GERMANY – A NEW CANDIDATE FOR JOINING THE UNESCO GLOBAL GEOPARK NETWORK

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Keywords: *aspiring geopark, Germany, Thuringia, Bromacker, Permian*

The Geopark “Inselberg - Drei Gleichen” is located in the state Thuringia, the “green heart” of Germany and covers an area of 610 square kilometres. The area includes the western part of the Thuringian Forest Mountains composed of Palaeozoic rocks and a part of the Thuringian Basin where Mesozoic rocks characterize the landscape.

The Geopark was founded in the year 2002 and is organized as a municipally cooperation of 18 Communities. In 2008 it was certified as National Geopark in Germany and has been successfully re-evaluated in 2013.

The name of the Geopark refers to two important landmarks. “Drei Gleichen” is the name of an ensemble of three medieval castles located in the lowlands of the Thuringian Basin and standing on hills of colourful Upper Triassic rocks. The “Großer Inselberg” is the most prominent peak of the Thuringian Forest Mountain range and consists of a Lower Permian rhyolite.

Within this region there are a lot of spectacular geosites. One of them is the famous Bromacker fossil site - the best finding place for Early Permian tetrapods outside of the US.

Visitors can explore the geopark on 18 thematic Geotrails or on guided tours led by qualified Geoguides. 12 GeoInformation centres, Audioguides, geoeducational offers, a travelling information desk and many other offers complete the services.

Within the last three years alone about 1.7 Million € (different projects, 75-90% funded by the state of Thuringia and co-financed by the communities) have been invested in the geotouristic infrastructure of the National Geopark. Throughout the years the Geopark has proved as a successful tool in regional development and in improving the public awareness of the Geo-heritage.

POTENTIAL OF SETTING UP A GEOPARK IN GIA LAI PROVINCE, VIETNAM

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Keywords: -

Located in the Northeastern corner of Gia Lai Province in Vietnam's Central Highland, the potential area for geopark occupies an area of ca. 2500km², including the whole Kon Ka Kinh National Park on the Pleiku Plateau and the Kon Chu Rang Nature Reserve on the Kon Ha Nung Plateau along with the Ba River valley in their between. In the future, this potential area can be expanded to include parts, which are at present also nature reserves, of other neighbouring provinces of Kon Tum, Quang Ngai and Binh Dinh to fully cover the Kon Ha Nung Plateau. In addition to the bio-diversity value, the area is home mostly to the Bana and many other ethnic groups who have settled in the area for generations with rich cultural values including many famous legends, folks, musical instruments etc. Furthermore, the area has become recently known with Early Paleolithic archaeological findings which may date back ca. 800 k.y.

Geologically, the area, being part of the ancient Gondwana continent, has long and complicated history of development of ca. 2500 m.y., including lots of mafic, ultra-mafic, acidic intrusions, high and ultra-high metamorphic rocks, Mesozoic intrusions and eruptions, active faulting, Neogenic lacustrine and basalt eruptions as well as Pleistocene-Holocene riverine formations. The area also features many interesting geomorphological landforms including waterfall, streams, volcanoes etc.

Numerous geological mapping and research works have been carried out in the past and extensive survey is on-going to assess the potential of the area to become an aspiring geopark, projected by the end of this year.

PHORPYRLAND GEOPARK (GERMANY) – A NEW UNESCO GLOBAL GEOPARK CANDIDATE

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Keywords: *porphyry, rhyolite, supervolcano, caldera, ignimbrite*

The Geopark applying for designation as a UNESCO Global Geopark is called “Porphyryland. Steinreich in Sachsen“ (short form: Porphyryland Geopark). Founded in 2006, the Geopark was certified as Germany’s 15th National Geopark in 2014.

The Geopark is located in the eastern part of Germany 20 km east of Leipzig and 120 km south of Berlin. It comprises an area of 1.200 km² and is situated in 13 communities.

The unique geological characteristics of the Porphyryland Geopark are:

1 the location in the largest of all exposed Permo-Carboniferous volcanic areas in Europe with different varieties of rhyolites/rhyodacites extending to several hundred metres depth. The huge estimated volumes of volcanic ash and pumice released during two major ignimbritic phases of volcanic activity 294 Ma and 287 Ma ago suggest continual eruption of super-volcanoes in association with the development of larger calderas.

2 the red ashlar and sculptor’s stone “Rochlitz Porphyry Tuff“ (rhyolite) in the south of the Geopark

3 the pyroxene-bearing ignimbritic rhyolite/rhyodacite in the northern area of the Geopark which because of its highly crystalline form is unique to the world.

4 widespread deposits of kaolin that played such an important role in the industrial development of Germany. They were after all the raw material that was used to make the first European porcelain by the Meissen porcelain factory 300 years ago.

The history of the geological development, the geotope abundance, the historical evidence of the mining of rhyolite/rhyodacite and kaolin as well as the industrial heritage serve as a unique geological and geotouristic backdrop for the wide range of topics of the Geopark. They are also a supporting medium for an important concern of the Geopark „Porphyryland. Steinreich in Sachsen“ – the environmental education of both young and old.

SHORT-TERM TANGIBLES AND HERITAGE INTERPRETATION IN THE ASPIRING GEOPARK VOLCAN TUNGURAHUA

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Keywords: *Governance, heritage interpretation, social networking, responsible tourism investment, valorisation of intangible heritage*

The Aspiring Geopark Volcán Tungurahua in Ecuador offers an impressive array of geological, natural and socio-cultural resources, including the closest summit to the sun, the Chimborazo. The Chimborazo was widely researched by Humboldt and his work still serves nowadays as a basis for studying climate change through changes in altitude of vegetation and receding glaciers, leading to depleted water resources and general geological instability manifest in the volcanic activity of Tungurahua itself, together with the nearby Sangay.

The Aspiring Geopark makes manifest, apart from the problems of tourist interpretation of areas around live volcanoes, the difficulties of working on an inter-provincial level and of organising representative participation, even in a country such as Ecuador where much has been done to put in place mechanisms allowing for bottom-up involvement and commitment. Likewise, it tackles the area of education, training and experiential marketing using IT.

However, most of all it looks at the actions to be taken through intercultural interpretation to ensure exponential benefits of tourism activity within the community while putting new places on the tourist map of perception without the income generated leaking to large foreign tour operators.

SUSTAINABLE GEOPARK DEVELOPMENT: CASE OF CILETUH GEOPARK WEST JAVA

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Keywords: *Ciletuh Geopark, sustainable development, geological resources, tourist destination, economic valuation*

West Java has a tremendous geological potential resource, in the form of a very beautiful landscape in the Ciletuh region, Sukabumi Regency, West Java Province. The aspiring Ciletuh Geopark, has several geological heritage outcrops that resulted from subduction between Eurasian continental plate and Indo-Australian oceanic plate during pre-Tertiary age which are believed to be the oldest rocks exposed on the surface of Western Java. The Ciletuh region was declared as a National Geopark that not only can provide economic benefits for regional development, but also can provide protection for the sustainability of geological resources and natural resources and the environment, of the region. In particular, the development of Ciletuh Geopark has several goals, which among others are to protect geodiversity, biodiversity and cultural diversity, to promote geological heritage and encourage sustainable economic development of the region in line with the increase of community's welfare. This paper descriptively describes on how the development of Ciletuh Geopark, is encouraged to be the prime mover of regional development in the Southern part of West Java, where the development is much slower than the Northern part of West Java.

Furthermore, this paper outlines the multi-dimensional site planning used in the area. Focusing not only on the development of geological heritage in the field it also develops various other aspects such as biodiversity and culture diversity (including sites of ecological, archaeological, historical and cultural heritage) through conservation principles, and regional spatial planning. These aspects are the basis for the development of Ciletuh Geopark, towards a world-class tourist destination. Last but not least, the paper also describes the use of economic valuation methods, such as travel cost and contingent valuation, to measure the value of the site

TATEYAMA KUROBE GEOPARK CONTRIBUTING TO THE REGIONAL DEVELOPMENT OF NATURAL DISASTER MITIGATION

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Keywords: *natural disaster, earthquake, active fault, SABO, erosion control*

Tateyama Kurobe Geopark is located in north-central Japan, and is geographically composed of the seaside alluvial fans cohering deep waters more than 1000m of Toyama Bay, Japan Sea, and 3000m high mountains of the northern Japan Alps. The people carry on their life with provincial culture therefore, this geopark has the advantage that it can provide a one-day compact geotour including the wonders of nature and culture.

Toyama Plain is famous for the 1858, Hietsu earthquake disaster, and there are many historical sites of downstream flood damage from when the earthquake dam, formed in an upstream torrent-river burst, where they had succeeded in reconstruction by people and their feudal clan. As a result of the earthquake disaster, national sediment control work called ‘Sabo’ and its facilities in the Tateyama Caldera area were initiated and are now a historical legacy of civil engineering, called ‘mecca of sediment control’.

In the mountainous area of the Geopark, there are interesting outcrops of the Atotsugawa fault, which is the source fault of the 1858 earthquake and as such it has been a target field of scientific research projects such as "Active Fault Frontier (1996-2000)", "Strain Concentration Zone (2007-2013)", and "International Project for Crustal Dynamics (2014-2019)".

Other local aspects on sustainability development are the Kurobe-river dam sand-elimination issue looking for future continuation of water electric-power facilities, and the shoreline disaster-resistant issue of wave disaster countermeasures. With these features of an outdoor-museum in disaster prevention and mitigation, geopark activities in this area are very useful for concerted neighborhood action to build up a resilient community against natural disasters. Our society will play the role of a hub of connecting cooperation with the people who live in disastrous regions aiming at joining to UNESCO global geopark network.

TOWARDS A REGIONAL UNESCO DISTRICT – THE PIEMONTE STRATEGY

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Keywords: -

On 17 November 2015, during the 38th General Conference of UNESCO, the 195 Member States of the organization ratified the creation of a new label, the UNESCO Global Geoparks. As declared during the conference, UNESCO Global Geoparks, together with the other two UNESCO site designations Biosphere Reserves and World Heritage Sites, give a complete picture of celebrating our heritage while at the same time conserving the world's cultural, biological and geological diversity, and promoting sustainable economic development. So the future challenge will be the integration and the bringing together of different labels within the same territory, promoting synergies and common activities. The Piemonte region, first in Italy, launch in 2017 the project of a regional UNESCO district. The general idea is to clearly map and put in connection all the regional UNESCO designations (WHs, MABs, Geopark, Creative city, Chairs, etc) to develop an active cultural network under the supervision of the regional administrative body. The main goal will be the development of a common management plan able to focus common strategies, key projects and communication actions. This will be realized through the adopting of a network model and avoiding any further bureaucratic institution with a "light governance" policy. The individual designations will remain totally independent and fully operative in their territories, whilst the regional coordination will guarantee synergies, long running strategies and process monitoring. From the beginning the initiative found a tremendous positive reaction from all the UNESCO designations, so well begun ... half done.

TYPICAL GEOHERITAGES IN KRONGNO VOLCANO ASPIRING GEOPARK IN DAKNONG PROVINCE OF VIETNAM

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Keywords: *volcano geopark, volcano geoheritage, lava tube cave, tree mold, South East Asia Records*

Krongno Volcano Aspiring Geopark (KVG) is proposed to be the first volcano geopark of Vietnam, according to the Decision N0 220/QĐ-UBND on February 4th, 2016 of People Committee of Daknong Province – a Southern province of The Central Highlands of Vietnam.

Covering approximately 2,000km², including the entire area of Krongno district and some communes of the adjacent districts of Daknong Province, KVG has a great variety of geological heritage, especially volcanic geoheritage. Geoheritage related to volcano-activities consist of typical craters, large basaltic plateau, spectacular waterfalls, unique lava tube caves, tree moulds in basaltic rocks, basaltic rocks of different facies such as columnar basalt, foamed basalt, volcanic bombs, ultramafic xenoliths, and so on. Lava tube cave is one of the most significant volcanic geoheritage sites of KVG. Many lava tube caves have been discovered and explored here, 18 lava tube caves have been measured, in which 6 Southeast Asia Records on lava tube cave length have been recognized.

Besides, there are many different significant geological, natural and cultural heritages. They all make KVG becoming an attractive destination for tourists in recent years.

In this the paper, we would like to introduce KVG's heritage values to scientists in the Conference and call for your co-operation support in heritage conservation and sustainable development, help the aspiring Geopark to become a UNESCO Global Geopark in the near future.

UNDERWATER TRAILS AT FERNANDO DE NORONHA ASPIRING GEOPARK PROJECT (BRAZIL): MARINE GEOSITES AND THE IMPORTANCE OF THE ENVIRONMENTAL INTERPRETATION RELATED WITH THE GEODIVERSITY

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Keywords: *underwater trails, environmental interpretation, marine geosites, Fernando de Noronha*

Fernando de Noronha Archipelago is an Aspiring Geopark Project in Brazil, and is considered by many visitors one of the best places in the world to practice snorkeling and scuba diving. The underwater scenery is outstanding and in an unprecedented action in the country, Google Maps made the first collection of underwater images, mapping 6 kilometres, covering some of these dive sites in these images.

The archipelago comprises two protected areas, a Marine National Park and an Environmental Protection Area. A Working Group is preparing the application dossier and due to the small size of the archipelago, it was realized the need to include marine geosites. The points of snorkeling and scuba diving that are listed in the Management Plans were defined as the marine geosites, since only these areas may be used for underwater activities.

As the scuba diving without instructors is not allowed, underwater guiding along trails is performed. Diving instructors end up performing the role of a guide, however, it was observed that the information passed on by the instructors was related with the biodiversity and almost nothing about geodiversity. To fill this gap in the environmental interpretation, this study aimed to perform on-site observations and the collection of information on geology and geomorphology of these sites. Petrobras sponsored this work, with support of the Spinner Dolphin Center.

The methodology involved consultation of documents and references, participation in snorkelings and 35 scuba dives. As a results, we suggest that these are the marine geosites, and proposals have been performed to improve the interpretation of the underwater environment. Finally, it is known that this is an activity that generates impacts and in the case of the trails it can promote the conservation, in land or water trails, so it is important that the environment is understood as a whole.

VISUAL AND VIRTUAL IDENTITY OF SAARTE GEOPARK PROJECT, ESTONIA

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Keywords: *Saarte Geopark, Silurian era, GeoConnect, IT, visibility*

Rich in natural monuments Saarte Geopark area covers over 700 islands and islets in western Estonia. The biggest island Saaremaa is well known amongst tourists because of its location and isolation. .

Geologically, the area is famed for the internationally recognized is Kaali meteorite crater. However, the main pillar of Saarte Geopark is based on the presentation of the Silurian era. The outcrops of the Silurian are located all over the islands and present $\frac{3}{4}$ of the Silurian era. Most of them are exposed along on the seashore and form high or low cliffs.

To ensure the broad impact of the geopark to the economic and social development Saarte Geopark as a label and identity of a region has to be recognizable for the community and visitors. The organization has worked for five years on a local level to stand out as a geopark – both visually and virtually. The most capacious work, building geopark visibility, has been marking important natural, historical and heritage sites with signposts, information boards and route maps. This project has been ongoing for several years now and we hope to demonstrate the results at English Riviera GGN Conference and in reality at an international conference we are hosting in October 2016 in Saaremaa.

Virtual presence is even more important when attracting visitors from abroad as a result a brand-new app to connect the interests and needs of a geopark visitors into one pocket-size guide has been developed. Saarte Geopark together with Geoconnect team develops IT solution suitable for all geoparks - all-in-one information and management system. GeoConnect's universal platform is designed to work like a global geopark virtual community, developed for and by geoparks, whilst enabling each geopark to preserve their own unique identity.

Saarte Geopark continues to work on a local level in an international perspective - to join the UNESCO GGN and EGN network.

WEAVING A GEOMORPHOLOGICAL GEOSTORY LINKING THE PEOPLE OF COASTS AND MOUNTAINS- A PROPOSAL FROM HAKUSAN TEDORIGAWA NATIONAL GEOPARK

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Keywords: *geostory fossil, hydrological cycle, topographic formation, watershed*

Hakusan Tedorigawa National Geopark was designated as a Japanese Geopark in 2011. One of our main geosite is Kuwajima Fossil Bluff. Various Cretaceous species are found from this site, where we can describe the whole fauna and flora only from the fossils found here. Moreover, we can find some species as “missing links,” which indicates the process of evolution from the old typed species to the new typed species.

One of the reasons we can find these fossils today, is erosion. Erosion is one of the important geological process, which our geopark describe as “Journey of Water” and “Journey of Rocks.” The “Journey of Water” stands for the water cycle between mountains, rivers and sea, when the accompanying “Journey of Rocks” stands for erosion, transportation, and sedimentation.

These two journeys are not the only phenomenon throughout the world, but since Japan is so tectonic and so pluvial, we can find the hydrologic cycle in a very compact scale, and the topographic formation in a very short time scale. Hakusan Tedorigawa Geopark is a good miniature of such Japan. For evidence, Mt. Hakusan is one of the great snowfall area among the world, and Tedor River is one of the steepest river in the world, showing the high erosion level. In addition, our area has the headwaters and the river mouth in our small area which provides a good field to learn the watershed management system as a whole.

This geostory enable to integrate mountains, rivers and sea in a single unified geostory, as well as geology (including geomorphology), ecology and culture. We would like to propose this geostory as a new value of geoparks, which also plays an excellent role to involve various peoples from the coast to the mountains.



Aspiring Geoparks

Poster Presentations



ASPIRING ARXAN NATIONAL GEOPARK

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¹Arxan National Geopark

Keywords: *geo-science popularization, geopark visibility*

Arxan National Geopark is located in Arxan City, Xing'an League, Inner Mongolia Autonomous Region, People's Republic of China, the Asia-Pacific Region. Its geographic coordinate is between 46°39'~47°39'N and 119°28'~121°23'E, covering an area of 7408.7 km² with an average elevation of 1100 m. Arxan Geopark was accredited as a national geopark in 2004 for its unique geoheritage resources and scientific values. On the 2014 CGN Meeting for Global Geopark Candidate Recommendation, Arxan National Geopark successfully became one of two Chinese candidates to apply in 2016 for the membership of Global Geoparks Network. Sustainable development in the past years has laid a solid foundation for the geopark management, protection, tourism, as well as scientific popularization. For a better development of Arxan Geopark based on our current foundation and protection system, we are interested in promoting its geoheritage to the world by becoming a member of the Global Geoparks Network.

Arxan is located on the middle section of hilly Daxing'anling Ranges, northeast Inner Mongolia, boasting numerous volcanoes, thermal springs and other various geoheritages and unique geomorphologic landscapes. Arxan Geopark is an ideal place for geological investigation, cultural tour, expedition, and relaxation.

THE BEAUJOLAIS' ASPIRING UNESCO GLOBAL GEOPARK

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Keywords: *geopark, aspiring, Beaujolais, landscape, geology*

Located between the French Massif Central and the Alpine domain, the Beaujolais province, aspiring UNESCO Global Geopark, have inherited a rich and complex geology, with an especially high variety of rocks, geological processes and ages. The diversity of its subsoil and its landscape is born from the convergence between numerous geological phenomena that leave an indelible mark in people's living environment.

Also characterized by geology, the diversity of landscape in the Beaujolais province, from forested mountains to the plain, through vineyard hillsides, is a defining element of its identity. Dating back millions of years, this story is being conjugated in the present tense, through human activities, history, heritage, culture and life of the region. A large part of its identity, its past and its future comes from the great diversity of stones remarkably emphasized in the local architecture, which is a "permanent exhibition" of the geological terroirs of Beaujolais.

The geological and hydraulic resources keep the industry and the craft alive, in the same way they determine soil suitability. Granites, schists, limestone and clays of vines and wines, volcanic rocks of the pastures and forests, fertile alluviums of plain crops; the Beaujolais and its daily life are rooted in the heart of the earth.

Since its launch in 2012, the Geopark project has involved many local stakeholders and has created a real territorial dynamic. Beyond the international recognition, the Geopark label is a pro-active tool for sustainable development of the territory. The project is though participation, built on actions and dynamics already existing; sustainable and committed to long-term development, for passing an attractive and living heritage, vehicle of knowledge and promotion for the territory. Today, as an Aspiring Geopark, the Beaujolais reveals its secrets. Do not hesitate, come and visit us!

THE EVOLUTION OF QESHM ISLAND GEOPARK EXPANSION

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¹JPT

Keywords: *Qeshm Island, geopark, expansion, territory*

Since 2009 the territory of this Geopark has changed four times. Each time we sought to expand and improve the livelihood and guarantee the sustainability of the new developments in the territory. All these modifications were undertaken following guidance from GGN experts.

1. Up until 2009 the territory of the Geopark covered 320 km² of Qeshm Island registered as a Global Geopark by Qeshm Free Zone Organization. Most of the geosites were located in this perimeter. However, at that time human communities, some important geosites and environmentally important sites were not included in the Geopark territory.

2. Based on GGN criteria, Geoparks have to include people and communities. After two years of study, the Geopark boundaries were revised. In 2009 the management plan of the Geopark was published with a new area of the territory at 400 km² including 13 villages. There remained satellite geosites outside the Geopark and this was not acceptable based on the GGN criteria. Because of management weakness and lack of networking of the Geopark, the territory did not change until 2010. This was the reason why Qeshm Geopark received a yellow card in 2010.

3. After receiving its yellow card, the Organization decided to expand the Geopark territory and include more villages and the satellite geosites. This expansion resulted in the Geopark reaching 1,559 km². As Hara Mangrove forest is a protected area, a biosphere reserve and a Ramsar site, permission of the Environment organization was needed for its inclusion in the Geopark.

4. Finally, after receiving permission from the Environment organization in 2015 all of the island, to a point 500 metres from the lowest tide point, was presented as the final territory of Qeshm island Geopark and the area is now 1,736 km².

GEOHERITAGE OF SAO NICOLAU ISLAND: GEOTOURIST VALORIZATION (DRACAENA GEOPARK)

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Keywords: *geodiversity, biodiversity, geoconservation, geotourism, Island of Sao Nicolau – Cape Verde*

The island of São Nicolau, inserted on the windward group, is part of the archipelago of Cape Verde that is distant approximately 455 Km from the West African coast. It reaches 1500 meters of altitude above the average level of seawater, with an area of about 343 square kilometers.

It has large valences of landscape point of view. The geomorphological elements, geological structures and volcanic forms, particularly the mountainous massif of Monte Gordo with 1312 meters of altitude and the geodiversity of Carberim, are an important part of it. It is in the mountain massif of Monte Gordo, which it is located the Natural Park and serves as physical and ecological support of all existing biodiversity there.

It also highlights the importance of biodiversity that plays an important role in variety of vegetable species, some endemic in particular the Tortolho (*Euphorbia tuckeyana*), the dragon-tree (*Dracaena draco*), etc.; as well as some animal species such as the hawk (*Falco tinnunculus*) and Gongon, (*Pterodroma feae*).

The natural elements require a strong relationship with local communities, mainly to protect the geosites, the vegetation, and the cultural traditions (such as agricultural activity, handicraft, music, dance and gastronomy).

So that the student population and general public will better understand the scientific, cultural, economic, among others, São Nicolau is important to promote appreciation and conservation initiatives.

Initiatives related to education must be a priority to create learning resources that transmit knowledge within the themes of geodiversity, biodiversity, geoconservation, natural resources, environmental education and geotourism; encouraging instruction to local and student communities respecting the specificity of the target audience and promote development. Geotourism and natural tourism is increasingly common contributing to the sustainable development of local communities.

GEOPARKS AND GEOLOGICAL HERITAGES STARTING IN IRAQ

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Keywords: *Al-Ahwar, Baba gurgur, geopark, Jabal Sanam, Sawa Lake*

Iraq, the home of the oldest human civilizations, is a land of many natural and geological heritage sites of particular scientific, historical and cultural importance, which are waiting to be discovered and to be protected. Starting step must be establishing a Society of Geological Heritage, with a main job spreading the geopark interesting culture within the community. The forthcoming steps are preparing and submitting projects of those sites that meet the required conditions for developing geoparks. The study highlighted and proposed several sites located in Iraq.

The suggested sites are:

1-Baba Gurgur, the famous Eternal Fire, described by ancient Greek Herodotus (c. 484–425 BC), which is referenced in the Bible as the "fiery furnace" of the Old Testaments' Book of Daniel. It is an important cultural and spiritual site for the local residents.

2-Sawa Lake, “the Pearl of the South”, a unique historic closed salt lake, characterized by its own small almost totally fat fishes, with waters useful in treating skin diseases.

3-Al-Ahwar, the Mesopotamian Marshes, are a wetland area. Historically, mainly composed of separated but adjacent three Marshes, the largest wetland ecosystem of Western Eurasia. It is a rare aquatic landscape in the desert, providing habitat for the Marsh Arabs and important populations of wildlife.

4- Jabal Sanam, a mountain (class T - Hypsographic) is a type of salt plug that stems as a conduit from a deeper diapiric structure with oldest evaporite sequence rocks of the infracambrian time (600-560 my).

‘GOD CREATED THE WORLD BUT THE DUTCH CREATED THE NETHERLANDS’: HOW ABOUT GEOPARK GOOI AND VECHT?

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Keywords: *geology, hydrology, landscape development, management, functioning*

In broad lines, the dominant role of water is described in the creation over the ages of the landscape of the Gooi en Vecht region. Emphasis is on the threat posed by water and ways that the Dutch handled this threat, and on their use of its waters, whether for traffic, defense or consumption. Whereas the higher, well drained Pleistocene area (‘t Gooi) was already inhabited for a long time, and its landscape deeply affected, in the low lying Holocene marshes to the west (Vecht area) and east (Eem valley) intensive land use started only in the Middle Ages. The fundamental geological and hydrological characteristics of these two complementary areas are still clearly visible today and played a dominant role in the later development of the landscape. This history and its functioning are elucidated by a number of maps for time slices, showing the activities and underlying processes that shaped the landscape.

Management of the current landscape, whether for agriculture, urban development or nature conservation, is deeply rooted in a thorough and fundamental understanding of the geology and hydrological functioning of the region, and these also form the basis for plans to combat future threats, such as sea level rise and climate change.

HORMOZ ISLAND, THE GEOLOGICAL PARADISE OF IRAN, AND ITS POTENTIAL TO BE A GEOPARK

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Keywords: *Hormoz Island, Iran, geopark*

The Hormoz Island, in southern Iran, attracts many geologists from different countries every year to visit its unique geological phenomena. Hormoz Island with valuable and different geosites is a suitable geotourism centre in Iran. Hormoz Island is a salt dome which is located in Persian Gulf strategic area. This Island is composed of evaporites, igneous and sedimentary rocks. The unique geodiversity in rocks and mineral which made various colours in Hormoz Island made it a mineralogical reservoir. Beside considerable mineralogical attractions, there are other potentials like ochre mine, coral reefs, sea caves, salt caves, plant cover and wild life which have added to various tourism capabilities of this Island and made it a unique place in the world which can be a geopark.

THE INCHEON GEOPARK PROJECT

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Keywords: *Baekryeong Island, cruise type geotour, far westcoast of Korea, Incheon, the Incheon Geopark project, transboundary geoparks*

We are now creating a new geopark, “The Baekryeong Islands Geopark”, one of the Hexagonal Geoparks Strategy, which intends to create six geoparks located at far outside of Korean territory.

As the islands are located far west and north near North Korea with strong geological correlation between them, the geopark project could be a good platform for transboundary geopark between South Korea and North Korea.

It has many top ranked geoheritages by the national assessment system, including diverse natural and cultural assets related with North Korea and China.

Being without airport in the islands, we are considering a cruise type geotour program to overcome the accessibility handicap connecting many islands in the west coast.

INTRODUCTION TO DUNHUANG GEOPARK OF CHINA

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Keywords: *Yardang Wonderland, Mount Mingshashan, crescent moon-shaped spring, Mogao Grottoes, the ancient Silk Road*

Located in Dunhuang city, Gansu Province, Dunhuang Geopark of China is composed of Yardang Geo-area, Mount Mingshashan and Crescent Moon-shaped Spring Geo-area, Natural Landscape Tourism Area and Cultural Heritage Tourism Area. The special geological history and natural environment in the geopark have created amazing geological wonders. Large, majestic mound-shaped, wall-shaped, tower-shaped and columnar Yardang landforms, which are very lifelike and look like fleets on voyage, or mysterious castles.

Mount Mingshashan is composed of a series of high sand peaks and the sands make a huge sound when people slide down them. The Crescent Moon-shaped Spring, surrounded by sand peaks of Mount Mingshashan, is never buried by sands and is clear and quiet.

Dunhuang has a high reputation due to its profound history, and the numerous cultural sites have witnessed the past glory of the important city on the ancient Silk Road. Mogao Grottoes, the birthplace of Dunhuangology, is an art palace and the Buddhism treasure of the ancient architectures, sculptures and murals largest in scale and richest in collection in the world. The historical ruins of Yangguan Pass, Yumenguan Pass and Han-dynasty Great Wall show the vicissitudes of history.

Dunhuang is the pioneer on the “Silk Road Economic Zone”, Dunhuang Geopark is the representative of different landforms in the extremely dry climate, birthplace of Dunhuangology, and hometown of melons and fruits. With its distinctive geoheritage and cultural resources, Dunhuang Geopark is like a brilliant star to welcome numerous visitors from all over the world.

LAS LORAS GEOPARK PROJECT

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¹Las Loras Geopark Project

Keywords: *development, sustainable, empowerment, heritage, Geotourism*

From bottom to top: The project began 12 years ago by a Local Development Group (GDL) and three associations with the aim of using the natural and cultural heritage that the territory has in sustainable way. It is currently supported by the 16 municipalities of las Loras, by provincial governments of Palencia and Burgos and the regional government of Castilla y Leon.

Performances: there have been numerous actions related to the disclosure of heritage, geotourism and empowerment of the local population. We highlight the following: Development of the strategic plan of the " Las Loras Geological Reserve ", editing a territory Guide, equipment of five interpretive routes, opening of the Oil Museum of Las Lora, lectures in the villages, agreements with companies, associations, municipalities and other public authorities involved in the territory, participation in National geology forums and the Spanish Committee of Geoparks, collaboration with universities, training guides, etc. There is currently a fixed annual activity programming: geolodays, geo-environmental volunteering, Geo-week and activities with school and university groups.

Management: Now there is a formalized Executive Committee comprising representative of municipal, provincial and regional governments, GDL, associations and foundations of the territory and ARGEOL association that led the project. The organization is completed with three participatory platforms: economic-social council, an educational-scientific council and a social volunteer. A scientific director and manager of the ARGEOL association are responsible for coordination and technical management of Las Loras Geopark project.

Lines of action: conservation program, and enhancement of heritage (A), a program of educational outreach and scientific research (B), and a program of sustainable social and economic development (C)

MIXTECA ALTA ASPIRING GEOPARK, OAXACA, MEXICO

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Keywords: *geoheritage, geoparks, geocultural sites, Oaxaca, Mexico*

The Mixteca Alta has some of the most important traces of Mesoamerican culture and is characterised by a variety of conspicuous erosional features strongly related to traditional farming practices carried out for more than 3500 years.

The erosional features represent a valuable geoheritage that can show the relationship between geology and society and promote the knowledge of Earth sciences among members of the general and specialized public. The erosional features include gullies, badlands, erosive amphitheatres derived from fluvial and mass-wasting processes, alluvial deposits, palaeosols and water and sediment traps used for farming purposes (locally known as lamabordos). Other sites of interest include examples of intrusive magmatic dikes, spheroidal weathering and sites of palaeontological interest. The identification of these sites has lead to the proposal of ten geotrails, which represent the basis for geotourism in the study area as an alternative for local economic development.

The study area, perceived as an "ecological disaster", represents an opportunity to understand the complexity of interrelationships among geology, geomorphology and society, to interpret the resulting outstanding erosive landforms and their dynamics and to appreciate the importance of environmental conservation. Many lessons can be learned about the present condition of landforms and the whole landscape, and the concepts and importance of geoconservation may be easily and effectively transmitted to visitors.

Finally, the promotion of the geoheritage and its links to archaeological sites in Mixteca Alta Aspiring Geopark represents an alternative for local development. In this respect, local authorities and indigenous groups show enthusiastic interest and have been involved in the project from its conception, contributing in the selection of sites, providing materials and proposing mechanisms for the implementation of geotourist activities.

It is rewarding to hear indigenous inhabitants talking about geosites, geotourism and geoparks as part of their everyday language, since it reveals their involvement and commitment.

“SAKURAJIMA – KINKOWAN GEOPARK” WHERE PEOPLE COEXISTS WITH ACTIVE VOLCANOS

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¹ Sakurajima-Kinkowan Geopark Promotion Council

Keywords: *Sakurajima Volcano, Kagoshima Bay (Kinko Bay), active volcano, union between active volcano, Aira Caldeta*

The Sakurajima-Kinkowan Geopark is located in the southern part of Kyushu Island, located in the southwest of the Japanese archipelago. With its distinguishing theme of active volcanoes, this geopark boasts one of the world's most active volcanoes Sakurajima as its major feature. This Geopark's most unique feature is that about 4km from the actively erupting Sakurajima there lays a city with a population of over 600,000 people, which realizes the union between the active volcano and urban city. Although suffering from volcanic disasters or ash fall, the people have developed lifestyles that allow them to take advantage of the benefits of the active volcano such as hot springs, or crops particular to volcanogeneous soil.

Kinko Bay has an inner bay lwhich surrounds Sakurajima on almost every side. The bay was created by a huge volcanic eruption about 29,000 years ago. The enormous eruption created a depression called the Aira Caldera, which became Kinko Bay after filling with seawater. Its deepest point extending over 200 meters

distinguishes it as unique among many other bays.

Wakamiko Caldera is an active volcano that continues volcanic hydrothermal activity at the seabed. Due to this, formations of rare metals and gold deposits, acidic water masses, and chemosynthetic ecosystems using volcanic gas and thermal water are foound the bottom of the bay. Our geopark aims to create an area that continues developing sustainability, and maintains harmonious relationships with the active volcano. With a focus on tourism, disaster prevention, and education, we've been carrying out various activities to achieve this goal by making full use of Sakurajima-Kinkowan's uniqueness. During the poster presentation, we will introduce our geopark and describe its activities in more detail.



Conservation, science and research

Oral Presentations



ANOMALOUS FAULTS AND FOLDS IN FFOREST FAWR UNESCO GLOBAL GEOPARK

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Keywords: *Variscan, orogeny, faults, folds, stress-fields*

The geology of Fforest Fawr UNESCO Global Geopark is dominated by three main structural components – the Carreg Cennen Disturbance, the Swansea Valley Disturbance (SVD) and the Neath Valley Disturbance (NVD). These zones of faulted and folded Upper Devonian and Carboniferous rocks form major features in the landscape and are associated with earthquakes during the 18th, 19th and 20th centuries. They provide a field laboratory where professional and amateur geologists and students come to study geological events and processes.

The NE-SW orientation of the disturbance zones differs from the pervading E-W trending Variscan structures that developed in response to the N-S directed horizontal shortening during the Variscan Orogeny. This process, spanning approximately 100 million years, culminated in the creation of a mountain belt during the convergence of continents in late Palaeozoic times. The anomalous orientation of these structures is attributed to the reactivation of pre-existing faults in basement rocks during the Variscan Orogeny. These faults are the legacy of the Caledonian Orogeny, a process involving early- to mid-Palaeozoic continental convergence over a period of about 200 million years.

The initial results of this detailed investigation of the structural geology of the SVD and NVD, based on measurements of dip and strike, reveal that the SVD is affected by three consecutive phases of folding, F1, F2 and F3, and the NVD by phase F2 and F3 folds. The folds are, in both cases, overprinted by normal faults, strike slip and oblique-slip faults.

The difference in the direction of bulk horizontal shortening between the younger F3 (SW-NE) and older F1 and F2 (SE-NW) phases of folding and the contrasting directions in fault displacements reveal the changing pattern of stress fields, both during and after the Variscan Orogeny in South Wales.

THE CONTRIBUTION OF THE JOURNAL GEOHERITAGE TO DEVELOPING THE GGN

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Keywords: *science, publication, geoheritage, ProGEO, geoparks*

The journal *Geoheritage* was established in 2009 as a collaboration between ProGEO – the founding international forum for the promotion of geological heritage in Europe – and the commercial publisher Springer (www.springer.com/journal/12371). The journal specialises in the publication of high quality, scientifically informed, peer-reviewed works on all aspects of geological heritage and its promotion, including both philosophy and practice. Not surprisingly, as ProGEO's origins were closely associated with the origin of the geopark concept in the original European Network, the development of a philosophy and practice for the sustainable management and use of geological sites has always been a key theme in its publications, and this continues in *Geoheritage* today. *Geoheritage* also has a global perspective, providing an overview of the development and implementation of wider geoconservation and related global educational issues, and includes contributions from a wide range of countries and continents, even Antarctica. In addition, as *Geoheritage* is listed in Science Citation Index Expanded, SCOPUS and Google Scholar, it provides an internationally credible source for presenting new survey and management techniques and the most important and influential case studies. Therefore, geoparks, both aspiring and established members of the GGN, feature in most issues of the journal, and have formed a core theme in the journal's development. *Geoheritage*, therefore, functions as a methodological reference source for the assessment, sustainable management and educational use of geodiversity sites, as well as a vehicle for sharing good practices and influencing decision makers, with its rigorous review process providing credibility. *Geoheritage* can play a crucial role in promoting the sustainable management of geological areas for science and education and in providing a framework for local, sustainable economic development for the benefit of resident communities, a primary aim of the Global Geoparks Network.

THE CONSERVATION STRATEGY FOR FOSSILS IN TIANZHUSHAN GEOPARK

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Keywords: *conservation, co-management, cooperation, fossil, support*

Sedimentary rocks on the Earth are like pages, and prehistoric species among the rocks texts, recording the evolution of the Earth's crust and creatures. In Qianshan Basin of Tianzhushan UNESCO Global Geopark area, there are red clastic rocks which contain rich Cenozoic vertebrate fossils, making Tianzhushan an important home to Paleocene vertebrate fossils. So far, 31 species of fossil vertebrates, including 30 new species, have been reported within the geopark. The mammalian fossils found in the Tianzhushan UNESCO Global Geopark have great significance in understanding the evolution of early Cenozoic mammals, and the geopark is thus considered as "one of the origin places of Asian mammals and a treasure land of Paleocene vertebrates".

In order to conserve the precious fossil heritage of international geoscientific significance, Tianzhushan UNESCO Global Geopark has adopted many different measures to achieve that objective: the geopark networks at different levels (including global, Asia-Pacific regional, and national) provide an exchange and learning platform for the fossil conservation and management; national geological relics protection project provides financial support; the cooperation of geoparks and relevant institutions provides technical support; the development of the geological tourism enhances the public awareness of fossil protection, and wins wide support; the geo-museum provides necessary facilities for fossil exhibition and popularization of related scientific knowledge; Tianzhushan Administration Committee and the local community make a co-management plan for the construction of the fossil village. Tianzhushan UNESCO Global Geopark will realize the scientific use of precious fossils, by implementing the paleontological resources conservation and management project, scientific research project, science popularization and culture industry construction project.

THE DIFFERENCE AND SYNERGY BETWEEN CHINA'S UPDATE

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Keywords: *geoparks, natural reserves, difference, synergy, China*

National Natural Reserves (NNR) are areas where development and other types of human activities are restricted to protect the remarkable natural landscapes that are representative in China. Each NNR is officially designated by State Council and administered pursuant to the NNR laws. Since 1956, 428 areas throughout the country have been designated, only 20 of which are geological NNR.

National Geoparks (NG) as a creative and supplementary act, aiming to protecting geo-heritage with international and regional significance, not only are important for researches and education, but also play an important part in promoting social and economic development of local community. NG is officially approved by Ministry of Land and Resources and managed following the departmental administrative regulations. From 2001 to 2015, 240 locations have been officially recognized.

Both NGs and NNRs are relatively concentrated in developed regions, presenting the pattern of "intense in East, sparse in West". This to some extent shows their development is subject to the economy, tourism and cognitive level of the local government. Moreover, the distribution of NGs has certain relevance with cities, and also had important impacts on the urbanization construction, because NGs are actively engaged with the local communities. However, NNRs which focus on the harmonized management and promote the conservation relatively stay away from the densely populated areas. Each of them, especially in western China, usually covers much larger areas.

NGs and NNRs have common values in the outstanding natural scenery and biodiversity based on geological features. Many NGs overlap with NNR. In those areas, NNRs have an important role to preserve geological features, just like Geoparks do. Collaboration related to information and programs for visitors is expected to contribute to promote the wise use and the promotion of local tourism.

DOCUMENTING OUR GEOHERITAGE OR WHY COLLECTING FOSSILS IS A GOOD THING

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Keywords: *fossils, heritage, science, education, collecting*

Collecting fossils is one of the most emotive subjects for the conservation of geological heritage – philosophies vary from effective prohibition to a virtual absence of any management, leading to extensive loss and damage. Even within the sites recognised by UNESCO for their global geoscientific importance as World Heritage or UNESCO Global Geoparks, both of these extremes can exist – and neither creates positive outcomes for science and education. Crucially, however, for the latter aims to be fulfilled, some level of informed, sustainable specimen collecting must be allowed, but this is where decision making so often becomes more dogmatic or exclusive than objective. As with any part of the natural heritage, some fossil taxa can be very rare and others extremely abundant, and the need to protect the rare, whilst permitting the sustainable use of the latter is very well established for biological conservation. Crucially, both governments and a wider public accept that rare species should be strictly protected, but common species could be ‘exploited’ at a level regulated for sustainability. In the case of protected fossiliferous sites, it is generally accepted, however, that commercial exploitation of the resource, virtually without exception, creates a negative attitude for heritage and conservation and that collection for scientific purposes (including by informed ‘amateur’ groups) documents and promotes understanding. What is less agreed, however, are the benefits or dis-benefits of allowing the collection of fossils for general education, even recreation. This presentation will discuss this ‘thorny’ issue, presenting evidence of both positive and negative effects and reviewing developing international recommendations and proposals, including through IUCN. It will also provide a range of decision making processes and potential management solutions to help assess the potential for a much wider participation in the ‘discovery’ of a fascinating global heritage with which UNESCO Global Geoparks are so intimately associated.

FUNCTION ANALYSIS AS A MANAGEMENT STRATEGY TO ASSESS THE GEOSITES OF THE AZORES UNESCO GLOBAL GEOPARK

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Keywords: *geosites management, functional analysis, sustainability*

The sustainable development concept has arisen due to increased environmental concern resulting from a variety of intensified pressures.

Function Analysis is an innovative technique able to provide a mean for assessing changes in environmental quality of an area and evaluating the sustainability of the applied management regimes. This is dependent on the environments inherent characteristics within the context of locally applicable time and space functions.

Geosites are considered special areas for geoconservation as such their sustainable use is essential, so with this aim the eighteen geosites from Pico island, in the Azores UNESCO Global Geopark, were analysed via Function Analysis, to compare the potential for conservation or for development of human activities, and also those with high levels of conflict.

This methodology involved the assessment of specific environmental and socio-economic indicators with allocated scores from field surveys, extensive desktop studies and a survey of experts on different areas about the island (nature conservation, socioeconomics, municipalities, etc.) during 2016.

Through this analysis we can evaluate each geosite individually, but also to comparatively analyse several geosites, highlighting the versatile character of this technique. In future works it is intended to apply this pilot study to all Azorean geosites.

GEODIVERSITY RESEARCH AND GEO-EDUCATION AT CILETUH GEOPARK WEST JAVA

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Keywords: *Ciletuh Geopark, geoheritage, geo-education, geological research, mega amphitheatre*

Ciletuh Geopark has the landscape of a horse-shoe shaped plateau (amphitheatre) which is open toward the Bay Ciletuh. The amphitheatre has a dimension of almost 15 x 9 km², its believed to be the largest natural amphitheater form in Indonesia. In the middle of the amphitheatre there is a distribution of the oldest formation in western Java in the form of mélange and ophiolite complex which are a result of subduction activities between oceanic crust and continental crust in the Cretaceous age, and believed as the oldest rocks formation in West Java. The occurrence of this type of rock out cropping at the surface is very rare and very important in understading the geological process. Despite this resource, in the past only very limited intensive geological research has been conducted within the region, due to the limited accessibility.

However, since 2013, detailed geological study has been conducted with the involvement of undergraduate and post graduate students to provide geological information on the geoheritage sites. The data is used as the basis for the delineation and designation as an area of geopark. Recent integrated geological research is focusing on the theme of: petrogenesis ophiolite complex; formation mechanism of amphitheatre; model reconstruction of melange formation; paleo tsunami; geological hazard; hydrogeology; and formation environment of Ciletuh Formation type locality; as well as age determination of various rocks formation. The result is used as material for education purposes for university student, high, middle and elementary school as well as for tourist guide, local community and common public and visitor. Geological information is also used for leaflets, brochures, information panels, books as well as video or animation of geological process within the geoparks.

GEOLOGICAL NATURE CONSERVATION PROJECTS, ALSO AS TOOLS FOR RAISING AWARENESS IN BAKONY-BALATON GEOPARK, HUNGARY

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¹Bakony-Balaton Geopark

Keywords: *geological nature conservation, geosite management, raising awareness, geo-education, geotourism*

Bakony–Balaton Geopark was accepted into the Global Geoparks Networks in 2012. The 3,244 km² Geopark is located in western Hungary, near Lake Balaton, the largest lake in Central Europe, on the boundary of four major geographic regions. It is characterised by a variety of geological, topographic, climatic and hydrological features as well as by its extensive biodiversity. Numerous geosites are located within protected natural areas (National Park, Protected Landscape Areas, Nature Conservation Areas) and/or the geosite is itself protected by law (e.g. caves, sinkholes, springs).

The Balaton Uplands National Park Directorate, as the leading organisation of the Geopark, is responsible for the conservation of the geological heritage as well. Since launching the geopark project in 2006, the Directorate has been focusing on geological nature conservation actions more intensively than before. Different types of geosites, altogether 22, were the intervention locations of the first, big-scale project: caves, a disused quarry and the unique ‘Seas of Stones’ (fields of sandstone/conglomerate boulders) in the Káli Basin. The 410,000 EUR budget of the project was supported by the EU, with the co-financing of the European Regional Development Fund. The most considerable item was the reconstruction of the Lake Cave of Tapolca (stabilizing sections and installation of an energy-saving LED lighting system). The project provided the opportunity for raising awareness and geo-education: 32 information panels were placed, 4 nature trails were created, and a 32-page booklet was published, also in English.

The Geopark organization is going to submit a new EU tender in 2016 (the budget will be appr. 500,000 €): the main goals are to clean geological key sections, install ‘bat-friendly’ cave doors (and also new stainless steel ladders inside), complex management of geological nature conservation areas, create new geological nature trails and publish a new booklet for the general public.

GEOLOGICAL PRINCIPLES AND STUDIES OF THE GEOPARK-PROJECTS IN FINLAND

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Keywords: *geology, studies, geoparks, Finland, principles*

The Geological Survey of Finland (GTK) provides professional help to the local projects in their work to create new Geoparks in Finland.

GTK's opinion is that on national level we should avoid granting Geopark status to multiple areas with exactly the same geological themes. Four nationally significant and area-specific main themes have been chosen to direct the planning of new Geopark candidates.

- 1) Finland's bedrock, which is among the oldest in Europe (age range 3.5–1.55 Ga).
- 2) Finland's soil has mainly formed from glacial deposits stratified on the melting phase of the Fennoscandian ice sheet, between 13,000 and 10,000 years ago.
- 3) Originally, mires accounted for a third of Finland's land area. Finnish bogs are a part of the unique northern European string bog zone.
- 4) Approximately 56,000 lakes is a geological nature type unique to Finland. The lake network has been created as a result of post-glacial rebound and tilting of land related to it. The lake nature is complemented by the Baltic Sea's land uplift coasts.

Geological studies made by GTK in Finnish the Geopark –project areas includes three steps;

- Collecting existing data/material; geological material, protected areas, nature paths/routes and sites, LiDAR elevation model.
- Field work; mapping and inventory of the geological sites, photos and site descriptions.
- Reporting and writing the geological description.

In Finland Rokua UNESCO Global Geopark represents the heritage of the ice age. Lauhanvuori area plans to become a Mire Geopark, and in Saimaa GTK is operating with Lakeland Geopark -project. The old bedrock is linked to the main themes of the Karelian Mining Geopark –project. The inventory methodology for geological sites based partly on the interpretation of the LiDAR elevation model has proven to be very useful in Finnish Geopark project -areas.

GEOPARK ACTIVITIES UTILISES THE EXPERIENCE OF A VOLCANIC ERUPTION; KIRISHIMA ASPIRING GEOPARK, SW JAPAN

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Keywords: *active volcano, eruption, geological site, disaster prevention, vegetation*

Kirishima aspiring Geopark which went through volcanic eruptions in 2011 hopes to share its experience with Global Geoparks Network and to create together how to live with active volcanoes for sustainable developments of local communities. Mt. Shinmoedake located in the center of our geopark had not erupted for 300 years however the eruption in 2011 damaged local agricultural industries, transportation network and so on. On the other hand, the eruption brought us new geological resources and enhanced our sense of crises for the next eruption. Some specific examples are as follows:

1. Revelation of new geological sites for example impact craters created by volcanic bombs directly show us the power of the eruption.
2. Improvements in values of existing geological sites for example fresh volcanic materials and the regrowth of the vegetation are added to the topics of the Nakadake geological site.
3. Good use of annoying volcanic ashes: Meat and fish matured by ashes, called “Hai-boshi”, were developed.
4. Advancements of preparations for future eruption: equipment of shelters and sirens around volcanic craters was completed.

Going forward, it is important that the memories of eruption and information on volcanic activities should be given not only to local residents but also to the tourists.

GEOPARK CHALLENGE TOWARDS ASO NAKADAKE VOLCANIC ACTIVITY

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Keywords: *Mt. Nakadake, volcanic activity, geopark challenge, research, science popularization*

Mt. Nakadake had become active gradually since autumn 2013.

Showing the early stage of volcanic activity cycles Nakadake emitted volcanic ash occasionally after January 2014. After 25th November in 2014, ash eruption continued and eventually magmatic eruptions began. Since spring 2015, it has seemed that the activity down, however explosive eruption still occasionally occurs and activity remains unstable. At present the alert level 2 has been set by Japan Meteorological Agency.

Throughout the eruption cycles, Aso Geopark had been sampling volcanic ash from the early stage. We have observed the sampled volcanic ash by a stereoscope after ultrasonic cleaning. Eventually we could almost manage to clarify transition of the volcanic activity by comparing surface phenomenon of the volcanic ash focused by a live camera at the crater showing at the Aso Volcano Museum and changes of the volcanic glass. Therefore we could deliver the information to the public.

Moreover aiming at disaster prevention and mitigation, Aso Geopark has updated volcanic information on our official website and SNS pages, published leaflets and hosted a knowledge sharing workshop on the volcano to help the community to understand clearly the present volcanic activity and characters of Aso volcano in order to reduce anxiety and prevent the spreading harmful rumours towards tourism in the geopark area.

Aso Geopark believes that volcanic activity is an opportunity to experience the breath of the Earth, however many people thinks it is a dangerous thing. We continue to work on science popularization in order to better assist the community understand the Earth's activity.

THE GEOTOURISM POTENTIAL OF KARST PHENOMENA IN ZAGROS MOUNTAIN

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Keywords: *Karst, Geotourism, Geodiversity, Zagros*

An area of 185000 square kilometer of Iran is covered by calcareous formations related to Mesozoic and Cenozoic eras, containing about 11/1 percent of the total areas of Iran. The Zagros Mountain is the major karstic area and extends from the northwest to southeast of Iran. From geomorphological point of view, this area is a land with many differences and in general, mountainous. Because of the expansion of the calcareous formations in Zagros region, the touching surface of the lime stones with climatic and erosive factors is very high. This factor causes more expansion of karst phenomenon. Also plentiful folding of faults and the breakages of lime layers have positive effects on transferring water, making it suitable for the development of karst. Owing to all these factors, many variants of karstic phenomena are developed in the region which can be considered as the most important geo-tourism attractions of the region. The karstic regions have their own particular geomorphological phenomena, their propagation rate being related to the development and maturity of the karst. Among surface karstic phenomena, Karen, Sinkhole, Karstic water flows, Polje, and spring can be introduced. Also, caves, underground flows and canals are among the inner karstic phenomena. This kind of morphology is observable in the southern part of Tang-e- Boragh, north of Margan and the south of Khosrow-Shirin plane. By introducing the geology of the region and through images and graphic, this paper will try to go through the factors affecting the creation or rather the corrosion of these phenomena, as well as the potential of the region as a natural geomorphologic laboratory. This paper will also mention the importance of establishing a security system for tourists and a protecting system for this geological site in order to sustain calcareous formations of Zagros region as a geotourismic site.

INTERPRETING FOSSIL RESEARCH IN STONEHAMMER UNESCO GLOBAL GEOPARK

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Keywords: *fossils, ichnology, conservation, interpretation, research*

The study of fossils has been a key component of the Stonehammer story since the first geoscientists began exploring here in the 1830s. Palaeontologists continue to make new discoveries every year. Precambrian stromatolites, Cambrian trilobites, Silurian fish and sea scorpions, Carboniferous plants and trace fossils, and Quaternary fossils are well represented, and rank among some of the earliest discoveries made in North America and beyond. While scientifically important, the fossils of Stonehammer are among the most difficult to share as stories with the public. Fossils are often small, incomplete and enigmatic. ‘Small shelly fossils’ from the Cambrian rocks, for example, are among the first of their kind described in the world, but they are as promised ‘small’, millimetre-scale fossils, unfamiliar to most people. The same might be said of our tiny jawless fish, or faint trackways left by Carboniferous horseshoe crabs and amphibians.

Among several active research projects has been the discovery of new Lower Carboniferous invertebrate trace fossils near Norton, at the eastern border of the geopark. Norton has been promoted as having one of Canada’s oldest ‘fossil forests’. 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 descriptions 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 the geopark is how to bring this 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.

INTRODUCING OF GEOTOURISM OF HISTORICAL MINING SITES IN FARS - IRAN

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Keywords: *historical mining, geotourism, Fars province, Achaemenian*

Fars province, located in the Southwest of Iran, with splendid cultures, historical reserves and beautiful landscape is one of the most attractive places among all fascinating regions in the country. Because of the existence of various kinds of mines, rocks, tectonics setting, and metamorphism events as well as having several unique geomorphologic phenomena, the North and Northeastern of this province turns to significant sites, which have a great potential to endorse as Geo-parks on mining. The proximity of the existing mines to the natural and historical phenomenon makes it a unique tourism Geo-archaeology complex too.

Archaeological observations in the region show the relationship between these areas and metals which were used in historical sites and also another related construction in the ancient civilization. Moreover, there are numerous relics of rounded-off stones and metal melting kilns in the region that provide valuable information regarding the manner of rock extraction as well as their displacement. That's why these parts of the province have the ability to use as museums of science and technology and they can present lots of information on how to extract, transport and enrich mineral for visitors to promote informed tourism.

This research will attempt to introduce the potentials of the region as a natural geomorphologic laboratory, likewise a geo-tourist attraction being a national and possibly global geo-park. It will also highlight the role of these geo-sites on improving geo-tourism industry in Iran by emphasizing on the importance and the necessity of protecting and preserving them as precious geological heritage.

MARINE CONSERVATION AND RESEARCH IN THE ENGLISH RIVIERA UNESCO GLOBAL GEOPARK

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Keywords: *marine conservation, seagrass, foraminifera, ecology, palaeoecology*

Marine conservation in the United Kingdom has been stimulated by the Marine and Coastal Access Act (2009) which led to the designation of Marine Conservation Zones (MCZ). Much of Tor Bay, adjacent to the coastline of the Geopark, is now recognised (2013) as one of the first generation MCZs. This effectively extends the designated sites of the Geopark into the marine environment. The Tor Bay MCZ, with its well-known sea grass meadows, with their populations of fish, sea horses and cuttlefish are now protected and being researched on a continuing basis. These provide a modern environment in which to study ecology, taphonomy and the efficacy of conservation. These extant sea grass meadows also provide an understanding of the processes that we see in the fossil record, with sea grasses known to have originated in the late Cretaceous, some 70 million years ago. The sea grass meadows in Tor Bay are now some of the best studied in South-West England, with other significant meadows known in the Salcombe Estuary, Fowey Estuary, Plymouth Sound and the Fal Estuary. The last two are Special Areas of Conservation (SAC) under the 'Habitats Directive' (Council Directive 92/43/EEC of the 21st May 1992) of the European Union.

MYSTERIOUS CONNECTIONS AMONG A FOSSIL LAKE, LANDSLIDE, VOLCANOES AND A LOCAL FOLKTALE: AN INTERDISCIPLINARY GEOSTORY OF THE IZU PENINSULA GEOPARK, JAPAN

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Keywords: *folktale, fossil lake, interdisciplinary geohistory, landslide, volcanic eruption*

Geological and historical studies revealed the geomorphological evolution of the Ito area, Izu Peninsula Geopark, and the geohistorical implication of a mysterious folktale, which tells about a subaqueous monster moving from one lake to another.

We found lake sediments which are distributed along the Ogawazawa valley, the Ito area of the Izu Peninsula Geopark, and which are directly overlain by a thick scoria layer, erupted from the Suidoyama volcano. The volcano belongs to the Izu Tobu Volcano Group, a monogenetic volcano field consisting of scoria cones, tuff rings, maars and lava domes. The tephrochronological age of the Suidoyama volcano is estimated to be 24,000 years old. The facies of the Suidoyama scoria shows that the depositional environment is subaerial. This means that a fossil lake had suddenly been broken by the eruption of the nearby scoria cone.

This geological history strangely coincides with a local folktale, which tells us that the “Red Bull” hiding in Lake Ippekiko, one of the maars of the Izu Tobu Volcano Group, once lived in a lake at Ogawazawa and moved to Lake Ippekiko because of reduction of the original lake. It, however, is unlikely that the folktale of the ancient lake remains over 24,000 years up to the present.

We found a reliable historical document, which was written in 1594 and describes the location and size of a pond at Ogawazawa. Although this pond also does not remain now, the document suggests the potential source of the “Red Bull” folktale. The Ogawazawa valley has steep geomorphology and many landslides and debris flow deposits are distributed there. Such phenomena often make dammed lakes and they disappeared sooner or later by redeposition of sediments or volcanic products. Such geological situation probably made the “Red bull” folktale.

NEW NATURAL MONUMENT: LOWER CAMBRIAN JELLYFISH IMPRESSIONS (SIERRA NORTE DE SEVILLA GEOPARK)

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Keywords: *Cambrian, Geoconservation, jellyfish, monument*

The site of jellyfish impressions located in the Geopark Sierra Norte de Sevilla, in the municipality of Constantine, and dated in the Lower Cambrian (540 - 510 million years). It is one of the most important in the world due to several factors: the anomalous size and singularity of their morphology; the high number of specimens; and the shortage of paleontological sites of these animals on the planet.

In the early nineties of the last century, a large rock surface with a high number of circular impressions was located. These marks were first interpreted by the local population as signs and symbols produced by primitive men (petroglyphs), and named the site as "The Written Stone". A first visit in June 1990 by paleontologists from the universities of Huelva and Zaragoza (Spain) identified these tracks as impressions left by medusoid type animal's bodies and emphasized the high scientific interest of the site.

These jellyfish fossils were impressed in geological strata attributed to Lower Cordubiense stratigraphical stage. This age corresponded to the beginning of the Cambrian system, with an age of 540 million years, coinciding with the "Cambrian explosion" of life forms.

The Government of Andalusia is promoting the necessary actions to preserve this paleontological site, one of the few fossil records of soft-bodied animals with an exceptional abundance and large size of the specimens, with the declaration of this site as a Natural Monument.

This statement makes possible to perform cleanup actions: the site has suffered in recent years a significant deterioration; protective measures to ensure their conservation and enhancement; and the adaptation for an adequate public use.

THE NISIOPI PETRIFIED FOREST MARINE PARK, LESVOS GLOBAL GEOPARK, GREECE

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Keywords: *boat trip, geoparks, geotourism, marine fossils, petrified forest*

Nisiopi islet is located at the westernmost tip of Lesvos, close to the village of Sigri, with a total surface area of 81.5 ha. In the northern part of the islet exists a great concentration of plant fossils, 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 in the sea surrounding the islet.

The Natural History Museum of the Lesvos Petrified Forest has completed a new project regarding the geotouristic development of Nisiopi Petrified Forest, funded by the NSRF 2007 – 2013 Operational Programme "Crete & Aegean Islands" approved in 2011. The project included 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.

The main outcomes of the project are:

- conservation of petrified tree trunks in situ on the islet of Nisiopi,
- documentation-identification of fossils,
- mapping and determination of activity zones in the marine area.
- acquiring the necessary equipment for the operation of the Park
- construction of a glass bottom boat for visiting and observing the submarine sites.
- signage of the sites of interest
- visibility of the project outcomes through exhibitions, the creation of documentaries, guides, printed and electronic material, publications, workshops and conferences.

The results of the operation of Nisiopi Marine Park in 2015 were very promising and over passed expectation.

Nisiopi Marine Park has the potential to become a main geotouristic attraction of the Lesvos geopark providing alternative exploring opportunities to the visitors of the Petrified Forest of Lesvos, which is a unique protected natural monument

THE OPTIMUM LABORATORY FOR STUDIES OF THE “PLATE LANDING”: YANDANGSHAN GLOBAL GEOPARK

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Keywords: *optimum laboratory, magma origin, tectonic background, Yangdangshan, South China*

Yangdangshan Global Geopark a large coastal mountain scenic area, is located in South China and, belongs to the giant volcanic rock zone in the eastern Asian continental margin. The volcanic stratum belongs to Xiaopingtian formation of upper volcanic series Yongkang group in the eastern Zhejiang. The SHRIMP zircon U-Pb ages in the first, second and fourth period of volcanic complexes were $99.6\pm 1.9\text{Ma}$, $101.7\pm 5.7\text{Ma}$ and $101.7\pm 9\text{Ma}$ respectively in Yangdangshan Global Geopark, and attribute to the Late early Cretaceous. The 2000m thick, Yangdangshan volcanic rocks were formed by violent eruptions in a short period of time provide a full record of the formations and evolutions of the composite calderas during the rhyolitic volcanic eruptions, collapses, resurrection uplifts.

According to the geological facts, the typical rock associations that represent Mesozoic oceanic plate melting have not be met, and there are no oceanic island basalt and continental arc andesite in South China. As such the Mesozoic magmatic activities in South China have different patterns from the typical “island arc” and “active continental margin”. The Authors put forward that in approximately middle-Jurassic ($175\pm 5\text{Ma}$), South China entered the tectonic system, roughly from south to north oblique subduction of the pale-Pacific plate. After 120Ma, the subduction direction of pale-Pacific plate changed dramatically, and became forward subduction towards the Asian continent. The volcanic rocks of upper volcanic series Yongkang group in the eastern Zhejiang were formed during Late early Cretaceous(ca.102-99Ma). Their geodynamic sources come from the subduction/retreat of paleo-Pacific Plate, but magma is not originated directly from oceanic plate. However, the original magmas are derived from partial melting of Precambrian continental marginal rocks and lithosphere mantel. The tectonic background is not active continental margin, but is the Mesozoic reworking of ancient continental marginal materials under new intracontinental tectonic background. We suggested that Yangdangshan Geopark park is the optimum laboratory for study “landing plate”. Therefore, a plate tectonic theory with the distinct geological features in China can be established based on further studies.

PRESERVATION AND NEW DISPLAY PLANS FOR FAULT LINE PARK, WHICH DISPLAYS A PLATE BOUNDARY (EURASIAN AND NORTH AMERICAN PLATES)

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Keywords: *fault line, plate boundary, new display plan, conservation, renovation*

The Itoigawa UNESCO Global Geopark features a fault line observation park where visitors can directly observe the Itoigawa-Shizuoka Tectonic Line which forms the boundary between the Eurasian and North America continental plates in Japan. One of the most important sites in the Itoigawa Geopark, the geology on the western side of this fault tells us of the movement of the Earth's crust when Japan was part of the Asian continent while the eastern side tells the story of the formation of the Japanese islands as they broke away from the continent.

However, when this fault was excavated to make it easier to observe, resulting landslides necessitated the building of a stone revetment over much of the fault line, obscuring the view and preventing visitors from understanding and appreciating the dynamic forces on display. In order to resolve this issue, discussion began in 2014 among experts in conservation, faults, landslides and education along with local residents. We are working with these experts, local community members and Geopark Guides to better display and preserve this fault line and conduct necessary surveys and investigations in the local geology. We are hoping to achieve improved conservation, education and regional development together through these efforts. Planning for the renovated fault line park will commence in 2016 with construction beginning in 2017 and ending in 2018.

PROMOTING SCIENTIFIC RESEARCH: GOOD PRACTISES IN SOBRARBE UNESCO GLOBAL GEOPARK

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Keywords: *dissemination, geoconservation, Pyrenees, scientific research, Sobrarbe*

Geoparks are not research institutions. However, Geoparks are territories with enormous possibilities to develop research projects, as they possess an outstanding geological environment that needs to be interpreted.

Sobrarbe UNESCO Global Geopark, situated in the Spanish Central Pyrenees, has a complex geological frame and shows an unusual richness of geosites. Managing all that heritage has to be based on a deeply scientific knowledge of the territory. The scientific approach is the key to properly select and manage good geoconservation practices.

Although this territory has received researchers during more than a century, from Charles Lyell to the most recent PhD students, the geological characteristics of the area demand a permanent revision and Sobrarbe still has interesting geological problems to be solved.

To help in achieving such a goal, since 2009 Sobrarbe Geopark promotes a grant program for researchers. Every year, two projects are selected according to the main interests of the Geopark. All the projects are one year long and have to be developed by official research institutions or by individuals with the support of them.

Furthermore, Sobrarbe Geopark offers some facilities to researchers, in order to make easy the work once in the geopark.

In addition, all the researchers beneficiated with a grant, subscribe the compromise to offer a presentation to the general public and/or to the pupils of Sobrarbe High School. In this presentation, not only the results of the research but also the “making of” are presented and explained to the inhabitants of the Geopark.

REDISCOVERING THE ANCIENT CORAL SEAS OF THE ENGLISH RIVIERA UNESCO GLOBAL GEOPARK

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Keywords: *marble, limestone, Devonian, sediments, fossils*

Quarries and cliffs in the English Riviera UNESCO Global Geopark are dominated either by fossiliferous limestones of Devonian age or by younger pebble-rich conglomerates and breccias of Permian age that contain much derived Devonian limestone. These outcrops have been scoured by collectors and researchers for 200 years and are well-known. Quite separately, though, the Geopark limestones were also once much exploited as building stone and decorative marble, becoming the most famous of British marbles in the nineteenth century. Today, the marble works are gone, most quarries are degraded, overgrown or redeveloped and the iconic marble localities have had to be rediscovered. Even so, the best ‘outcrops’ of Geopark marbles are no longer in the quarries but are the fine pieces of polished architectural stone; panels, pillars, steps and pavement, in churches, mansions and public buildings spread nationwide, even worldwide. Smaller pieces form decorative inlay in rare specimen marble tables and ornaments. Fossils, sediments, tectonic textures and alteration effects are often dramatic and beautiful. Oddly, these two manifestations of Geopark rocks, the scientific and the aesthetic, have not been reconciled until now. This talk shows how reuniting the once famous Devonshire marbles with their parental Devonian limestones leads to better understanding of the ‘coral seas’ from which they come. These abounded with corals, stromatoporoids, brachiopods, crinoids and cephalopods, inter alia, all contributing to the greatest period of reef-formation of all geological time. Properly identified and geologically understood, well-polished pieces of architectural marble and ornamental inlay sourced from the Geopark and nearby can be recognised as, e.g., shallow-water reef, tide-swept channel, turbulent beach, sweaty mud-bank, rocky island or quiet lagoon. Many are characterised by organisms of types now extinct. Some of these fossil-rich sediments will be seen during the geological excursions and examples of the marbles and inlaid items will be demonstrated at Torquay Museum.

RIVER INVESTIGATION SYSTEM OPERATED BY CITIZENS IN MUROTO GEOPARK

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Keywords: *river water quality, river sediment, forest environment, simple technique, community engagement*

Local people in Muroto UNESCO Global Geopark, southwestern Japan, are worried about environmental changes of the forest in the drainage areas as this may cause changes in the quality of the water, increase the risk of overbank flooding, erosion of river channel, and landform change of beach areas. Our project has established an investigation system for the river and forest environment operated by local people with geopark staffs. This investigation system includes a method of estimating the volume of suspended sediment in river water by simple and easy techniques, such as differentiation of river water colour or transparency. 80% of Muroto Geopark area is covered by forest which is characterized by evergreen broad-leaved trees (mainly *Castanopsis* and *Quercus*). Agricultural lands on riverside plain had been urbanized after 1970s, but the condition of the forest has been kept favorable in Muroto Geopark area. Forest industries including charcoal makers in Muroto efficiently manage forest environment. The forest environment keeps moderate sediment amount and gentle river behaviors in Muroto in comparison with drainage basins in the adjacent regions. On the other hand, decrease of river sediment caused reduction of beach deposits and regression of the coastline. Our research project on river and forest environment will be continued next years.



Conservation, science and research

Poster Presentations



DEVELOPMENT OF A NEW DATABASE FRAMEWORK FOR WEB AND MOBILE APPLICATIONS OF GEOPARK GUIDANCE

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Keywords: *geosite database, tag-based approach, information sharing, geopark application*

One of the most important issues that many geoparks are faced in common is how to provide their information to people widely. All geoparks are preparing some guidebooks, various geosites leaflets and a web-site for the visitors. Some of them have a mobile application that works with smart-phone devices. However, preparation and maintenance costs for these are high, especially, when it is necessary to construct a database for providing ICT tools which requires much time and effort for editing information and categorizing data manually in advance.

Our institute, the ACRIFIS-EHAI (AIG Collaborative Research Institute for International Study on Eruptive History and Informatics, Fukuoka Univ., Japan), aims to construct a new database system not only for academic purposes but also for general interests. To achieve this purpose, we have previously developed a geo-database platform and published a web-site and a mobile application for collecting geo-information.

Furthermore, to cope with the database maintenance issue, we have proposed a new framework, called MOMD-GIS (Metadata Oriented Multimedia Database for GIS). This framework provides some API (Application Programming Interface) for easy constructing of database applications and can deal with various data not only by user-generated tags like keywords extracted from user's comments but also by automatically added metadata like GPS information. Database editors can also add arbitrary keywords without being troubled by data format and can use automatic categorization using similarity calculation between tagged data. Moreover, the contents of the database can be enhanced with user's uploading photos and texts.

In this presentation, we introduce our proposed geological database framework and a new database service for geopark guidance.

EVOLUTIONARY PROCESS OF THE LANDFORMS IN ZHANGHJIAJIE GLOBAL GEOPARK

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Keywords: *landscapes, geology, science, geotourism, Zhangjiajie*

Zhangjiajie Global Geopark is located in Hunan Province of China, and has been one of the top-listed tourism sites in China since its picturesque landforms were discovered in 1979 by Wu Guanzhong, a famous Chinese painter. The landforms have developed in Devonian sandstone over an area of ~400 km² and are characterised mainly by more than 3000 sheer vertical sandstone pillars, peaks and walls of up to 350 m high. These spectacular features have made it a UNESCO natural heritage site in 1992 and a UNESCO Global Geopark in 2004. However, there has been lacking a convincing scientific explanation on the formative process of the distinct landforms over a long geological period of about 0.38 billion years. In recent years, a number of research projects have been carried out aiming at uncovering the evolutionary process of the distinct landforms as well as the mechanisms driving the evolution. This presentation introduces the latest scientific research outcomes, the causes behind the debates over naming the landscape, and the approaches for effectively applying the geomorphic knowledge to the conservation of the valuable geo-heritage and the development of geo-tourism in the geopark.

GEOHERITAGES DIVERSITY ASSESSMENT – A CASE IN ZHONGNANSHAN GLOBAL GEOPARK

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Keywords: *geoheritages, diversity, assessment, Zhongnanshan geopark*

Geodiversity was proposed by Sharples, refers to all the geologic phenomenon in earth sciences system, which contains geoheritage, soil, climate and landscape etc., it is connected and interacted with natural environment and social and culture.

Geoheritage diversity is a new field, an expansion of earth sciences. The significance of Geoheritage diversity is realized gradually in the process of exploring nature. Its research can provide guidance for the planning, education and protection, thus promote the sustainable development of geological relics resources. It is necessary to define the conception and content of Geoheritage diversity.

Geoheritage diversity is the diversified features of the geological elements and the relationship among them, including strata, tectonics, bedrocks, palaeobios, geohazard and landscape. It is reflected in the scale and distribution, the geological background, the type, quantity and grade, primarily the diversity of geologic and geomorphic features, their formation process and relationship.

We should establish the content system of Geoheritage diversity based on the following aspects:

1. Geoheritage diversity is based on the composition of the following elements, strata, tectonics, bedrocks, palaeobios, geohazard and landscape features.
2. Geoheritage diversity consist of the scale and distribution, the geological background and type, the quantity and grade, the protection and utilization, which are the indicators system of the Geoheritage diversity. We should establish an evaluation system relate to the elements to evaluate the diversity index.
3. Promote the evaluation of Geoheritage diversity quantitatively, applying mathematics and statistics methods to describe the properties and variability of the geological relics.

GEOHERITAGE MANAGEMENT ON A CROWDED TOURIST ISLAND: PRELIMINARY STUDIES IN FLORIANOPOLIS (SOUTHERN BRAZIL)

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Keywords: *geoheritage, inventory, management, Florianopolis*

The municipality of Florianópolis is the capital of Santa Catarina state in southern Brazil. It includes the island of Santa Catarina (424km²) and a small part of the mainland (11.9km²). The municipality consists of two main geological/geomorphological units: the igneous basement and the coastal plain. The basement is composed mainly of Precambrian granitic rocks, crossed by diabase dikes of the Cretaceous period.

Florianópolis's unique scenic landscape attracts hundreds of thousands of tourists and new residents every year. Its population nearly doubles in the summer, reaching more than a million. The island of Santa Catarina, which receives the entire tourist flow has 45% of its territory designated Permanent Preservation Areas, which are now fragmented by the expansion of urban areas and roads, and are being degraded for the construction of new urban-tourism infrastructure.

Consequently, the natural heritage is under threat, particularly its geodiversity and geological heritage, which is not yet recognised by the local authorities. An inventory is being conducted to identify all the geosites and geodiversity sites of Florianópolis. So far, seven geosites of national relevance have been identified: the Lagoa Conceição viewpoint, Joaquina dunes, rocky coastline of Joaquina beach, Lagoinha do Leste beach, sand spit of Daniela, Itacorubi mangrove, and Ingleses-Moçambique dunes. These geosites were selected on the basis of their representativeness, integrity, rarity and scientific relevance. The next step in the research is to assess the scientific value and risk of degradation of these geosites, and to identify the geodiversity sites. Once the geosites and geodiversity sites of Florianópolis are identified, our goal is to produce guidelines for their proper management. This information will be available to local authorities so that it can be used in the land-use planning of the municipality.

GEOPARKS: BRINGING MAN AND EARTH TOGETHER – BASED ON CASE STUDIES FROM THE ASPIRING BUZĂU LAND GEOPARK AND HATEG COUNTRY DINOSAURS GEOPARK, ROMANIA

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Keywords: *geodiversity, cultural diversity, geopark*

Geoparks are important tools for sustainable development, education and awareness, and provide a framework for conserving and using the natural heritage responsibly and sustainably. Cultural heritage is often attached to those elements of geoheritage that define the local environs, and building a geopark focusing on the interaction and connection of Man and the Earth adds value and makes the approach holistic. We wish to explore this connection and the possibilities it offers on three levels, based on case studies.

The first level (lore) is defined by the stories that people have crafted around their local natural world. This is a psychological reaction to our need to explain phenomena and adapt the natural world to the human mind. A few examples include stories about how some places are bad or good, and stories that try to explain spectacular phenomena (such as volcano fires kept alight by dragons, or mud volcanoes that are traps set by hungry ogres to catch cattle). These stories tend to change over time, so an element of geological heritage can have a number of stories attached to it, each defining a certain moment in the evolution of our awareness of, and reaction to, natural processes.

The second level (crafts) is a practical level, defined by the physical interaction between Man and the Earth and is both made possible and constrained by the natural resources that are available to the local community.

The third level (social development) is a modern level defined by how the dynamics of the community can be rejuvenated based on the local natural and cultural identity.

The first two levels define the local cultural identity as a function of natural “identity”. Basically, geodiversity leads to cultural diversity. The third level describes the way in which social dynamics can be built upon the first two.

INVESTIGATING BIVALVES IN THE PALEONTOLOGICAL PARK IN GALVE (MAESTRAZGO UNESCO GLOBAL GEOPARK)

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Keywords: *bivalves, cretaceous, fresh water, Jurassic, teruel*

The Palaeontological Park in Galve (Teruel, Spain) is internationally famous for Jurassic and Cretaceous dinosaur bones, footprints and eggshell fragments. For example, the Regional Government of Aragón preserves dinosaur footprints there, and the first new dinosaurian from Spain, *Aragosaurus*, was found in Galve. Much less well known are rich fossil gastropod and bivalve sites, the recent sampling of which is producing very interesting results. Bivalve fossils yield information on ancient environments enabling the reconstruction of the ecosystems shared with the dinosaurs. At Las Zabacheras (upper part of the Villar del Arzobispo Formation, Tithonian-Berriasian) occurs an unusual concentration of large shell-core oncoids whose nuclei are interpreted as freshwater bivalves with complex ornamentation similar to forms recently described in the Late Jurassic from Asturias (Northern Spain). Within the El Castellar Formation (Hauterivian-early Barremian) exposed at the same locality occur single valves of the bivalve *Teruella*, a genus defined, and dedicated to the province of Teruel by Mongin in 1965. The type locality of this species is Mora de Rubielos (province of Teruel), in the Peñagolosa sub-basin.

Several new localities have also been found in the Galve sub-basin. The youngest parts of the succession, the Camarillas Formation, yield other freshwater species, whose type locality is at “La Maca”, located in the Galve sub-basin: Mongin defined the species *Elliptio galvensis*, named after the village of Galve. Re-examination and new finds indicate that *Elliptio galvensis* should be placed in a new genus. Two the eight local exhibition centres, part of Dinópolis, which has its main exhibition located in the capital Teruel, lie within the Geopark, at Galve and Castellote. Our new fossils, the research upon them, and their association to the dinosaur fossils will be included in the display at the exhibition centre at Galve, which houses dinosaur remains representative of the area

NECESSITY OF ENVIRONMENTAL PROTECTION PLAN FOR THE QESHM ISLAND GEOPARK (IRAN: THE QESHM ISLAND) AS A CONTACT ZONE OF WORLD BIOGEOGRAPHIC REGION

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Keywords: *geoheritage, technical methods, main achievements*

Qeshm with an area of 1491 km² is the largest Island of the Persian Gulf and it was the natural and cultural heritage of the Island led to establishment Qeshm Island Geopark in 2006. The geographic position and historical event combined have resulted in the formation of the unique biodiversity of the island. Indeed, Qeshm Island Geopark is located at the contact zone of three main world biogeography regions, i.e. Palearctic, Oriental and Afrotropical. Also, the Geopark is situated in the contact zone of Persian Gulf and Gulf of Oman that, ecologically, are completely different ecosystems. The location of Qeshm Island at these contact areas has formed complex and unique fauna and flora. Furthermore, habitats in the Island which supports this complexity of biodiversity are surprisingly very diverse. This heterogeneity on small area like the Qeshm Island is considerable. For instance, all kind of coastal substrate (muddy, sandy, rocky/cobble and mangrove) that occurs throughout the Persian Gulf and the Gulf of Oman, can be seen on the Qeshm Island coastline (around 300 km in length). Monitoring and documenting the biodiversity in the Island is very important since the area is under extreme pressure due to several environment and anthropological factors. During the past three years ecological and biodiversity studies have been done on the Qeshm Island Geopark. Such unique biodiversity and habitat diversity requires the appropriate conservation management. In this regard, eight habitat and natural phenomenon include Naaz's Island, Hawksbill sea turtle nesting site, Dolphins Bay, Salt Dome, Chah Kuh Valley, Stars Valley, Dokoochak Birds Wetland and Shrew Habitat (Gedar) with total area of 18100 hectares which support specific biodiversity was documented and proposed to register as a national natural monuments. For each separate protected area, protection plan which most of them are community-based have been developed and presented.

PROGRESS AND ACHIEVEMENTS OF A GEOHERITAGE SURVEY IN CHINA

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Keywords: *geoheritage, technical methods, main achievements*

Geoheritage is part of our precious collective wealth, formed by both subsurface and surface geological functions. It is the consensus of countries throughout the world that geoheritage should be conserved, studied and used for science education and popularisation. Since 2008, the Department of Land and Resources, China Geological Survey Bureau has systematically deployed the first round of a geoheritage survey, a national project. As at the end of 2015, more than 3,400 geoheritages sites had been surveyed, which is about 56% of the sites included in the project. The remaining work will be completed by the end of 2017. Among the surveyed sites, 247 have world-class geoheritage. We have established an effective method for the geoheritage survey and evaluation of the findings is underway. The timely application and transformation of the main findings of the survey will play a very important role in geological scientific research, and geoheritage protection and management, and will benefit local economic development.

RESEARCH ON THE FORMATION OF YUNTAI LANDFORM

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Keywords: *geopark, geoheritages, conservation*

Yuntaishan Global Geopark, which was approved as a member of GGN in 2004, covers an area of 556 km², with a core area of 323 km². The geopark is located in the north part of Jiaozuo City, Henan Province.

Among the geopark's most notable features are its tectonic landforms and waterscapes. The tectonic landforms include a U-shaped valley, mesa, precipice, stone wall and stone pillar. The waterscapes include a hanging spring, flying waterfall, mountain steam, blue pond, red stones, green moss and a flowing spring. The most typical geoheritage in the geopark includes a red stone valley (red stone and blue water), the Yuntai Heaven Waterfall (with a single stage fall of 314 m), the Long Feng Urn Valley (with a Long Feng adarce green precipice), the Qinglongxia Valley (karst cave and adarce landform), a peak-forest, a Qingtianhe-incised meandering stream, the Shennongshan Dragon Ridge Great Wall (the combination of an 11 km stone wall and white bark pine) and the Baijiayan red long cliff (stepped long cliff). There is also considerable geoheritage with great significance for science education distributed in the valley and on the precipice, such as oolitic limestone, tempestite, cross bedding, parallel unconformity and angular unconformity.

In order to protect the abundant and typical geoheritage, ecological resources and cultural sites, the geopark has conducted research studies, such as Research on the formation of Yuntai landform. The research is used for the science education and geoconservation, and to support exhibition planning. The geopark has put in place effective conservation measures for important, typical geoheritage, has established a science-popularisation programme and has ensured the healthy and sustainable development of nature-based tourism in the geopark.



Education, interpretation and communications

Oral Presentations



THE ‘ABC’ APPROACH TO INTERPRETATION IN SUCCESSFUL GEOTOURISM

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Keywords: *geotourism, interpretation, sustainable development, global, case studies*

Geotourism is best understood as being made up of the following three ‘ABC’ elements. They are the Abiotic or Non-living – climate and land (primarily geology and landforms); Biotic or Living - plants (flora) and animals (fauna); and Culture or people – past and present.

When understood and presented in this format then people (locals and tourists) can easily see the links between how climate and geology have determined the plants and animals, which live in an area, which in turn has shaped the way people have lived in a region in the past, as well as today. Thus, it is geology, which is the key building block to our understanding of all components of the environment and the way in which we live in it.

A second central element of geotourism is the presentation of geology interpreted through its components of Form (landforms and landscape), Process (how the landforms originated) and Time (when the processes occurred and how long they lasted). When Geotourism is presented in this way through the ABC approach, then people have a better understanding of the significant

This presentation will outline the central role of Interpretation in developing Geotourism as a key contributing factor in fostering community-based, sustainable regional development. By putting this interpretive approach to Geotourism into action it promotes awareness of geological features within the context of the biota and culture of a region. This ‘interpretive bridge’ is a central, but often missing, link in bringing geology to life. Once understood and put into practice through geotourism, it can be a powerful tool in the development of geoparks.

This approach will be illustrated with examples from USA, Australia and Iceland.

ADVANTAGES AND DISADVANTAGES OF USING HIGH TECHNOLOGY IN CHECINY-KIELCE GEOPARK - POLAND

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Keywords: *geopark, high technology, tourist guide, Poland, Holy Cross Mountains*

Our presentation is about the aspiring Chęciny-Kielce Geopark, which is situated in the southwest part of the Świętokrzyskie (Holy Cross) Mountains, in central Poland. The headquarters of the geopark is the Center of Geoeducation (COG), which has an innovative geological museum.

High and innovative technology has become an integral part of modern museums. Our COG uses new technology in all our educational and promotional activities. For example, we use many touch screens, applications, animations and 5D cinema. For tourists, we offer audio guides and specially designed smartphone applications.

People like new technology, but the human factor, especially human relationships, is also very important. The COG, therefore, offers both interesting information about geology and a warm family atmosphere and people-friendly approach. That's why we put a lot of effort into providing a high level of education for our guides and educators, who create the atmosphere in the geopark. The geopark staff love geology and are eager to share their knowledge and enthusiasm.

Educators can use new technology to share knowledge of geology. But in our presentation, we emphasise that nothing can replace human contact, especially in special educational activities for young people and at promotional events. Examples include stone-cutting workshops, art activities and competitions.

Only well-educated, motivated staff can transfer geological knowledge successfully. In our experience, virtual activities cannot replace traditional tours in places where tourists can explore minerals and fossils.

Geology is often regarded as difficult and specialized subject. However, when we combine people who love geology with appropriate modern technology, it can make geology simpler and more interesting. To sum up, it's important to keep a proper balance between high technology and the human touch.

DATA IN THE PALM OF YOUR HAND – MOBILE, DIGITAL AND 3D GEOLOGY

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Keywords: *geology, digital, iGeology, maps, free*

Geology has come a long way since the advent of the first national-scale geological map produced by pioneering British geologist William Smith in 1815. The traditional image of 19th and 20th Century geologists is with hammer in hand traversing geological boundaries, annotating paper maps and recording observations in a trusty field notebook. The 21st Century counterpart carries a web-enabled ruggedised tablet computer with line work and observations entered directly onto a GPS-located digital map capable of incorporating detailed metadata, photographs and other geological information.

The capture, management and delivery of data is at the heart of the modern British Geological Survey (BGS). Data captured by geologists during survey programmes is used to continually update the understanding of the geology of the UK. BGS maps are wholly digital with a seamless geological map of the UK that is scalable from the national 1:1 million scale to the local 1:10,000 scale.

The revolution in spatial data over the last 20 years has enabled a move from 2-dimensional flat plan view geological maps to the 3-dimensional geological models of the subsurface. Visualisation technology enables geologists to carry out virtual field excursions before leaving the office. In addition, the policy of Open Data has seen a surge in freely available geological information largely accessed through web map viewers and data portals. More recently mobile applications such as iGeology in the UK and mGeology in the United Arab Emirates enable access to geological information via smart phones and tablets.

This presentation will look at how the digital revolution has transformed the delivery of geological data to the world. It will cover the advances made by the British Geological Survey in delivering geological maps to your smart phone, 3D subsurface modelling and 3D visualisation of data in a ‘virtual field laboratory’.

DEVELOPMENT OF A THREE-WAY AUGMENTED REALITY FOR ATTRACTIVE GUIDANCE OF GEOPARK

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Keywords: *augmented reality, Geoparks, guidance, marker less*

Our aim is to enhance attractions of each geopark and to provide a low cost maintenance free guidance-showing tool by using augmented reality (AR). In this paper, we introduce new AR tools that don't require any artificial markers and are applicable to various natural scenes.

We assume that there are two types of user on our AR tools. One may be a staff of the geopark who maintain the contents of the AR, and the other is visitor of the geopark. Generally, a geopark covers a wide area that consists of multiple geosites. For each geosite, the staff create the content by using our AR-map creator tool. The visitors can download the contents from a web site to their tablet PC. After this, using our onsite-AR tool, visitors can see the guidance, enjoy, learn about and deepen their knowledge about the geopark.

The onsite-AR tool is applicable to three types of geosite, and AR-map creator enables the staff to create the content for each types of geosite. First type is for narrow geosite so that visitors observe a geopoint within about 10 meter distance. In this case, the content consists of single AR-map. An AR-map includes a guidance CG and 3D information indicates the position of display CG. The second type is for a middle sized area geosite in which there are several geopoints. In this case, content includes multiple AR-maps. Therefore, the onsite-AR tool must automatically distinguish the geopoint and apply a correct AR-map to it. The third type is for a wide area geosite so that visitors observe far great view. In this case, the AR tools use a different mechanism from other two types. As a feasibility test, we apply our AR tools to Aso Unesco Global Geopark and Unzen Volcanim Area Global Geopark. In this paper, we also report the result of the feasibility test.

DIDACTIC CONCEPT OF THE MESSEL PIT WORLD HERITAGE SITE, GERMANY – WORLD HERITAGE GEO-EDUCATION IN USING THE “THE TIME TRAVEL CREW” AS A TOOL OF FOR EARTH SCIENCE EDUCATION AND POPULARISATION

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Keywords: *world heritage, didactic concept, education tools, public outreach, earth science popularisation*

The Messel Pit World Heritage Site (WHS), situated within the Bergstrasse-Odenwald UNESCO Global Geopark, Germany, is a fossil site of extraordinary universal value. The unique complete Messel fossils however are the main “attraction” for visitors and the general population. However, it is, and was unthinkable that any fossil could be given off for any other use than for scientific investigation. A way needed to be found to overcome this and that the fossils could not be “dug out by visitors”. Collecting all information to develop a concept for a new visitor centre and too, to open a regular access for the public and for marketing, it seemed to be necessary to think in a sensitive but different way of all the earth scientific topics existing. The result was surprising, as beside the famous paleontological fossils a high geodiversity of other earth scientific topics was discovered. In thinking of how to market “fossils” quite soon it was obvious that the geodiversity and topics of the Messel Pit are related to “time”. The “Geo-identity” was defined. By this it made sense to think of combining the geodiversity in a new way and to use it in a new approach as didactic concept for the Messel Pit WH Geo-Education: The Time Travel Crew with Fiora Eocene – Queen of Time. Within this context the names of fossils have been given to “figures” fitting to certain characters having a special shape and appearance which links with the Messel Pit geodiversity first. The heart of the created team is “time” and the “ability of travelling” into time. The characters and the topics will be presented as well as the scientific topics and the actually improved concept to use the Time Travel Crew as a tool for World Heritage Earth Science education and popularisation in combination with World Heritage topics and too UNESCO Global Geopark territories.

EDUCATIONAL PROGRAM “GEA – MOTHER EARTH”: A TOOL FOR THE IMPLEMENTATIONS OF A NEW ASPIRING GLOBAL GEOPARK OF UNESCO IN PORTUGAL

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Keywords: *Program GEA-Mother Earth, school contest, partnership, networking, geosciences for society*

Since 2011, the Portuguese National Committee for the International Geosciences Programme (IGCP-UNESCO) has created in partnership with the Portuguese National Commission for UNESCO the educational program “GEA – Mother Earth”. This programme is based on school contests, focused in geosciences themes, itinerary exhibitions and training courses mainly for teachers. It is promoted especially in partnership with the Portuguese Global Geoparks of UNESCO (Naturtejo, Arouca, Azores and Terras de Cavaleiros) and the Portuguese Network of Biosphere Reserves. It is also supported by the Portuguese National Forum of Geoparks. Currently, in its fifth edition, this educational program launched the school contest “Natural Disasters – how to live with them and what solutions?”. For the first time, it was also included the Aspiring Estrela Geopark, involving the school community of this region (composed by nine municipalities: Guarda, Seia, Gouveia, Celorico da Beira, Fornos de Algodres, Manteigas, Belmonte, Covilhã and Oliveira do Hospital). The school contest was promoted in all levels of teaching and 66 students were inscribed. In this sense, teachers and students were invited to explore the proposed theme, focusing on the natural disasters that occur in this region and to debate possible solutions. Simultaneously, they were also invited to learn more about the Global Geoparks of UNESCO and the Global Geoparks Network.

The Aspiring Estrela Geopark also made available on its website (<http://cartaturistica.ipg.pt/index.php/concursos/gea-terra-mae>), additional information, including flyers about the school contest and the application form. With this educational program it has been also possible to contribute to the promotion of the UNESCO Global Geoparks Programme and to link Geosciences to Society, based in an effective networking supported by strong partnerships, especially among the school communities located in the territory of this Portuguese aspiring geopark.

THE EDUCATIONAL PROGRAMMES AT PENAMACOR (NATURTEJO GEOPARK)

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Keywords: *educational programmes, exhibition, field trip, Penamacor, workshop*

Penamacor is the newest Municipality of Naturtejo UNESCO Global Geopark, since September 2015. In the school year of 2014/2015 the Educational Service of Naturtejo Geopark started working in partnership with the Geologist of the Penamacor Municipality. The goal was to create and organise educational activities for the Penamacor and abroad students.

The Field Trip M “The Geodiversity in the lands of the Lynx” was created within the framework of the Educational Programme “School meets the Geopark”. This field trip included an urban trail in the village of Penamacor to explore its geodiversity. This main activity could be combined with one of two optional activities: a visit to the Thermal Spa of Águas or a pedestrian trail in the Natural Reservation of Malcata Mountain to identify the plants on the area of the Roman Gold Mines of Penamacor Geomonument. During the school year of 2014/2015 students from the 5th, 7th, 9th and 10th Forms belonging to the School of Penamacor participated in this field trip following Natural Sciences or Geography classes.

In the school years of 2014/2015 and 2015/2016, on the “Patron’s School Day”, the workshop “Fossils as you like!” was organised in the framework of the Educational Programme “Geopark goes to School” for Primary schools and for the 5th and 7th Forms students of the Penamacor Municipality. In the framework of the Educational Programme “Anim’a Rocha”, in the school year of 2015/2016, the Exhibition “ab initio geologicamente” held at the Municipal Museum was visited by children from the Kindergarten and Primary Schools of Penamacor. A booklet with pedagogical worksheets and some educational games were used by the students during the visit. Distinct versions of the booklet were adapted to the different student levels. The exhibition was also visited by students from other Municipalities of the Naturtejo Geopark.

EDUCATION AND PROMOTION OF CONSERVATING HERITAGE VALUES - ENGAGING THE LOCAL COMMUNITY OF THE DONG VAN KARST PLATEAU UNESCO GLOBAL GEOPARK (DVG)

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Keywords: *education, promotion, public awareness, young generation, perception*

After joining the Global Geoparks network, a program of improving awareness of the community and promoting geopark development has been run for all people. As one of the poorest areas of the country, having an area of about 2350km² with hazard weather conditions, scattered residents, low educational level and various languages the DVG's development has a lot of difficulties.

The program plays an important role in the construction and development of the geopark and we have taken many steps from low to high, from villages to the entire province. With many forms of the promotion like media, photo exhibitions and heritage knowledge contests, which are translated into local languages, the program has worked quite effectively. Particularly, with the participation of all school in the province, the program has even been spread to children at kindergaderns.

Recently, local people living in the Dong Van karst plateau geopark have changed their perceptions, and awareness about the heritage value and their responsibility of protecting heritage. Local people have joined voluntarily and actively to support the management and promotion to everyone to preserve and develop the values of the VVG. Therefore, the local community contribute towards the tourism development, economic growth and social improvement.

ENGAGING WITH THE MEDIA: GARNERING PUBLICITY FOR YOUR GEOSITE

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Keywords: *media, publicity, communication, branding, identity*

An effective communication and public relations strategy is a key component of every thriving geoheritage site. Beyond the physical boundaries, each site's destination identity, including the geological significance, the vital linkage between people and the landscape, and the available activities and attractions, must be clearly and actively communicated on-the-ground and to potential visitors.

We will explore the dynamics of science communication from a journalism perspective, focusing on methods to help garner publicity for an established or aspiring geosite. A fundamental technique is storytelling: identifying an attention-grabbing angle and harnessing this to construct a narrative that helps brand the destination. Key points include engaging the media; identifying a target audience, reaching out to them, and keeping them engaged; delivering a message the audience can relate to and that sticks with them; identifying trends and tourism themes into which a site can fit; and developing creative ways to broaden the audience and hence expand the geosite's appeal.

From eating trilobite cookies in Portugal's Geopark Naturejo, bicycling amongst limestone towers in southwestern China, climbing a steaming stratovolcano in Bali, and visiting New Zealand's mythical Middle Earth, we will provide examples of ways to effectively communicate geosites' significant science and distinctive character to ultimately make geoheritage destinations more palpable—and more popular.

GEODIVERSITY INTERPRETATION IN ROMANIAN GEOPARKS

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Keywords: *geodiversity, interpretation, geoparks, geotourism*

Geodiversity is a complex concept that could be defined as the variety of earth materials, forms and processes generated in continuous multidimensional contexts. Geodiversity is different from one place to another being the result of interaction between internal and external forces in local or regional frameworks. Geodiversity has played an important role in human community development and contributed to shape local identity. Interpretation is the art of improving and enriching the visitor experience, to make people understand the significance of the place. It aims to provoke people to learn and think, to make connections and to inspire them. A Geopark is aiming to play an active role in the economic development of its communities and enabling the inhabitants to re-appropriate the geodiversity local values and actively participate in the territory's cultural revitalisation as a whole. Interpretation is one of the key activities in this process. This paper is presenting our approach in geodiversity interpretation in Hateg Country Dinosaurs Geopark, a UNESCO Geopark and Buzau Land Aspiring Geopark, in Romania. Based on interdisciplinary research our interpretation strategy is aiming to link tangible heritage represented by different geodiversity assets in each territory and intangible heritage developed by local communities, artists and scientists. A network of interpretation trails and visiting structures were developed in order to create a direct link between local geodiversity, cultural heritage and visitor personal experience.

GEOLOGICAL SIGNATURES CREATED BY THE LATE PLEISTOCENE GEOTECTONICS AND FLUVIAL PROCESSES FROM THE TAK PETRIFIED WOOD ASPIRING GEOPARK

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Keywords: *geological signatures, geotectonics, fluvial processes, northern Thailand, Tak*

Four geological sites in the Tak Petrified Wood Aspiring Geopark area are chosen to shortly describe herein. The petrified wood site is a sedimentary deposit in association with abundant fossil logs formed by depositions of the floating logs in the Ping River and completely turned into fossils at around 120,000 years ago where they were still under the riverbed. The sediments were still continuously removed from the fossils and replaced by new volumes until the river channel had been shifted leaving the fossil logs embedded by the much younger sediments at around 23,000 years ago.

A large pile of debris-flows, Pha Sam Ngao, is one of the series of isolated hills along the mountain front, bajada, about 19,763 – 22,079 years ago. After that, the Pha Sam Ngao debris-flows had been cut by the uplift of the terrain in contemporaneous with deeper penetration of the Ping River giving rise to a steep cliff on the riverside. The granite tors at Wat Khao Tham are the residual granitic rock masses that displays group of isolated piles of boulders. They have been developed by deep penetration of weathering along jointed granitic bedrock which produced a thick saprolite mantle intersperse the corestones then has been brought up by tectonic uplift. The granular saprolite was quickly removed by wind and water leaving behind the rounded granitic corestones with large interspaces between them. The Huai Pla Lod natural bridge is made of Ordovician thin-bedded limestone crossing over a stream with about 30-40 meters high and about 18-20 meters wide. Both west and east sidewalls under the bridge are characterized by stalagmites and stalactites with patches of stream gravels embedded by travertine limestone. These four geological sites have been created by the geotectonics and fluvial processes since Late Pleistocene.

GEOPARK EDUCATION IN SCHOOLS IN THE OKI ISLANDS UNESCO GLOBAL GEOPARK

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Keywords: *geoparks resources, ministry of environment, regional pride, school education*

At present, all Elementary, Junior High and Secondary Schools in the Oki Islands UNESCO Global Geopark have adopted new educational programmes which utilize the resources of the geopark. For example, the Oki High School has created an elective “Geopark Studies” course which commenced in 2014. In this class, students study all elements of the geopark, including geology, nature, culture and history. Similarly, Oki Dozen High School began teaching a geological sciences class in 2016, which is designed to utilize geopark resources. On the other hand, education at the Elementary and Junior High School levels was previously dependent on the dispatch of geopark staff or guides who would teach the students for 1-2 hour classes. As a result, school teachers adopted a backseat role with regards to geopark education. In order to change this, the geopark worked with the Ministry of the Environment, educators and the local Boards of Education to develop a geopark education model with detailed content and lesson advice for incorporating geopark themes and resources into the existing school curriculum. This presentation will discuss the development of this programme and the response of the teachers and students.

GEOPARK NETWORKING THROUGH CARTOGRAPHIC INFORMATION

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Keywords: *birds eye view map, mapping geosites, database, web-GIS, networking*

In the national geoparks in Japan, birds-eye view maps are featured on the explanation panels around geosites or viewpoints. The birds-eye view makes it easier for the visitor to understand the topography of the place. The birds-eye view map is created through GIS, using DEM and land use data. Therefore we can say that there are advances in the spatial data analysis in these geoparks. However spatial data has not been adequately used in all cases. The Japan Geo Service which is a private company, and the Hokkaido Chizu Co. which specializes in producing maps, are promoting GIS based networking of geoparks in Japan. The key features of this networking are:

1. Location and conservation status related information of the sites organized through GIS;
2. Designing of interactive web-GIS where researchers and visitors can input local information and photographs.

Our objective is to develop such interactive spatial information tools so that researchers and visitors can make use of it to gather information about geoparks.

IDRIJA UNESCO GLOBAL GEOPARK AND IDRIJA TOURIST DESTINATION PROMOTION

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Keywords: *communication, UNESCO, tourist destination, brand, geotourism*

Geotourism protects nature and stimulates the welfare of the population in a responsible way. It takes an area integrally, with its history, traditions, culture, landscape, cuisine, art, flora and fauna, the welfare of the people, and thus emphasises its geographical character. Municipality Idrija has established Idrija UNESCO Global Geopark following its sustainability policy to protect, interpret, educate and develop geotourism here. It works within Idrija Heritage Centre which is in charge of the development and promotion of Idrija tourist destination and Visit Idrija brand.

The local population is vital for the geopark to exist and operate. It is not only a sight for visitors to enjoy geological features, it enables development and a revival of remote areas through restoring traditional local handicrafts, delicacies and lifestyle.

Marketing Communication and Public Relations are the main tools to gain the recognisability and recognition of the Idrija UNESCO Global Geopark. Perpetual appearance of the Geopark in the media and on websites maintain the relations and the brand name is strengthened among certain target groups. Idrija Heritage Centre and Visit Idrija destination are promoted alongside. Our visitors and the public get the information of Geopark activities and we invite them to cooperate or participate in events or meetings.

Depending on goals and target groups we want to reach, Idrija UNESCO Global Geopark presents its high-ranked brand name that we promote. In general promotion the destination boasts the brands Unesco, Visit Idrija, Idrija UNESCO Global Geopark, Eden, Green Destination.

Idrija heritage has been protected by Unesco on two different projects within three years. For Municipality Idrija it is a unique opportunity for sustainable geotourism development and a responsibility to preserve the heritage for our descendants. Unesco branding brings more recognisability to local, national and international expert and general public.

INCREASING PUBLIC APPRECIATION OF ABIOTIC NATURE – GEO-EDUCATION IN MICHIGAN’S KEWEENAW PENINSULA

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Keywords: *geo-education, geoheritage, geotourism, interpretation, self-guided geotours*

Jutting out into Lake Superior, Michigan’s Keweenaw Peninsula hosts globally significant geodiversity including one of Earth’s largest native copper deposits. This rich deposit was discovered and mined by the earliest North Americans thousands of years ago. Although many are familiar with the widely interpreted European immigrant migration which fed a mining boom in the late 1800s, the geologic context is less familiar with locals and visitors. This gap has led to an education and outreach program focused on identifying, interpreting, sharing, and promoting the significance of local geosites and geological concepts in partnership with educators, national park interpreters and museum staff, decision makers, business people, and the broader public.

Self-guided geotours have been developed throughout the peninsula. Brochures and signage focus on significant geologic sites while also highlighting cultural heritage of the area; other self-guided materials include videos, books and field guides. Boulder gardens representing all lithologies of the Keweenaw have been installed on the university campus in an artistic manner allowing people to connect to the local geology in a tactile way. This idea has been replicated on a number of K-12 school campuses engaging the student voice through their own creation of design, signage, and brochures. We have also successfully piloted Keweenaw Geoheritage Tours allowing participants to visit and learn about significant geosites by water and land. These trips have grown in popularity and are the basis of a geotourism business model for the Keweenaw.

Educational activities and materials are also proving to be fruitful in engaging our community with respect to contentious issues in the Keweenaw such as the varied anthropogenic impacts of past mining operations in the region. A geopark designation would further support outreach and education efforts, while promoting sustainable economic development opportunities and the conservation of abiotic nature in the Keweenaw.

THE INTERPRETATIVE CENTRE OF BIODIVERSITY “IDANHA LANDS” AND SCHOOLS

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¹Naturtejo UNESCO Global Geopark

Keywords: *educational programmes, biodiversity, geodiversity, Erges Gorge, educational resources*

The Interpretative Centre of Biodiversity “Idanha Lands” is located at the village of Segura, in the Municipality of Idanha-a-Nova. The centre opened in 2013 and is included in the Natural Park of the International Tagus. In front of the centre stands the Erges Fluvial Gorge, a geosite of the Naturtejo Geopark. The Interpretative Centre has got panels, interactive equipment, replicas and samples of the geodiversity of the Idanha-a-Nova Municipality.

The Educational Service of the Naturtejo Geopark created two educational activities based on the Interpretative Centre and the geosite.

The Field Trip “Bio & Geodiversity of the Erges Fluvial Gorge - Segura”, was created in the school year of 2013/2014, in the framework of the Educational Programme “School meets the Geopark”. A booklet with pedagogical worksheets to explore the exhibition at the interpretative centre, a booklet to explore the flora, birds and the geodiversity in the area of the geosite and a guide to identify the plants were then produced. In that same school year, the Educational Service with the partnership of the Municipality of Idanha-a-Nova organised this field trip for 472 children from the Kindergarten and Primary Schools of the Municipality. The Kindergarten school children also visited the farm of the Company “Aromas do Valado”.

The workshop “Who is who in the wonderful kingdom of plants?” was created in the school year of 2014/2015. The workshop included a guided visit to the Interpretative Centre and a pedestrian trail heading to the geosite. A plant identification guide and a game with pictures of plants along with derived products used in gastronomy, cosmetics and medicines were used. In the end, standing in front of the Fluvial Gorge, the participants ate the gastronomic products included in the game. This workshop was organised for 20 participants from the Geopark Naturtejo territory.

INTERPRETING GEOHERITAGE BY MINGLING IT WITH TRADITIONAL LOCAL CULTURE

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Keywords: -

This study presents an interpretation system model for geoheritage to facilitate understanding of geoscience by ordinary people. Quality interpretation systems are crucial to geoparks and of great value for popularizing science among the general public. Approaches to improving the effectiveness of geoheritage interpretation are continually being explored. We outline the improved interpretation system of China's Longhushan Global Geopark with examples of interpreting geoheritage by mingling it with traditional local culture. Using our experience and lessons learned, we suggest using geotourism as a complete contextual communication system, in which a geopark (source) delivers information about its unique cultural and geological features to target visitors (receivers) through tourism activities (channels). The communication effect of geotourism is better from experience tourism because of its profound impact on tourists, both physically and mentally. We expect this model to provide a more effective interpretation of geoheritage from a new perspective.

MAKING OF THE OUTDOOR LEARNING QUIZ BOOK FOR SCHOOL TRIP IN TOYA-USU UNESCO GLOBAL GEOPARK

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Keywords: *education, guide, quiz, volcano*

In Toya Caldera and Utsu Volcano Geopark, we have made some outdoor learning textbooks for school education trips over the last few years. The contents of these textbooks are along the course of study. We have encouraged school trips and local staff who are guiding to use these texts. However, the guidance program using these texts have had some problems. It is impossible to show all sites listed in the guidebook without a local guide and the guide staff relayed the information from the learning textbooks in such a way that the content did not remain in the memory of visitors.

In this study, we examined the learning program and guidance method. The goal is to create a program in which students can learn more proactively. We have made the quiz book “Volcano disaster prevention quiz book in Toya Caldera and Utsu Volcano Geopark”. We chose the 3 tour route called “Nishiyama Foothill Crater hiking trail”, “Konpirayama Trail and 2000 Eruption Memorial Park”, “Mt. Showa-shinzan and Utsu Gairinzan Trail”, and created 50 questions along these routes. These routes are the most popular in this Geopark. Furthermore, the questions can only be solved through observations in the field.

If the guide staff will use this program, the student will learn about contents of quiz positively and will remain in everyone's memories. Furthermore, using this quiz program will probably improve the technique of the guide staff.

In this presentation, we report about the quiz book and the school trips using this program and we will verify the effect of this program.

MOBILE GUIDING APPLICATION FOR INFORMATION SHARING AMONG VISITORS

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Keywords: *mobile application, guiding services, sharing information, communication, SNS*

We have developed a mobile application (app) framework for forming a new relationship between geoparks and visitors. In addition to providing information about geoparks, the app allows geopark visitors to share information directly among themselves, adding to the geoparks' appeal. We are preparing a dedicated geopark guiding mobile app with an information management system for this.

There is often limited information about geoparks for visitors to plan their visit in advance. Geopark operators are often restricted in the communication channels available to provide such information. Therefore, there are insufficient channels for visitors who have visited geosites to share their information and impressions with those who are planning to visit. We have developed a guide app that visitors can use on their smartphones. The app introduces geosite features and allows geopark visitors to share information with each other: places visited, photos taken, impressions, experience and advice, for example.

Information can be shared in various ways through the system, including dedicated SMS, to help new visitors learn about the geopark's features in advance. This can also help regular visitors find new features that suit their interests. The geopark can also use the app to provide helpful information to visitors, new and old. The app can provide valuable feedback to geopark operators, including visitor interests and sites visited.

We have already developed a prototype and have started field tests in cooperation with two global geoparks in Japan. This will allow us to improve and evaluate the effectiveness of the functions. In this presentation, we will introduce some of the features and concrete possibilities of the use of our information-sharing mobile app.

A NEW SYSTEM OF CERTIFICATION FOR GEO-GUIDES OF MUROTO UNESCO GLOBAL GEOPARK

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¹Muroto Geopark Promotion Committee

Keywords: *guides certification, quality control, activity program, guide training course, communication skill improvement*

In Japan, there is no national license for guides except for those that include foreign language interpretation. Some private organizations have a certification system for guides including some of the Japanese UNESCO Global Geoparks. In Muroto UNESCO Global Geopark, there was no kind of certification system for guides until last year. It was realized that the certification system is very important for quality improvement and control. Since the geopark became an official program of UNESCO, it is more important than ever to ensure good quality. There are geo-guide training courses every year and this year a new course has started entitled as “The 1st Muroto UNESCO Global Geopark Guides Training Course” focusing on interpretation and communication skills as well as the basic knowledge of earth science and understandings of the geopark program.

Before design of the course began, discussions were held with the members of three guide groups operating geopark guide tours within Muroto UNESCO Global Geopark. Through these discussions, the necessity of a new system for the certification was mentioned by one of the members. Another mentioned that how to communicate with the participants of guided tours is the most important skill for those who take guide training course. The training course was then designed focusing on the interpretation skills with a professional trainer. In the new training course, the operation of activity programs was added and now these are included in some guided tours. Feedback was also initiated for the main guide by sub-guides. A new certification system after the training course was set up and guides will be certified by the Muroto Geopark Promotion Committee through which they can achieve the feedback skill, communication skills as well as basic earth science knowledge.

THE ‘PALEONAUTS’: AN EXPERIMENT OF NETWORKING

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Keywords: *networking, paleontology, education, educational sites, Quercy*

This project was initiated in 2006 by two neighbouring French areas: Causses du Quercy aspiring Geopark and “Pays Bourian”. The purpose was to develop synergies between Quercy archaeological and paleontological sites in order to structure the local cultural, tourism and educational offer.

The “Paleonauts” network was originally composed of 6 sites of international scientific interest with shared common values:

- Complementarity: each site is part of the record of life and human history. They are complementary from a chronological point of view (covering the period: -150 million years to - 4,000 years) and enable different approaches.
- Authenticity: each site proposes discovering and visiting offers but is also the subject of scientific studies.
- Accessibility: each site wants to be meaningful; quality of service and scientific mediation accuracy are essential issues for the network.

The “Paleonauts” have carried out many initiatives over this 10-year period. The network is trying to embody a true role of “science purveyors” and has produced several educational tools such as: an educational booklet, a ludic CD-ROM (“Let’s investigate with the “Paleonauts”!”) and more recently also two special educational kits and educational courses between multiple sites for schools.

Since 2009, the network has been organising a special event for the general public called “Coup de calcaire”. This two-year event is dedicated to the promotion of the latest in scientific research in archaeology and palaeontology fields. The event programming is very eclectic: lectures, workshops, film projections... Nowadays, Causses du Quercy aspiring Geopark is still actively involved in the network but its organisation has become independent since 2012, following the creation of the association “Les Paléonautes”. The Network has since grown to include two more sites. This “Paleonauts” project is truly a testament to the advantage of local networking to strengthen the territorial cohesion.

A PICTURE BOOK ABOUT GEOSTORIES OF XINGWEN GLOBAL GEOPARK FOR SCHOOL CHILDREN

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Keywords: *karst landform, cultural, geoheritage, geoeducation*

Xingwen Global Geopark is situated in Xingwen County, Sichuan Province, China, with an area of 156 square kilometers. It is characterized by karst landform, wildlife and the ancient cultural remains of the Bo People and present day Miao culture. Because of this, we can find a lot of hidden tales, "Geostories", associated with the activity of the living Earth when we focus on the different aspects of people's livelihood and the natural habitats. In 2015, Xingwen Global Geopark published a picture book *Come on a Journey to Xingwen Global Geopark with us* in order to comprehend the relationship between the worlds above and under the ground. It was edited to include mascots, easy-to-understand texts and illustrations to reach school children. In March 2016, about 40,000 copies were delivered to the local students as a part of the curricula of the schools. According to the feedback from the students and teachers, it shows that the book is very helpful for the students to recognize the value and to appreciate and protect geoheritage and culture of their area.

POPULARIZATION PROGRAM OF CHINA FANGSHAN GLOBAL GEOPARK

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Keywords: *geo-science popularization, geopark visibility*

In recent years, Fangshan Global Geopark of China has taken effective measures to boost popularization activities. We added the introduction and tour map of both the whole geopark and 8 geo-regions in each geo-regions and geo-areas. We set up 15 science popularization corridors, installed 532 panels including information panels, geoheritage panels. Improved the Geopark website in both Chinese and English, and connected to the GGN website, established Fangshan Geopark database and e-archives system, providing a sound base for geosite conservation and geoscience research. Developed electronic tour map and electronic guide pen, which can provide audio tour guide service in both Chinese and English, QR code is widely used in the geopark's interpretation system and publications. A new video monitoring system was added to the geopark's service centre to monitor real time traffic safety and visitor flow in eight geo-regions. We established Scientific Research Fund, providing not less than 5 million yuan for science research each year. Completed Research Projects with China Geological Survey on Protection and Development Study on Fangshan Karst Cave Resources" and other 5 projects with different institutions. Established geo-science research and education base in Zhoukoudian and Yesanpo, which receive more than 40 universities practice each year. Rewrote the geoscience interpretation to ensure they are interesting and easy to understand. Published 4 popular science books for students and adults in both Chinese and English.

Moreover, we made geopark picture books, guide books, pamphlets and so on. To provide more convenient service to disabled people, Fangshan Geopark made the guide book for blind, which is the first one in China Geoparks as well as first one in GGN members. Launched the campaign of popular science activity at school, at community and local family. Each year we held World Earth Day on different themes. We launched the campaign of Popular Science Week. Carried out geo-science summer camp and essay writing activities.

PROJECT GEA - MOTHER EARTH IN GEOPARK TERRITORIES ARARIPE / BRAZIL

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Keywords: *education, geosciences, schools, territory, sustainability*

Project "GEA - MOTHER EARTH" was developed in the territory of the Geopark Araripe - G. A. It was launched in December 2013 through the Project Portugal Cooperation / Brazil in the field of Geosciences with the theme "THE WATER THAT UNITES US". Organized by UNESCO, the Portuguese Committee and the Brazilian Committee for International Geoscience Programme, Geopark Arouca and GeoPark Araripe, those involved entered into a partnership for the development of the project. The work is being done in Municipal Public Schools and State of the Araripe Geopark Territory in primary and secondary education. It aims share thematic way of knowledge and is articulated around the general reflections of Geosciences, and socialization with environmental education following the national guidelines for education, quality of life and sustainability. The work is carried out with direct participation of schools, exhibition and a competition that includes scientific, artistic and cultural dimensions.

In first edition (2014) with the theme "Desertification", 17 schools participated with 34 outcomes in arrangements such as drawing, photography, video, dissertation, string, puppet theater, dance, music and scientific papers, with a audience estimated at over 200 direct participants. In its second edition in (2015) with the theme "Soil" were attended 27 schools with a production of 70 outcomes presented in arrangements such as drawing, photography, video, dissertation, string and puppet theater , with an audience of over 250 participants. This year is being worked the theme of "Leguminosas" presenting the importance of these foods in promoting health, nutrition and food security and environmental sustainability. The actions developed in this project, aims to bring the people especially the school community of G.A, enabling these institutions to contribute to local sustainability, through educational activities involving society.

PROMOTING EDUCATION AND TRAINING: AN ONLINE COURSE ON GEOPARKS

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Keywords: *geoparks, training, education, courses, lifelong training*

Geoparks have gained increased global visibility with the recent establishment of the “UNESCO Global Geoparks” label, associated with UNESCO’s implementation of the new International Geoscience and Geoparks Programme. In spite of the increasing number of geoparks that have been established worldwide in the last 16 years, the geopark concept is still considered a new approach to geo-conservation, sustainable development, and territory management. New countries and regions are becoming interested in this new approach, but there are still a number of misunderstandings. Therefore, we need more education about the principles and strategies of geoparks, addressed both to those intending to be involved in geopark projects and to society in general. The University of Minho in Portugal has been involved in teaching, training, and research on geo-conservation and geoparks for the last 15 years and has recently decided to offer an online course on geoparks (<http://cursosonline.uminho.pt>). The four-week course comprises four modules: (1) general geopark concepts; (2) structures and strategies of geoparks; (3) geoparks as tools for sustainable development; and (4) UNESCO’s International Geoscience and Geoparks Programme. The university awards a diploma for those who complete the course (2 ECTS – European Credit Transfer and Accumulation System). The first edition of the course was held in Portuguese in April 2016, with 23 students from different countries (Argentina, Brazil, Chile, Ecuador, Italy, Mexico, and Portugal). In order to enlarge the number of potential students, English editions of the course will begin in October 2016. The online course at UMinho is an efficient way to guarantee quality education for people who are interested in working in geoparks and also to promote lifelong training of geopark staff, with the flexibility of studying from anywhere and at any time over the Internet.

PROMOTING THE PORTUGUESE UNESCO GLOBAL GEOPARKS DURING THE WORLD SCIENCE DAY FOR PEACE AND DEVELOPMENT UNDER THE MOTTO “SCIENCE FOR A SUSTAINABLE FUTURE”

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Keywords: *cooperation, education, communication, networking, partnership*

The Portuguese NatCom for UNESCO in partnership with the National Agency for Scientific Culture and Technology organised a national event to celebrate the World Science Day for Peace and Development proclaimed by UNESCO. This event took place on the 10th of November 2105, in the Pavilion of Knowledge, in Lisbon. It was supported by the Portuguese National Forum of Geoparks and the Portuguese National Committee for the International Geosciences Programme of UNESCO (IGCP). Under the motto “Science for a Sustainable Future”[1], this event gathered the four Portuguese UNESCO Global Geoparks (Naturtejo, Arouca, Azores and Terras de Cavaleiros), as well as five Portuguese Biosphere Reserves. It was possible also to promote several educational projects led by different entities, in the framework of the International Year of Light and the International Year of Soils (2015).

The Geoparks and the Biosphere Reserves were invited to promote their own activities during the fair that took place in parallel to the Conferences in the auditorium. Participated in this event teachers, students from all levels, researchers, representatives of NGO’s, municipalities and companies and also members of National Committees of the Scientific Programmes of UNESCO (e.g. IGCP, MAB, IOC and IHP), including UNESCO Chair holders. The event had more than 700 participants and it was broadcasted through Internet. It was also covered by the national public channel of television (RTP) and newspapers. The interviews focused especially on the activities developed by the UNESCO Global Geoparks and Biosphere Reserves, which were promoting their own territories with educational and scientific activities, and also with promotional materials regarding cultural activities, geotourism and gastronomy. The geo-cooking sessions were a major success. The event ended with the approval by the Scientific Commission of UNESCO of the International Geoscience and Geoparks Programme with great joy for all the participants.

REPORT ON THE SCIENTIFIC RESEARCH AND SCIENCE EDUCATION OF SHILIN GLOBAL GEOPARK

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Keywords: *scientific research, science education*

Shilin Global Geopark, covering an area of 350 square kilometers, is located in southwest China's Yunnan province. It is unrivalled in the multi-phase complexity of its evolution from Middle Permian to the present; it was once covered respectively by basalt lava and lacustrine red bed and reemerged. The park is therefore of great geological and geomorphological significance. On the world scale, Shilin is the best site that preserves and displays all pinnacle-like karsts, almost every existing distinctive pinnacle karsts can be indentified in the park; it is regarded as a great natural wonder.

With easy access, the park plays an important role in scientific research and science education. In recent years, on the basis of abundant geological resources in the park, Shilin geopark has done a lot on scientific research and science education as following: setting up Shilin Research Center jointly with the Chinese Academy of Sciences and carrying out fruitful scientific research with universities and institutions; establishing geoscience popularization base to make the geopark a platform for science education; installing easily understood interpretation panels within the park and organizing regular training courses for park guides to optimize geoscience popularization for visitors; publishing popular science readings to spread geoscience to the public; organizing various science activities to make sure effective science popularization. In short, Shilin geopark plays its full role in scientific research and science education.

THE ROLE OF GEO-EDUCATION IN STARS VALLEY GEOSITE OF QESHM GEOPARK

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Keywords: *geo-education, Qeshm Geopark, Stars valley*

Geo-education is one of the key components in a geoparks activities and leads to an increase in people's knowledge and understanding of geology and the geological heritage. Qeshm Island is characterized by its varied geology, therefore the geosites in Qeshm Geopark provide the potential for developing a comprehensive classroom for geo-education.

In this study, the educational value of Stars Valley Geosite as one of Qeshm Geopark's geosites has been investigated. This geosite is significant for the variety of its geological structures. These structures can be used for training students in structural geology, stratigraphy, geochemistry, environmental geology, geological risks and geomorphology and the site can also be used to improve people's knowledge about the geological heritage. The most visible structures in this geosite include faults, folds, various fossils, bedding, ripple marks and various types of sedimentary rocks.

STORIES OF THE EARTH: COMMUNICATING GEOSCIENCES AT MARBLE ARCH CAVES GLOBAL GEOPARK

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Keywords: *communication, Geological Survey of Ireland, Geological Survey of Northern Ireland, Marble Arch Caves UNESCO Global Geopark, mapping*

Marble Arch Caves UNESCO Global Geopark has undergone significant changes since it was first established in 2001. Three expansions since 2007 have meant that its size has increased by nearly 30 times, and as a result, the way that its diverse geological heritage is communicated has also had to change dramatically.

The effective communication of geoscience is often quite a challenging task as the perception of the subject is that it is boring and unstimulating. However, at Marble Arch Caves UNESCO Global Geopark, an engaging, innovative and diverse range of geoscience activities and products has led to a significant increase in the interest of the subject. In partnership with the Geological Survey of Northern Ireland and the Geological Survey of Ireland, Marble Arch Caves UNESCO Global Geopark has developed a number of interactive education projects, innovative mapping products and engaging publications. The increase in size has meant that the geological heritage is much more diverse than it was initially, so new products are developed on a regular basis, enabling fresh ideas and up-to-date methods to be applied to this ongoing process.

With the rise in the use of digital media it is becoming increasingly difficult to engage with the general public due to the requirement for instant information. By keeping the communication of geoscience relevant and stimulating it is possible to successfully engage with the public, and to maintain and even exceed the current level of success achieved at Marble Arch Caves UNESCO Global Geopark.

TOOLS AND METHODS FOR EXPLAINING GEOLOGY TO NON-GEOLOGISTS

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Keywords: *geoheritage, picture, cartoon, interpretation, geology*

Providing adapted geological information for a diverse public audience is a key challenge for geoparks. The information must interest the public in people's relationship with the Earth in a very attractive way, avoiding the trap of being too complex or academic. Pictures and cartoons are key tools for increasing the public's understanding and awareness of geoheritage, natural resources, and sustainable development. These graphics can provide attractive and educational ways to present information in an accessible way and they use an integrated approach to address the specific needs of the public. Creating these images is not within the scope of an ordinary graphic designer or info graphist. It requires a combination of skills: (1) a good understanding of geological concepts; (2) design skills and a good grasp of animation software programs; and (3) an understanding of pedagogy and science-popularisation approaches to ensure the geological concepts are presented appropriately for the intended audience.

We present the experience of the Massif des Bauges Geopark to show how we integrate this communication at various levels. The aim is to explain the landscape and geoheritage in the form of a story. We present small stories about each of our sites, but also put them in the perspective of the larger stories of geological and human history. We use different approaches to illustrate this dynamic, taking into account the specific details of the sites and our partners there, and integrating this into a global coherence.

The pictures, cartoons, videos, applications and panels illustrate the decision-making process involved during the production process and the application of the three skills described above. The gap between the available resources and issues involved in this work indicates that there is a wide range of possibilities and a place for new skills in the crucial domain of geoheritage popularisation, providing layman-friendly geoscience information and ensuring sustainable development.

TOWARDS GEOLOGICAL MEDIATION: PARTICIPATION AND INNOVATION

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Keywords: *aspiring geoparks, Beaujolais, education, mediation*

Earth sciences and geology in particular, seem hard for people to understand. The Beaujolais Aspiring Geopark has the key role in choosing the right language and the development of tools for scientific mediation in geology.

In 2014, the Beaujolais Aspiring Geopark implemented a working group on "educational action" in the Geopark. The first step was to unite educational actors and educational authorities to create an ongoing dialogue within the participants. Then, an educational action plan was established by the working group, based upon four main goals:

- creating cooperation between educational actors locally;
- creating tools and educational materials linked to the Geopark;
- collaborating and co-producing with educational authorities (ministry, resource libraries...);
- collaborating with the universities and laboratories in educational sciences.

Two years after the first meeting of the working group, some of those goals have been achieved through specific projects, even if we continue the ongoing involvement.

We will present some examples of educational projects and tools for the Aspiring Geopark, all developed in a bottom up approach, having considered the specific requirements and feedback, whilst integrating global thinking about educational action to different publics, schools or visitors.

The creation of a discovery map of the Beaujolais Aspiring Geopark was the first work made by the group. Educational and playful, this first tool is used by the general public. For the fourth Forum (open meeting) of the Aspiring Geopark, we made a talk with educational actors and other Geoparks about the geosciences' mediation. Another example is the Mobile App built with the educational authorities: this tool, in project for now, will be presented in September.

UNCOVERING THE EARTH BENEATH OUR FEET: GEOLOGICAL TEACHING TOOLS

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Keywords: *geology, education, sustainability, De Hondsrug*

In 2016, Geopark de Hondsrug, in the northeastern part of the Netherlands, launched a large-scale project to boost the region's geological education at primary schools. In collaboration with the NAM (the Dutch company for the production of oil and natural gas) and the IVN (the institute for nature education and sustainability), an educational project was developed for the province of Drenthe with a potential of more than 200 schools, 1900 teachers and 33,000 young students.

This project entails ten activating and playful workshops in combination with an excursion, designed to create awareness with children of the fascinating history of the ground beneath their feet. A number of geological periods, the related strata and their origins are dealt with in the lessons. Besides teaching the ancient geological history of the Hondsrug area, the relevance of geology for today's society is highlighted by letting children see, experiment with and rethink the role of geological composites like coal, salt, sandstone, boulder clay and peat. Finally, the link is made with the earth's future and the concept of sustainability. By adopting this formula, the approaches of all three organisers on the value and use of the Earth's crust are combined in one comprehensive educative packet.

The educational approach that is applied is one of 'teaching the teachers', as developed by the IVN. Teachers of all participating schools are offered an extensive on-site instruction. The materials for the workshops – the so-called geological teaching boxes – are leased to the different schools for a distinct period. By doing so, schools are able to incorporate the workshops in their existing programme, and at the same time stimulated to extend these by visiting one of the museums or visitor centres aligned to the Geopark for in-depth excursions. The project runs from 2016 to 2021.

UNDERSTANDING THE SUPERVOLCANO WITH AN INQUIRY-BASED APPROACH

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Keywords: *geosciences education, IBSE approach, multimedia tools, supervolcano, geoparks*

In the so-called “Sesia supervolcano area” (Sesia Val Grande UNESCO Geopark, Italy), a complete volcanic succession from the mantle to the caldera outcrops in a range of 30 km as a consequence of the Alpine orogenesis.

Supervolcano geosites have an international relevance but hold difficult concepts for activities with schools. Therefore, a local geotouristic organization (Associazione Supervulcano Valsesia) in cooperation with the University of Torino (Department of Earth Sciences) designed and monitored a multi-stage educational activity with secondary schools combining an Inquiry Based Science Education (IBSE) approach with the use of multimedia tools.

First stage is a fieldtrip on the supervolcano geosites: students are involved in acting as geologists. They cooperate in groups with specific roles; observing the outcrops, taking pictures and notes, interpreting the geological map and localising the geosites. Moreover, each group tracks the trail and takes geotag pictures and notes by using an application suitable for smartphone and tablet. No information is given about the geological history of the supervolcano. Back at school, a laboratorial activity is proposed about the specific weight of the same rocks observed in the field; digital data are downloaded and visualised on Google Earth. Students are finally required to find the relationships between the specific weights of the rock samples, their depth of formation and their current geographical position; they have to propose hypothesis for explaining the geological history of the supervolcano. A final explanation is given for verifying their hypothesis.

Results reveal that this approach encourages students in collecting geological data, helps them in reasoning about geological processes and promotes their ability to connect current situations with past events.

USING SOIL MONOLITHS AS A MAIN TOOL FOR GEO-EDUCATIONAL PROGRAM

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Keywords: *aspiring geoparks, geo-educational program, non-renewable resource, monolith, soil*

The soil forms an intricate system with climate, organisms and rocks. Healthy soils are the basis for food, fuel, fiber and medical products, making a key role in the carbon cycle, storing and filtering water, and improving resilience against floods and droughts. It is an essential component of the ecosystems and part of the geoheritage of Conca de Tremp-Montsec Geopark Project in the Catalan Pre-Pyrenees (Lleida, Spain).

New Knowledge on soils for a new society based in the integration and interdependence with this nonrenewable resource is one of the main objectives of a current geoeducational and dissemination program called "Pyrenees Soil Monoliths" carried out by the Institut Cartogràfic i Geològic de Catalunya (Project partner and Scientific Headquarters of the aspiring geopark).

This remarkable area provides an excellent framework to understand the variety of soils and its processes. In addition, agriculture, and in particular viticulture, as main activity of the area, is a very demanding sector of soil knowledge.

A soil monolith is a vertical section of a soil profile preserved in its natural condition (unaltered). The section of soil is extracted from the ground without disturbing the original conditions. In the laboratory a chemical treatment is carried out in order to consolidate the soil and to be able to handle and expose it.

Among the advantages of an exhibition soil monoliths include that soil monoliths are portable, can be used many times, allows comparison of different soil profiles, can be grouped or distributed according to the topic to be studied, can be observed indoors, it is appropriate for groups, can be exposed for long periods, allow temporary and thematic exhibitions and can be exchanged with other institutions to show the diversity of soils in relation to other areas.

YOUNG AMBASSADORS FOR GEOCONSERVATION: A HOLISTIC SUSTAINABLE TRAINING PROGRAMME TO PURSUE UNESCO GLOBAL GEOPARK OBJECTIVES

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Keywords: *young ambassadors for geoconservation, holistic sustainable training programme, networking and engaging, nurture future pillars, multifaceted purposes*

It is a prerequisite that all UNESCO Global Geoparks (UGN) develop and operate educational activities to spread awareness of our geological heritage and its links to other aspects of our natural, cultural and intangible heritages. This will provide a sense of pride to the local people and strengthen their identification with the area. The Young Ambassadors for Geoconservation Training Programme (YA) is organised jointly by the Association for Geoconservation, Hong Kong (an NGO) and the foundation trust of a public listed company with the support of UNESCO Hong Kong Global Geopark. It is an innovative educational FREE training programme pursuing UGN's primary objectives of promoting geoconservation, popularising earth science, networking as well as engaging different stakeholders.

The YA provides a range of systematic comprehensive training including geoconservation, geopark, geotourism, geoappreciation skills, leadership camps, environmental/city planning themes and overseas exchange to develop senior secondary school students into future leaders. It has been organised annually since 2011, training nearly 1,000 senior secondary students from over 80 schools exceeding 25,000 training hours in five years. Ultimate winners together with teachers of about 30 people will be fully sponsored to visit other Global Geopark and exchange with Geopark management, geopark guides and local students. YA exemplifies the successful co-operation between NGO, private enterprise and government to nurture future pillars of our society about geopark and encourage them to learn, communicate and interact with communities. This presentation discusses how YA achieves the multifaceted purposes and identifies challenges as well as areas for improvement.



Education, interpretation and communications

Poster Presentations



CONTRIBUTION OF GEOPARK TO DISASTER MITIGATION IN 2016 KUMAMOTO EARTHQUAKE

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Keywords: *Aso UNESCO Global Geopark, geohazard, 2016 Kumamoto earthquake, hazard map, disaster remains*

The 2016 Kumamoto earthquakes occurred on 14 and 16 April. The earthquake had the magnitude of 7.0. The Futagawa-Hinagu fault zone near the Aso UNESCO Global Geopark moved. 63 people passed away and about 180,000 people had been evacuated from their homes. In Aso UNESCO Global Geopark, many landslides occurred, and many buildings, including the Aso Volcano Museum, were destroyed.

The Aso UNESCO Global Geopark has presented geohazard information in the past. Geoguides explained the history of volcanic activity and plate tectonics to tourists in geotours. The leaflets and exhibited objects of the Aso volcano museum explain the elementary knowledge of earth science.. Municipalities made hazard maps, and distributed the documents to their own areas.

We verify the practical effectiveness to natural hazard disaster mitigation of the Geopark's activities. For example, was the hazard map useful at that time? Was the earth science knowledge helpful when the people used the hazard map?? We discuss about how to communicate with managers of the geopark, scientists and local people.

GEOEDUCATION AT THE QESHM ISLAND ASPIRING GEOPARK: AN ALL-INCLUSIVE PROGRAM FOR VARIOUS TARGET GROUPS

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Keywords: *geoeducation, geoparks, Iran, strategy, Qeshm*

Geoparks are an effective and efficient program that aims to familiarize societies regarding Earth Sciences and the protection of its valuable resources. Increased awareness is acquired through holding educational courses and programs and by employing innovative methods in Geoparks.

At the Qeshm Island Aspiring Geopark, the program of teaching basic geological concepts, which is an extension-education program, was designed and implemented with the following objectives: i) to increase the general public's knowledge of the geological characteristics and values of the Island; ii) to present concepts related to the Geopark; and iii) to include the geological, cultural, and remaining natural heritage of the Island in the strategies for protecting this heritage. This program is implemented with emphasis on tangible geological processes and phenomena on the Qeshm Island.

The target groups of geoeducation at the Qeshm Island Aspiring Geopark are divided into three groups: the local people, the employees of the Geopark, and the visitors. In the first stage of the Geoeducation Project, models, teaching aids, and manufacture of handicraft with students were used as innovative strategies for transferring to the students the concepts related to geology and to the Geopark. However, because of the large number of the students, the necessary knowledge was presented to the teachers so that they pass to their students.

In this relation, suitable educational materials were prepared and presented to the teachers. Moreover, the educational program includes training active local people who volunteered to implement continuous educational programs in distant villages. Part of the Geoeducation Program embraces visitors to the Geopark, in which promotional tools such as brochures, maps, and teaching aids for children, are used to convey information. Finally, periodical educational courses on various topics have been planned to keep the technical staff up-to-date on what is happening in other Geoparks.

“GEOPARK SCIENCE SCHOOL” FOR LEARNING EARTH SCIENCES AND OUR REGION

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Keywords: *science school, interpretation, earth sciences, San'in Kaigan, APGN*

We held “Geopark Science School” as the side programme of The 4th Asia-Pacific Geoparks Network Symposium 2015 held in the Tottori Prefecture, hosted by San'in Kaigan UNESCO Global Geopark, Japan. The main target of the Geopark Science School is children who live in San'in Kaigan Geopark area in order to provoke and nurture an interest in earth sciences and nature of their region. The Geopark Science School was composed of 10 booths of experiment concerning minerals, rocks, sedimentary processes, volcanos, fossils, planets, cold front and air pressure etc. Specialists of experiment and students of university lectured to participants on each booth. As a result of this one day science school, 20 university students learned and experienced science interpretation. About 200 participants mainly composed of children of elementary and junior high school and their parents enjoyed and learned geosciences whilst having fun.

JAMEO, A WORD TO REMEMBER IN THE LANZAROTE AND CHINIJO ISLANDS UNESCO GLOBAL GEOPARK

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Keywords: *collapse, jameo, nomenclature, school, science*

The word “jameo” is an endemic term used by people on the island of Lanzarote to refer to the resulting cavity when a part of the roof of a volcanic tube collapses. This mainly happens when the tube is forming and the lava flow is confined.

These characteristic shapes of the topography were used by ancient people of Lanzarote called “majos”, to access the inside of the volcanic tubes where they temporarily lived, and looked for shelter for their cattle. They were also hideouts used for protection from the numerous Berber pirate attacks in the 16th, 17th and 18th Centuries that massacred a significant part of the population.

Twenty-one place names have been confirmed to have existed in Lanzarote including the word “jameo”; the one that stands out the most is “Jameos del Agua”. This has now been turned into an Art, Culture and Tourism Centre that welcomes more than 600,000 visitors a year, and was the first work of great artist from Lanzarote César Manrique, famous for combining nature and art harmoniously.

The team of the Lanzarote and Chinijo Islands UNESCO Global Geopark, supported by the Research and Development Centre, La Casa de los Volcanes, has among its objectives to disseminate and spread the word and the ecological term “jameo” among scientists, as part of our intangible heritage. In order to do so, there are dissemination activities organised related to the term, mainly developed by primary and secondary education centres of our geoparks.

OUTDOOR GEO-ACTIVITY DAYS IN BAKONY-BALATON GEOPARK, HUNGARY

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¹Bakony-Balaton Geopark

Keywords: *geo-education, outdoor activities, geosites, identity, raising awareness*

Bakony–Balaton Geopark has been member of the Global Geoparks Networks since 2012. The 3,244 km² large Geopark is located in western Hungary, near Lake Balaton, the largest lake in Central Europe, on the boundary of four major geographic regions, characterized by diverse geological and topographic features and extensive biodiversity. There are 151 settlements in the Geopark and a great number of the geosites are located near settlements. The Balaton Uplands National Park Directorate, as the leading organisation of the Geopark, provides various geo-educational programmes for the almost 100 elementary schools operating in the geopark, including a geopark contest, summer camps, interpretive geosites, guided geotours and caving tours. A special programme is the outdoor geo-activity days that are organized at geosites near settlements. Schools near the geosite are invited to form groups of students, which – with an accompanying teacher – visit a series of stops on a certain itinerary. The members of the Geopark Staff and occasionally local volunteers present a certain topic at each site in an playful, interactive way. During these "geodays" the participants learn about the local geosite, its geological, geomorphological features as well as about the relevant cultural heritage and living natural heritage. The members of local civil organisations may help and contribute their local knowledge to these topics. A geo-quiz is to be filled by the groups at the last stops to summarize what they have experienced. The geodays are an excellent opportunity to create personal contacts with local teachers, headmasters and civil organisations and to start a longer cooperation. These events also help building a local identity linked to the local geological heritage.

PLAYFUL GEOLOGY – COMPONENTS FOR PLAYGROUNDS

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¹Železné hory National Geopark

Keywords: *playgrounds, kids, education, interpretation, jungle gym*

Železné hory (Iron Mountains) National Geopark, currently a candidate to become a UNESCO Global Geoparks, has prepared, in cooperation with partners, gateway visitor interpretive centres to the Geopark. Children's playground equipment are part of the objectives and outcomes which aim to promote geosciences in a completely different way to that normally done in Central Europe.

Kids are primary playful and it is mainly children's playgrounds and other similar activities, that awaken the most interest for them. Železné hory National Geopark has therefore decided to adapt to these needs. The Geopark decided to focus part of the visitor interpretative centres, and at other sites, on this target group.

Traditionally children's playgrounds contain equipment that has no connection with either the place or the region. It is most often a variety of pirate ships, castles, animals of various kinds and others. The advantage of this standard play equipment is that it is affordable and a certified product, approved for use in playgrounds.

One of the main remits of the Geopark is to promote the local natural heritage and bespoke children's "jungle gym" with geoscience themes is one way to achieve this. Železné hory National Geopark has created a wide variety of game elements; tactile fossils, dinosaur skeletons excavations, unique children's jungle gym, swings and other structures. Management has also resolved complex certification processes and much of the equipment is approved for use in certified playground.

The disadvantage of this bespoke equipment is a 30-50% higher price compared to standard play elements. However the clear advantage is the individuality of each component, its variability and its role in attempting to educate from an early age.

For more information about the possibilities of cooperation in the development and preparation of unique geological playground components please contact us at geoparkzh@vz.cz

SPECIAL GEOPARK EDUCATION PROGRAM FOR HIGH SCHOOL STUDENTS – IN CASE OF SAN'IN KAIGAN GEOPARK

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Keywords: *high school education, San'in Kaigan Geopark*

The Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) recently introduced education guidelines proposed that it was important to for a research institute and university to cooperate in respect to high school education. However, the universities and research institutes do not have a special educational programs developed for high schools, and therefore cooperation is difficult. On the other hand, school education is one of the important programs in geopark activities and the geopark can offer various educational programs and act as an intermediary between high school and university.

In San'in Kaigan Geopark, we offer various educational programs by cooperating with a university and local research institutes. The University of Hyogo has been cooperating with Toyooka high school in since 2010. Additionally a partnership was formed between San'in Kaigan Geopark, Itoigawa Geopark, Muroto Geopark, Jeju Geopark and Lesvos Geopark for the enhancement of high school education.

SHIMBARA PENINSULA AND US PART 2

Y. Nagata¹

¹Unzen Volcanic Area Geopark

Keywords: *ignorance, indifference, interpretation, Unzen Global Geopark*

I was born and raised in the Shimabara Peninnsula. We grew up under the watchful eye of Mount Unzen. The presence of this beautiful green giant was the backdrop to our childhoods. Although we knew it had erupted 200 years ago, most of us never thought it would break its silence again. Much to our surprise, in November 1990 it erupted and remained active for the next 5 years, 43 victims in its wake. In time, our hometown thrived and flourished again. People moved on and the eruption became a bad distant memory. The next generation of people was unaware of help we had received in our hour of need from the outside world. This ignorance made them slightly indifferent to activities concerning the Geopark and visiting guests connected to it. But now we started step by step slowly study our geopark. During time presentation I want to talk about how we have addressed this issue over the last 2 years.

I believe we owe this to our beloved hometown, Shimabara.

TO ORGANIZE BRAND EVENT ON THE PUBLIC-ORIENTED THE ZIGONG DINOSAUR EASTER FESTIVAL OBSERVATION

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¹Dinosaur Museum of Zigong Geopark

Keywords: *brand event, dinosaur, public-oriented, museum social functions, educational communication*

The Dinosaur Museum of Zigong Geopark is a well-known site museum around the world. In recent years, the museum is committed to social needs; its brand image and value as a result has grown. In order to be closer to the society and life of people, and fully integrate its own resources into creating a platform to attract tourists and impact potential and undeveloped audience, the museum has made a series of effective practices in its brand marketing through educational communication.

Since 2014, the museum has promoted a brand event of Zigong Dinosaur Easter Festival in Chinese New Year. During the event, the number of visitors to the museum has a remarkable growth compared to the same period of last year, the average time they staying in the museum extended an hour and their sense of identity and closeness of the museum have been improved. Even CCTV news reported the event, and it has become a demonstration project of National Popular Science Base of Land and Resources. In the past two years, the number of visitors to the museum has also grown at a speed of 20%. This article will analyze this brand promotion event from the aspects of event design, specific implementation and propaganda strategy, and discuss better utilization of social resources integration, accurate timing, and scientific process management, thereby, to explore a better way to realize practice of museum social functions.

THE WORKSHOP OF MAKING PERSONAL EVACUATION MAP WITH GEOPARK

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¹Izu Peninsula Geopark Promotion Council

Keywords: Disaster Mitigation, local Community, Disaster Prevention Education

The west part of Izu peninsula many times has hit by huge tsunamis caused by Suruga trough. And this area is expected to be hit by 5m to 7m-high tsunami in near future again. The inhabitants living here must find the way to escape from the disaster. The members of Nishiizu volunteer coordinator group have tried to find how to evacuate from the disasters such as tsunami and landslide and keeping the inhabitants mind highly motivated for disaster. We have performed the workshops walking around the town 6 times and analysed the result of the questionnaires.

1. The landslide occurred in this area in July 2013 and the group members managed the volunteer centre. This experience made the members eager to help the inhabitants from the disasters.
2. We divided Nishiizu area into seven small areas because each area is expected to be isolated when the disaster occur.
3. The participants including junior high students walked around the town together in a small group watching and checking the safeties of the evacuation road, and checked evacuation time. They tried to find the shortest way to evacuate and tried to find the alternatives.
4. The map was made by Airbone LiDAR elevation data. These maps had been made in order to easy understand the local topography, sea level altitude and evacuation site. A map of Ansei Tsunami(1855) flooded area was show behind the room.
5. They put the data into the large-scale map after walking.
6. The data will be put into the GIS map and shared.
7. At the end of the workshops we asked them questions and analyzed 281 questionnaires.



Engaging Communities

Oral Presentations



THE 100 GREAT GEOSITES PROJECT – CELEBRATING GEOLOGICAL HERITAGE IN THE UK AND IRELAND

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¹ The Geological Society and Amgueddfa Cymru - National Museum Wales

Keywords: *tourism, geoheritage, engagement, geosites, geoconservation*

As part of Earth Science Week in 2014, the Geological Society and partner organisations across the British Isles ran an initiative to find 100 Great Geosites across the UK and Ireland. The project was designed to include the broadest possible definition of a ‘geosite’, everything from classic outcrops to stunning museums and sites of industrial importance. The UK and Ireland feature some of the most diverse and beautiful geology in the world, spanning most of geological time, from the oldest Pre-Cambrian rocks to the youngest Quaternary sediments and this unique geoheritage was celebrated in the final list.

The public were asked to nominate sites and the final list was composed of sites chosen by an expert panel and a ‘peoples choice’ popular vote. The list contains a vast array of geosites - many of which are located in Geoparks in the UK and Ireland - that take in sites important for classic geology, engineering geology, the history of geology and documents just some of the rich variety and stunning beauty of our nation’s geology. The project was effective in raising awareness of geological heritage and sites with publicity about the project appearing in a wide range of news outlets including the BBC website. Since then the list has spawned a number of additional outreach activities including an online resource detailing all the sites, we have produced a free mobile app in partnership with ESRI, run a photography competition leading to the publication of the 100 Great Geosites 2016 calendar and there have been a number of spin off competitions including ‘Scotland’s favourite fossils’ and the Quaternary Research Association’s ‘Top 50 Quaternary Sites’ competition

“ARISAN CAVING” AS A MODEL OF COMMUNITY EMPOWERMENT AT GEOPARK GUNUNG SEWU, INDONESIA

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¹Bandung Institute of Tourism & Indonesian Speleological Society

Keywords: *Arisan caving, community, empowerment, geoparks*

Geopark Gunung Sewu is the second Global Geopark Network in Indonesia and is located in three regencies (Gunung Kidul, Wonogiri and Pacitan Regencies) and two provinces (Central Java and East Java Province). It stated as GGN on September 11, 2015. The geopark is located in a karst area and as such has a high geological value for researchers. Ten years ago the Gunung Sewu Area was still known as a dry and poor area but since tourism was developed in 2010 the luck of local communities has changed. A huge change happened when the tourism that developed in this area lead to a significant increase in the well-being of the local community. However, on the other side some problems like environmental damage and the visitor's safety occurred as the locals developed their resources without concepts and enough knowledge and skills.

Bandung Institute of Tourism and Indonesian speleological society developed a community development model to help locals to increase their knowledge and skills. Titled “Arisan Caving” this model integrates many resources from universities and bodies sharing their knowledge and skills and they share their knowledge and skills. Qualitative data analysis and in depth interviews were conducted with the local community and analysis of the success of the model showed an increase of locals knowledge and skills in tourism.

The aim of this research is to develop a community based geotourism model at Geopark Gunung Sewu that could also be applied at another karst area in Indonesia.

CHALLENGES FOR SUSTAINABLE DEVELOPMENT IN SAN'IN KAIGAN UNESCO GLOBAL GEOPARK

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¹San'in Kaigan Geopark Promotion Council

Keywords: *sustainable development, management*

San'in Kaigan UNESCO Global Geopark is located in western Japan and stretches 120km from east to west, 30km in maximum from south to north, including three cities and three towns across three prefectures. So as to communicate and to organize various activities in the broad area, we are trying to work under the organization of the Promotion Council, which consists of various kinds of local stakeholders; municipalities, tourism commissions, chambers of commerce, fisheries cooperatives and so on. Compared with the tourism of big cities like Kyoto or Tokyo, the "San'in Kaigan" Geopark area is rather full of original rural life of Japan and tourists can enjoy its local food or enjoy marine/outdoor activities thanks to its ecological and geological environment. This presentation would mainly be focused on how we are managing to promote our different kind of activities with various kinds of stakeholders through a trial and error process. For example, public relations to attract tourists' interest in our Geopark, approaches to involve key persons in discussing the activity of Promotion Council, attempt to make effective the business creation fund, etc.

COMMUNITY BASED TOURISM – SEEDS FOR THE SUSTAINABLE DEVELOPMENT IN THE PLATEAU OF FREITA MOUNTAIN (AROUCA GLOBAL GEOPARK, PORTUGAL)

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¹AGA - Arouca Geopark Association

Keywords: *community based tourism, geotourism, Freita Mountain, Arouca Geopark*

A pilot project called Community Based Tourism, in partnership with the Local Action Group ADRIMAG, the Geopark management structure AGA (Arouca Geopark Association) and the Arouca municipality was developed between 2013 and 2015 in the villages of the Freita plateau, located in the south region of Arouca UNESCO Global Geopark in Portugal.

During this period actions of education were undertaken for the residents to better understand their thoughts about the Arouca Geopark and the geosites of this area, as well as their needs and fears, given the growing number of visitors to the area.

This first approach was to schedule activities for residents with the aim of promoting the social empowerment and provide the knowledge sharing about natural and cultural heritage of the region. Therefore through these enhancements we could have better informed residents with fewer fears over visitors and also increase their potential for creating better conditions of life.

The activities developed during this period were seeds to:

- a) engage the participation of residents in new activities such as guided tours along the villages of the Freita mountain with, for example, shepherds and farmers who can share with visitors their culture, lifestyle and knowledge.
- b) the creation of a documentary about the lifeculture in the Freita mountain involving the local inhabitants as actors in a partnership with Cinema Club of Arouca.
- c) the conservation and appropriation of the value of the geosites by local inhabitants.
- d) the orientation and guidance for entrepreneurship. Thus, the Community Based Tourism is being an important strategy for the social inclusion and empowerment of their competences in the same time contributes for the economic and socio-cultural development of the local community, preserving and valuing their identity and heritage, offering new touristic experiences to visitors.

DEVELOPING A PARTNERSHIP NETWORK (PN) IN DONG VAN KARST PLATEAU UNESCO GLOBAL (DVG) IN VIETNAM: A CASE OF MANAGING AND MITIGATING CONFLICTS BETWEEN STAKEHOLDERS IN HERITAGE MANAGEMENT

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¹Dong Van Karst Plateau UNESCO Global Geopark

Keywords: *conflict mitigation, partnership, stakeholders, tourism, heritage management*

Theoretically, conflicts usually occur in the relationship between tourism and heritage management. These happen when development targets of tourism are incompatible with conservation targets of heritage management. These can be minimized by making dialogues, cooperation, and collaboration between stakeholders. Given that, a Partnership Network Program (PNP) has been developed for the DVG in Vietnam to mitigate the conflicts and encourage the community participation to the geopark development. This presentation will analyse the program based on the conflict theory and heritage management guidelines. This also can be considered as a good case for solving conflicts in geopark developments.

The program is meaningful and sustainable for three parties: the heritage management agency, the local community, and tourist operations. By developing the PNP, the Management Board (MB) of DVG, will promote conservation and tourism plans, as well as heritage legislation to various classes of the public. The stakeholders can discuss related policies to improve service quality and how to accommodate these. Once this is achieved, then the MB can improve their coordinating role in heritage management. For the tourist sector, once specific criteria and commitments are achieved, tourist operations are registered and given the title of membership. Once a member of the network, they are authorized to use the geopark's logo for their advertising. They also have the rights to promote their products through the DVG. More importantly, their products are protected and qualified by the honour of the DVG. Finally, the local community can participate in, and benefit from tourism activities. Their rights are protected under commitment terms signed by tourist operations. Moreover, they can approach heritage policies and contribute to the decision making related to their lives, their heritage and their environment.

DEVELOPING VOLUNTEER NETWORKS FOR CIVIL PROTECTION IN GEOPARKS UNDER THE EVANDE PROJECT

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Keywords: *natural disasters, volunteer, e-learning, risk mitigation, EVANDE*

Two European geoparks – Psiloritis UNESCO Global Geopark and Beigua UNESCO Global Geopark – are participating in a European-funded project titled EVANDE, which uses e-learning to train volunteer groups how to mitigate risks from earthquakes, wild fires and floods. The main outcomes of the project will be the development of a web platform with e-learning activities, blending the learning methodology and various training activities used in the participating countries to create a network of volunteers with basic skills to act in emergencies to serve the needs of civil protection. All project outcomes will be delivered in English, Greek, Spanish, Italian and Bulgarian, and will be available for free through project's website: www.evande.eu.

The contribution of geoparks to mitigating the risks from natural hazards and climate change is becoming more significant than ever. As geoparks have a crucial role in motivating and training local communities to handle various environmental issues, including natural hazards, and in developing training and awareness-raising activities for both visitors and residents, they can all benefit from the outcomes of EVANDE project. The web platform, educational materials and proposed educational pathways can be used by geoparks to train both their staff and local volunteer groups on mitigating and reacting to earthquakes, wild fires and floods, and to introduce the European civil-protection mechanism. Using the EVANDE e-learning platform, geoparks can develop their volunteer networks to support the geoparks and local communities in emergencies.

EMPOWERING WOMEN TO ENSURE THE SUSTAINABLE DEVELOPMENT OF A GEOPARK: A CASE STUDY OF THE ASPIRING CILETUH GEOPARK

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Keywords: *Ciletuh, Indonesia, women, empowerment, geoparks*

Indonesia has enormous potential for establishing geoparks, with its many areas of significant and complex geodiversity, biodiversity, and cultural diversity. As the largest archipelagic island country in the world, its vast geographical area presents an immense challenge for the government in focusing on impartial development. The main reasons there are not more geoparks being developed like Ciletuh Geopark, Sukabumi and West Java are: (1) the remote location of potential geopark sites, which results in limited government concern; (2) a complicated bureaucracy; (3) the low education level of the local people; and (4) the migration of the local people.

Ciletuh Geopark, which was designated a National Geopark in 2015 by the Indonesian National Committee for UNESCO and the Ministry of Energy and Mineral Resources of Indonesia, faces many demands and challenges, but also many opportunities. One such opportunity is geotourism, which engages and involves local people as the main stakeholders, making them the primary motor of geotourism activities in their own communities.

Traditionally, men in the Ciletuh area were considered more capable wage earners than women. Today, however, many women in Ciletuh are also breadwinners, earning a better income by working abroad, for instance. Ciletuh geotourism is promising not only for its potential for providing jobs for the local people, but for empowering women in the local community. They need to be convinced that they have ability to develop the local economy and stay with their families instead of taking jobs outside.

Ciletuh geotourism offers local women plenty of job choices, such as producing traditional food and crafts, putting on local cultural performances, and actively participating in giving opinions and advice on the preservation and management of Ciletuh Geopark. Involving women in geopark planning, organising and activities is expected to result in considerable and sustainable economic, social and environmental advantages for the Ciletuh people.

ENGAGING LOCAL FOOD SME'S

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¹Magma Geopark

Keywords: *GEOfood brand, GEOfood criteria, local food*

Magma UNESCO Geopark is the leader of the GEOfood project, financed by Kreanor, started in 2014. The project involves: Odsherred, Rokua, Reykjanes and Stonehammer UNESCO Geoparks. The consortium has been working on two different levels: locally with producers and users and internationally within Geoparks.

At the local level every partner organized three meetings with local producers, users and tourist sme's with the aim of enhancing the awareness on food as resource for raising the local economy in a sustainable way. International partners agreed the criteria for developing the GEOfood brand for all the Geoparks in Europe.

Only producers or enterprises within the territory of an approved UNESCO Global Geopark can use the GEOfood logo.

The criteria adopted by the project consortium are focused on the geographical localization of the product (inside the Geopark), where the product has been processed (inside the Geopark) and the raw material area of origin. The link between the geological characteristic of the area where the raw material come from must be clearly described in the GEOfood label.

Geoparks can create a buffer zone if one product that wants to be labelled is located nearby the Geopark border and/or due to geological- scientific reason. The extension of the GEOfood product within the buffer zone must be approved by Magma Geopark and Magma Geopark is in charge of the authorisation of use of the GEOfood criteria and logo.

Soon Magma Geopark will establish the GEOfood webpage where GEOfood producers and users will be promoted and the potential GEOfooders could apply directly for the membership.

GEOGUIDES – ACTIVE AMBASSADORS

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¹Geopark Odsherred

Keywords: *geoguide, quality, training, entrepreneurship, tourism*

Initial efforts to broaden the knowledge of UNESCO Global Geopark Odsherred (Denmark), included geoguide crash courses offered to e.g. groups of teachers and people employed by the municipality, but also successful teaching programs such as Geokids where pupils get a hands-on experience with the geopark.

Recent development has introduced a new geoguide programme, including small introductory courses, as well as larger and more in-depth going modules, carried out by professionals, and offered to the public.

The new programme has been launched in order to create a corps of employed geoguides, but also to entice private entrepreneurs to create job opportunities and conceptualize different products and attractions.

Future geoguides are educated within the fields of geology and landscape, cultural and arts history, and local produce. On the side, they also go through minor courses in management and organization of the geopark, and not least story-telling, which will enable them to strengthen their own stories.

A high level of quality assurance and management is important for Geopark Odsherred, and the professional training of any future geoguide is therefore a very adamant perspective of the programme, and will help to ensure a consistent and high quality of future outreach products.

Furthermore, it will secure an active engagement of the public, which is of paramount importance for any geopark organization. Not only will the geoguides be able to work as a guide, but they will also be the materialization of all that is good in the geopark, thereby functioning as the best possible ambassador, possibly together with a voluntary corps, which Geopark Odsherred is considering to establish, as a bi-product of the programme.

GOVERNANCE COMMITTED BY THE COMMUNITY

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¹Aspiring Percé Geoparc

Keywords: *governance, tourism industries, implication*

The Percé Geopark solidarity cooperative is the key to our project's success. The commitment of the business community and of the various governmental economic development agencies have permitted the project to become a mobilizing and structuring project for the entire community. In addition, the participation of the municipality demonstrates the support of citizens for a project that will enable the development of our tourism offer while highlighting the great wealth of our geological heritage.

With this presentation, in which we give a brief overview of the history of tourism of our village, you will understand why this system of governance has permitted this achievement. We will present the steps that enabled the realization of the project.

HATEG COUNTRY GEOPARK AMBASSADORS – INVOLVEMENT OF YOUNG VOLUNTEERS IN COMMUNITY DEVELOPMENT AND PROMOTION

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Keywords: *geoparks, volunteers, ambassadors, community, young students*

Hateg Country Dinosaurs Geopark (HCDG) located in the Western part of Romania, in Southern Carpathian was the first geopark in Romania. Established in 2004 it joined the European Geoparks Network (EGN) and the Global Geoparks Network (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 responsible for geopark management. Since the beginning, research analysis indicated the need for a strong partnership with local schools, the involvement of young students and the development of different educational structures able to respond to local educational needs and the geopark development strategy. The development of a special program for young volunteers as geopark partners is responding to their needs of social recognition of their skills and creativity and personal development in their life and profession.

During the last few years, several structures were developed: EDU-Geopark Network, Explorers Clubs in each school, and Volunteers for Geopark. More than 150 young people were enrolled as volunteers in different geopark projects. According to Romanian legislation they signed a contract, passed training stages and were involved in several projects, some of these projects being initiated by volunteers themselves. Based on an evaluation process volunteers received last year an international Voluntapass issued by University of Bucharest. This year a new program started aiming to develop professional young volunteers able to represent their communities in national and international projects and to contribute to increase the level of understanding, appreciation, conservation and promotion of Hateg Country Dinosaurs Geopark – now a UNESCO Site. In the end after selection and training sessions a new official status will be established for the best volunteers: Geopark Ambassadors.

INNOVATION: A MUST FOR ADDRESSING LONGSTANDING RURAL BLIGHT

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¹ Hong Kong UNESCO Geopark

Keywords: *local engagement, rural blight, revitalisation, community, Hakka*

Hong Kong UNESCO Global Geopark of China (HKGP) is located in the northeast part of Hong Kong and includes geoareas and a number of local communities, which are closely tied to the geosites through culture and livelihood. One of the enshrined duties of a UNESCO Global Geopark is to encourage local participation and ownership in geopark initiatives through on-going capacity building programmes and long-term local engagement and partnership projects. Although there are many villages with a notable historical and cultural heritage in HKGP, most of them were depopulated and even abandoned as far back as the 1960s. The absence of working age villagers has limited the development of economic activity in the villages. Over the years, the ‘conventional methods’ have proved to be ineffective in revitalizing the dilapidated villages, so there is a need to foster an effective culture of innovation in HKGP.

The new project entitled “Sustainable Lai Chi Woo- Hakka Life Experience Village” is a good example to revitalize this 400-year-old Hakka village with over 200 traditional Hakka houses of great historical value. This project’s objectives are to develop a base for conserving and promoting Hakka village culture by restoring and rebuilding a cluster of selected buildings in LCW Village and to establish a viable social enterprise making wise use of this asset to revitalize the village sustainably and for the enjoyment of the wider public. Riding on the local support and the concerted effort of numerous government departments and NGOs, the project is crucial in dealing with issues not readily addressed through conventional approaches and in bringing benefits to the rural areas, the community groups and the local people in the geopark. It is anticipated that the positive impact of the LCW project as a model of sustainable countryside development that will be unprecedented.

INTEGRATED ACTIONS TO ENHANCE THE IMPLICATION OF THE GEOPARK FOR THE INHABITANTS, STAKEHOLDERS AND ELECTED REPRESENTATIVES OF LAKE ANNECY

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¹Massif des Bauges Geopark

Keywords: *geoparks, geotourism, geosite, stake holders, tourism development*

As everywhere some areas of our Geoparks are less inclined to support Geoparks topics to develop especially if they already have an attractive tourism spot or an active economic area. That's the case of the Northern part of the Massif des Bauges UNESCO Global Geopark (UGG) where is located the Lake Annecy, 90% supported by water coming from the Bauges massif. This area is very populated and the best touristic point of the Geopark.

The Massif des Bauges UGG would like to more share its sustainable development concept on this dense area around the lake in order to promote a virtuous land planning, to link up the different touristic sectors of the Geopark for a well-balanced tourism development. So the Massif des Bauges UGG has implemented several integrated actions:

- Improvement of the knowledge on the lake's geoheritage (glacial history and evolution, human settling, WH pile dwelling sites)
- Collaboration with the local administration and Boats Company (On board communications on geological history of the lake and water supply during the "Share the Lake" day).
- Public lectures
- Geosites fitting out (Biel spring, Lake Annecy overview)
- Collaboration with museums (Annecy Castle on pile-dwelling sites, Lake Annecy on human settlements and history of the lake, Viuz-Faverges on archaeology) and natural areas managers (marches, torrents).
- Educators for museums, tourism stakeholders, tourist offices and local guides on geoheritage and geosites
- Implementation of a geotouristic road-signs network
- Edition of booklets about the heritage of the lake
- Educational program on geology for secondary schools

All of the afore actions have contributed to enhance the Geopark visibility and take into account the Geopark concept for this important touristic sector. The communication proposes to describe the different actions and to analyse the results of the actions developed by the Geopark management structure.

LIVELY REGIONAL ACTIVITIES IN TOYA-USU UNESCO GLOBAL GEOPARK

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Keywords: *sustainable development, residents well-being, communication, community involvement*

The role of geopark committee is a comprehensive promoting organization that is the geopark's registration applicant, having total strategy and sustention function to regions conservation and utilization of geo-resources, assistance of resident organizations and coordination and information sharing among a number of related organizations. There are about 20 guide / resident organizations related with Toya-Usu UNESCO global geopark

Besides that, a bottom-up process involving relevant local and regional stakeholders and authorities in the area is said to be necessary to global geopark activities. Now introducing the projects and roles for the regions two main organizations (NPO The Friends of Usu Volcano Geopark and Toya-Usu Volcano Meister Network), which are particularly taking part in lively activities.

METHOD FOR FORMING GEO-COMMUNITY IN MUROTO GEOPARK

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¹ Muroto Geopark Promotion Committee

Keywords: *communication with local people, geo-community*

Geopark programs adopt a “bottom-up” or community-led approach. Muroto Geopark Promotion Committee promotes the conservation of geological heritages, the geo-education and the development of guide activities with local people. However, these activities are stuck in some communities and it is a challenge to engage the community to promote the Geopark activities in each community within the Geopark. As a result Muroto Geopark Promotion Committee planned “Coffee Talk” meetings in Muroto Geopark” (we call it “Geo-Bata conference”).

Geo-Bata conference is a meeting that the Geopark coordinators, such as geologist, geomorphologist and secretariat staffs visit different communities and exchange ideas with local people. These meetings have been held in seven regions of the Muroto Geopark so far. The aim of Geo-Bata conference is to create opportunities of communication of Muroto Geopark Promotion Committee Secretariat and local people, and to increase the sense of promoting ‘Our geopark’ together. At the meetings the secretariat reports recent news and activities about the Geopark, and obtains information such as the region-specific customs and the current situation of landscapes from the people. We plan and operate jointly the special exhibitions and geo-tours that encourage the subjective activities of local people.

To take advantage of the Geo-Bata conference, Muroto Geopark Promotion Committee is promoting the developments of new geosites and preparing a special exhibition that focused on the traditional festivals of each community together with local people.

NAPO AMAZONIAN GEOPARK PROJECT: ESTABLISHING A BASE FOR EDUCATION AND SOCIAL PARTICIPATION FOR THE FIRST AMAZONIAN GEOPARK PROJECT

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Keywords: *geopark, Napo Province, social participation, geoeducation*

The province of Napo in the Amazon region of Ecuador is known for its high levels of biodiversity associated with the variety of geoforms found in the piedmont sector of the Andes. The magnitude of the geological events, and the subsequent formation of the Ecuadorian eastern Andes, allowed for the formation of the Uplift Napo in the northeastern part of the country. The main characteristics of this Uplift are the occurrence of volcanic edifices in the Amazonian territory (Reventador, Yanahurco and Sumaco), and the presence of fracture zones in limestone rocks that have facilitated the creation of karst cavities. These geological features made the Napo province a prime tourist destination of adventure in Ecuador, due to their association with for example waterfalls, rafting, jungle walks, and shamanic activities

. However, despite the abundance of such tourism, the information provided to tourists on these geological features is lacking in accuracy and in quality. To counter this, Ikiam Amazonian University, in conjunction with the University of the Armed Forces ESPE, has developed academics projects, educational and technical activities aimed at tour operators, tourism services providers and organized communities. These geoeducational activities are strategies intended to improve the capacity of local communities, based on the knowledge of their environment and land. Current development projects include landscape interpretation and inventory of karst landforms. These projects aim to promote community participation and represent the basis for structuring the future Geopark project.

THE PAN PROJECT: ENVIRONMENTAL MONITORING WITH SMARTPHONES

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Keywords: *citizen science, environmental monitoring, mobile application, TERRA vita, time lapse*

Environmental monitoring and ecological studies detect and visualize changes of the environment in terms of long time periods. Often agencies, in particular Geoparks, could document these changes. While generating photos or video documentation is cost consuming, citizen science and crowd sourcing are modern approaches to collect data and to increase awareness of environmental changes. This is the starting idea of the project PAN funded by the German Federal Environmental Foundation.

With smartphones and the PAN_App citizens take photographs of points of interest such as a flooded river bank in spring. An innovative overlay technology connects these single photos taken by many different citizen scientists to a time lapse video that visualizes the changes. Citizens as well as experts in environmental agencies and especially Geoparks can use these time lapse videos for a long-lasting documentation of environmental changes.

This project is based on the wide distribution of smartphones equipped with camera and GPS to navigate citizens via the PAN_App to specified locations, initiated by dedicated persons and experts. The PAN_App helps users to take photos that can be connected with other photos of the same area. Thus, the quality of the crowd sourced photos does not directly depend on expert knowledge of participants. A server hosts a photo and video database as well as programs that execute the algorithms.

Two sites within UNESCO Global Geopark TERRA.vita (Osnabrück, Germany) are used to test the PAN_App. One is an abandoned limestone quarry, where many animal and plant species find optimal life conditions e.g. the eagle-owl. The other one is a marsh area, which is flooded several times over the year and also serves as shelter for many birds. These few examples emphasize that the PAN_App is a suitable tool for Geoparks worldwide to track the changing environment while raising awareness for these changes.

A STUDY ON AN IDEAL FORM OF GEOPARK, UNIVERSITY AND MUSEUM PARTNERSHIP FOR ACHIEVING POST- DISASTER COMMUNITY DEVELOPMENT USING DISASTER WRECKAGE AFTER THE GREAT EAST JAPAN EARTHQUAKE

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Keywords: *community development after disaster recovery, disaster wreckage, tourist promotion, promotion council, area management*

When reviving communities battered by natural disasters like the Great East Japan Earthquake and Tsunami in 2011, it is necessary that the new communities establish partnerships with the public and private sectors. Towards this end, Geoparks are establishing such promotion councils that comprise local governments, universities, museums, citizens' groups, and private companies. This study aims to clarify the roles of the promotion council, and its partnership with universities and museums in order to promote education on disaster prevention and tourism through the community development after recovering from an earthquake and tsunami.

The study covers the Sanriku Geopark Promotion Council in the Tohoku district. The study involved collecting relevant literature from 2014 and interviewing local government officers, researchers, curators, private companies, and representatives of non-profit organizations. The results are as follows: 1) the role of the promotion council is an area management organization that establishes social capital while orchestrating the opinions and intentions of industries, academia, and the public and private sectors and coordinates among them the developing of human resources, providing information, and raising funds; 2) the role of university and museum experts are communicators who convey the requests of local residents to government officers and propose measures from an academic viewpoint.

The study concluded that the promotion council should establish a mediator type (horizontal) social capital that allows them to set the direction of the entire community and act while building consensus with people in and out of the community. Universities and museums should attempt to establish a connecting type (vertical) social capital that connects government officers who can exercise their authority on the local residents. Considering these things, universities and museums should have a comprehensive partnership agreement with promotion councils and establish a system that allows participation in geopark activities as their members

“TREASURES AND KNOWLEDGE IN THE TERRAS DE CAVALEIROS GEOPARK”: A NEW APPROACH TO INTEGRATE THE LOCAL COMMUNITY

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¹Terras de Cavaleiros Geopark Association

Keywords: *immaterial heritage, socio-economic development, touristic programmes, educational programmes*

Through the project “Treasures and Knowledge in the Terras de Cavaleiros Geopark” the Geopark strengthens its active role in the preservation of its immaterial heritage and its importance to the socio-economic development of the council.

This project aims to make an inventory of the traditions, rituals and folklore of the Geopark’s territory, in order to preserve the knowledge and spread it among the younger generation and the people who visit the territory. One example are the Caretos of Podence, diabolic creatures of the carnival in the Transmontano region, who represent a most typical cultural element of the Geopark.

The Terras de Cavaleiros Geopark Association selects the most suitable “treasures and knowledge” to implement them in their touristic and educational programmes which allow the visitors to get to know the villages and their people very closely. This contributes positively to the socio-economic development of the territory and improves life in the local communities.

The geological history of the territory motivates visitors to get there in the first place and to learn about it. The tourist programmes however enrich the experience and provide the tourists with a more detailed and real view into the life of a Geopark. The project aims to produce a documentary film and to promote local art in a live exposition.

THE VALUE OF INDIGENOUS KNOWLEDGE IN THE GEOTOURISM SUSTAINABILITY

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Keywords: *Earth heritage, geotourism, indigenous knowledge, Rio Coco aspiring geopark, sustainability*

The subject matter of this contribution is the importance of the knowledge, skills and traditional lifestyle of indigenous population for the geotourism sustainability. To describe and analyze deeply the value of this indigenous know-how for the selected aspects of the geotourism sustainability, the qualitative research strategy in the form case study was applied. The indigenous community of San José de Palmira of the aspiring Rio Coco Geopark was selected as a research area. The research was conducted in July 2015 and it consisted in the content and causal analysis of the perceived value and form of usage of this collective know-how in this emerging geotourism destination.

The direct observation, photo-documentation, focal group discussions, life history narratives and local informants (indigenous leaders, healers, midwives etc.) interviewing were used as the main methods. The author applied also the participant observation method, living directly in the local indigenous dwelling and sharing the daily life activities with local people. The main perceived value and potential usage was found in the transmitted system of values concerning nature and related natural resources management, the consistent involvement of elders into the community management, usage of cosmology and natural cycles in the local agriculture and medicine, usage of the traditional knowledge in processing of local crops and natural raw materials as well as keeping and transmission of many interesting indigenous legends and rites connected to the local heritage of Earth.

Findings of the research indicate that the sensible and gradual fusion of the scientific knowledge system with the indigenous knowledge system could essentially assist in improvement of the geotourism sustainability in San José de Palmira community and its surroundings. It could be assumed that it pays for the whole aspiring Rio Coco Geopark. To prove these hypotheses, more case studies and large quantitative research need to be conducted.



Engaging Communities

Poster Presentations



CLOTH BOOKS : GEOPARK WORK ARARIPE DIRECTED TO THE CHILDREN OF MOTHERS WITH CARCINOMA

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Keywords: *community, mother, books, education, sustainability*

Cloth Book project is promoted by the Regional University of Cariri - Araripe Geopark - G. A. It aims to contribute to the education and sustainable development in communities and homes to support children with cancer and to their mothers. It produces books, which are used as a teaching resource for inclusive education. The book is produced with its own characteristics that lead the reader to make use of imagination, giving meaning to every detail contained therein. Currently, the project is directed to mothers of children with cancer in support homes in the city of Barbalha / EC. It is used as occupational therapy and stimulus to generate income. The book can be traded by institutions and also be worked in schools for teachers that didactically use for students with special needs (Libras, Braille and others). It brings in its fabric, materials that sharpen touch, smell and hearing, given that it contains texture with leaves, seeds and embroidery stand in book sewing. More than 80 Cloth Books have been produced, which are on display in the library Interpretation Centre and Environmental Education G.A Crato / EC. Pedagogy course students of the Regional University of Cariri - URCA and trainees G. A., initiated the project. The target audience are 42 mothers of children with cancer, which may subsequently continue the work in their localities. The Araripe GeoPark has a key role by providing engineers and scholars, to implement and monitor the project. Work is already being done with other groups such as the elderly attending the National Service of Commerce - SESC Crato / EC and municipalities as Exu / PE. It will be expanded to other municipalities of the territory that meet the project profile, promoting inclusion, socialization of education and sustainable practices.

COMMUNITY INVOLVEMENT: ENCHANCE THE SUSTAINABLE DEVELOPMENT OF THE GEOPARK AND RESIDENTS WELL-BEING

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Keywords: *sustainable development, residents well-being, communication, community involvement*

Since Sanqingshan was approved as Global Geopark in 2012, more and more residents have become involved in geotourism. Some regular and occasional jobs have been offered to the residents, including tour guides, family-run inn owners, restaurant owners, sedan chair carriers, patrolmen and sanitation workers, onsite souvenir vendors, handicraftsmen, and producers and sellers of local products. At the same time, several scenic areas such as Tianyuanmuge-Yulian Fall Scenic Area, Shenxiangu Scenic Area and tourism villages such as Lingtoushan Village have been established, this created many tourism-related jobs and better living conditions for local residents. In addition, the residents, especially She people, have been encouraged to develop and to take part in traditional cultural activities including She dances, parades and shows of festival lanterns during Spring Festival and Mid-autumn Hawthorn Festival. It is identified that community involvement is a tool to enhance the sustainable development of the Geopark and the well-being of people around the Geopark.

ENHANCEMENT OF A GEOLOGICAL SITE THROUGH VOLUNTEERING

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Keywords: *geotourism, heritage enhancement, participatory actions, volunteerism, Quercy*

The Cloup d'Aural phosphorite cave (« phosphatière ») is one of the most important geotourist sites today in Quercy (France). Those former mines were exploited during the 19th century and have been set aside for a long time. Largely as a result of the voluntary involvement of inhabitants, elected representatives and speleologists, the site is now open to the public.

Works first began in 1990 with an acrobatic clearing of the vegetation in and around the phosphatière achieved by the local speleologists. There started several rehabilitation participatory projects; indeed, as many phosphatières in Quercy, it was used as uncontrolled landfill and the help of speleologists and inhabitants has been essential for its clean-up.

All the site first facilities (access, car parks, safeguard devices and first educational equipments) were realised within the impulse of “Les phosphatières du Quercy” association. The elected representatives of the municipality assumed themselves the restauration workshop of the dry stone walls. Finally the opening to the public occurred in 2000.

Under the association direction, various projects were conducted between 2008 and 2015 with the help of volunteers. For instance, a “geological timeline” hiking trail has been set up around Cloup d'Aural site and tells the Earth 4.5 billion years story along a 9km path. The most recent initiative was the rebuilding of an old-time mining winch with the assistance of local craft people.

All of these participatory actions have made local people remind themselves of a long-time forgotten heritage. Already known by specialists for its paleontological interest, this former mining site is now an acknowledged educational site and an asset for this very rural village of 180 inhabitants far away from the main tourist flows. Today the “Cloup d'Aural phosphatière” welcomes almost 15,000 visitors a year.

SMALL PEOPLE OF LANGKAWI

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Keywords: *ambassador, community, innovative*

Langkawi UNESCO Global Geopark has been endorsed in the network since 2007. Strong governance and collaboration among the government agencies and private enterprises are what make Langkawi a prominent UNESCO Global Geopark in South East Asia region. Among the local community and private businesses there are passionate individuals who have been supporting Langkawi UNESCO Global Geopark from the beginning. 21 influential individuals from different background, interest and expertise have been recognised as Geopark Ambassador both to give more encouragement to them and further their continuous contribution towards supporting the Langkawi UNESCO Global Geopark development. As an initiative that was commenced as a way to penetrate and convey the Geopark message to all community levels in Langkawi there are now teachers, tour guides, doctor, restaurant owner, fish farm owner, hotel manager, artist, community leaders, photographer and entrepreneur among the Geopark Ambassadors. With their different backgrounds, influence and expertise these ambassadors have initiated programmes such as school's Geopark Club, free simulation Geopark tour, landscape breakfast and other interesting and innovative program to ignite the love and passion about the Langkawi UNESCO Global Geopark.



Geotourism, Cultural Tourism, Sustainable Development and Local Products

Oral Presentations



APPLICATION OF SATOYAMA INITIATIVE FOR INTEGRATED DEVELOPMENT OF QESHM AS GEOPARK AND ECO-ISLAND, IRAN-LIVELIHOOD IMPROVMENT RELYING ON ENHANCED BIODIVERSITY

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¹JICA Project Team

Keywords: *Satoyama Initiative, integrated geopark management, international cooperation, Iran, biodiversity conservation*

Qeshm Island of Iran has rich biodiversity in marine, tidal, and terrestrial areas. The Iranian government is attempting to re-apply for Qeshm Island to be recognised as a UNESCO Global Geopark. The new geopark interlinks the mangrove forest largest in the Persian Gulf, the world's longest salt dome, and other geosites. While the island was designated as economic free zones by the Iranian Government, more than a half of the population lives in rural areas and they rely on natural resources for their livelihoods. In response to the request by Iranian government, Japanese government decided to implement a project for realizing the "eco-island," which targets integrated development by 1) conservation of natural resources, 2) improved livelihood of local communities, and 3) development of environmental-friendly economic free zone.

For the integrated management of Qeshm as Geopark and eco-island, the concept of satoyama is being applied. Satoyama means areas historically managed in Japan, where livelihoods harmoniously coexist with ecosystems, and both high biological productivity and biodiversity are expected. This notion could be a counter to the idea of controlling the environment solely for economic development. Though the concept of satoyama is rooted in the Japanese culture, it is now universal, as the Satoyama Initiative was adopted by the 10th Conference of Party of Convention of Biological Diversity in 2010. They recognize the Satoyama Initiative as a potentially useful tool to better understand and support human-influenced natural environments for the benefit of biodiversity and human well-being. In Qeshm island as well, by applying the Satoyama Initiative, communities can sustainably utilize natural resources for local industries and services such as eco-tourism for the integrated management as Geopark and eco-island.

The presentation will show challenges to apply the satoyama Initiative for integrated development of the island as eco-island and geopark, under international cooperation between Iran and Japan.

THE ARTISTIC PATH “PARTAGE DES EAUX”, A NEW APPROACH TO DEVELOP CULTURAL AND GEOLOGICAL TOURISM IN MONTS D’ARDECHE UNESCO GLOBAL GEOPARK

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¹Monts d'Ardèche UNESCO Global Geopark

Keywords: *geotourism, cultural tourism, contemporary art*

Located in the south east of France, on the western edge of Massif Central, the Monts d’Ardèche UNESCO Global Geoparks offers a fantastic geological heritage.

Ardèche is also a territory of creation, as shown by the artists who have painted the walls of the Chauvet cave.

The opening of the facsimile of Grotte Chauvet in 2014 is modifying the kind of tourism in Ardèche, which is currently mostly seen as a nature destination. It will give the opportunity to develop more in depth the interpretation of landscapes and of the geological history.

The way chosen by the Geopark to contribute to the development of a cultural destination is an ambitious contemporary art project based on geological facts: the watershed between Mediterranean Sea and Atlantic Ocean. Incorporated in a wider policy for the promotion of its territory, the Geopark is leading a project called “Partage des eaux” which invites internationally known artists to create in-situ contemporary, monumental and perennial works within the landscapes of the area.

These works will trace a discovery path in some special places: one of the greatest maar craters in Europe, a phonolitic dome which is also the source of the “sources” of the Loire River, and some other historical or geological places.

The modern artistic creations that will be shown in the Geopark will echo back to the prehistoric works visible in the Chauvet Cave. Indeed, the last scientific published work about the paintings considers as possible that some unexplained paintings are in reality the illustrations of the eruptions of the Geoparks young volcanoes and could be so interpreted like the first representation of a geological event.

The ambitious projet of “Partage des eaux” led by the Geopark is so developing a perfectly complementary offer from both a geological and an artistic point of view.

BECOME GEO-CURIOUS IN BEAUJOLAIS

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Keywords: *companies, economy geosites, geotourism, network*

Beaujolais' region, known for its vineyards, invites you to discover the diversity of its scenery, the architecture of its villages, its traditional know how and its local produces ... all these features closely linked to its remarkable geological cultural heritage! In order to preserve and highlight this heritage, Beaujolais aspires to become a UNESCO Global Geopark.

The Aspiring Geopark staff worked with a professional network of 60 tourism companies, (named "Atouts Beaujolais") to develop a new concept of geotourism: "Geo-curious". They created a new kind of touristic product based upon the geosites discovery and mixed with other topics: local gastronomy, hiking, wine tasting, guided visits of local architecture or monuments. The goal is to reconnect geology to other touristic offers.

For instance, strolling around the famous Mount Brouilly and its interpretative trail, taking pictures of overviews, then tasting wine at Brouilly's space with explanations about the link between soil and wine, and having a geo-picnic all made with local products. Then you could go on visiting castles with a guide and understand that local stones are part of the wine identity as well as the vernacular architecture.

Currently, there are about twenty proposals with other surprising activities (Golden stones tour in 2CV car, Castle life, the Bourdon tower: 360° of pleasure, the trail of hidden treasures, yellow and blue stones story ...) and new ones are being prepared!

United in their passion for their territory, all the members of "Atouts Beaujolais" have a heartfelt wish to unveil its character and generosity, that's why they became the first ambassador of Beaujolais' aspiring Geopark.

COMMERCIAL TOUR DEVELOPMENT IN PARTNERSHIP WITH 3RD SECTOR ORGANISATIONS

R. Barton¹

¹Selkie Ventures

Keywords: *community, tourism, heritage, adventure, development*

Between 2013 and 2015, I was project officer at Geopark Shetland and involved in the Northern Georoutes project led by Magma Geopark, Norway, in partnership with Stonehammer Geopark, Canada, and Katla Geopark, Iceland. The project aimed to develop Geopark tours in the North Atlantic region and use a common digital platform for promotion and sales.

Stakeholders in Shetland's heritage and tourism sector were surveyed and a group business seminar was held to explore the potential for tour development, initially focusing on Shetland's Northern Isles. A number of businesses and third sector organisations expressed interest and possible itineraries were developed. However, the lack of a tour operator in Shetland to bring together, market and sell tour packages meant it was impossible to progress things further at that time.

Shortly after this experience I represented Geopark Shetland at the Adventure Travel World Summit, where I learned how many communities in different parts of the globe had benefitted from the development of niche, or thematic tourism. It struck me that it would be possible to set up a tour company in Shetland that would deliver a quality tourism product based on Shetland's fascinating natural and cultural heritage, by working in partnership with Shetland's many volunteer led heritage groups.

A number of these groups manage small heritage centres, which provide an incredible tourist resource, but they are constantly struggling for funds. There is scope for such groups to generate regular income by running paid events and activities which provide a unique and authentic visitor experience, but alone they lack the capacity to develop this potential. This presentation will highlight my progress in making this idea a reality through my tour company Selkie Ventures and explore the potential for a similar approach involving Geopark partners

THE CULTURAL TOURISM OF DALI MOUNT CANGSHAN GLOBAL GEOPARK

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Keywords: *cultural tourism, diverse ethnic customs, profound culture, unique geological
relics, sustainable development*

Dali Mount Cangshan UNESCO Global Geopark is located in the junction of Hengduan Mountains and Yunnan-Guizhou Plateau, covering an area of 933 square kilometers. It is famous for the unique geological relics, typically represented by metamorphic rocks section, glacial landform and basin-orogen coupling landform, assisted by the diverse ethnic customs and profound culture. The geopark became a member of Global Geopark Network (GGN) in 2014.

Twenty-five nationalities such as Bai, Han, Yi and Hui live on this land and have created cultures of Nanzhao Kingdom and Dali Kingdom, inherited over 300 aspects of intangible cultural heritage including Raosanling (traditional festival) and Tie-dye Technique of Bai Nationality, leaving than 300 cultural relic sites like Three-Pagoda Temple, Sanyue Ancient Street and Dali Ancient Town. All of these help the area to earn the reputations of “Famous Place for Classics and Talents” and “Ancient City for Cultural Crossroad of Asia.” Under the high degree of community participation, culture tourism within the geopark has been developing rapidly, and its cultural economy has become top in Yunnan province. We can say, the unique national culture and historical culture is the important guarantee for the sustainable development of community economy. This thesis, based on the mutually beneficial co-existence and common progress of the geopark with its cultural relics, will discuss the development of cultural landscape in Dali Mount Cangshan UNESCO Global Geopark.

DEVELOPMENT OF GEOSITES AND GEOTOURISM IN THE UNESCO TROODOS GEOPARK

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Keywords: *Troodos ophiolite, oceanic crust, geosites, geotourism, Cyprus*

The Troodos Geopark is located in the heart of the island of Cyprus. It features a fully developed fragment of oceanic crust, with well-preserved and well-exposed plutonic, intrusive, volcanic rocks and chemical sediments of the Troodos ophiolite, where ocean floor spreading processes that took place approximately between 92-83 mya in the Neotethys Ocean, are recorded.

The geosites of the Troodos Geopark include the biggest historic asbestos mine in Europe in serpentinite, chromite mining galleries in dunite, sites where plutonic rocks were intruded by younger dykes, sites of extensive parallel dyke landscapes, rotated and epidotised dykes, sites of sulphide deposits and ancient copper slag heaps in the pillow lavas, spreading center graben valleys and a fossilized transform fault.

The majority of these geosites have important scientific value, not well known to tourists and local inhabitants. Informational signs have been placed in a number of geosites and places frequently visited by tourists. Despite the progress, more infrastructure must be put in place in order to promote the importance of each geosite and increase the number of visitors, which is very important for further development. These infrastructure include: (i) convenient and safe access; (ii) informational signs with simple explanatory notes, sketches and mobile applications which will provide more detailed information on geosites and geotrails; (iii) view points with kiosk, benches and signs with panoramic views of the broader area; (iv) development of educational-entertainment facilities (interactive games, picnic sites, climbing slopes etc); (v) geotrails connecting geosites, sites of unique natural beauty, archaeological and historical sites and local businesses and; (vi) enrichment of the Geopark webpage with web GIS applications that will provide detailed information with illustrations on geosites and geotrails.

A EUROPEAN GEOVILLAGES INITIATIVE: PROGRESS REPORT 2011-2016

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Keywords: *geotourism, rural regeneration*

The Geovillage concept: To establish a network of communities across the EU that offer high quality focused geotourism. To identify and offer interested communities a "pathway to provision".

Detailed outline: The ultimate objective is to open up a range of focused and accredited geology-based sites across Europe complimentary to the vision and realisation of the Geopark network.

Actions so far: The initiative commenced in 2011 with the formation of The Teme Valley Geological Society based in Martley Worcestershire UK. The first theoretical initiative in 2013 was achieved through a Grundtvig programme linking with additional partners in France (Sentheim), Germany (Eichstatt) and Turkey (Boyabat). The first practical initiative was activated through European LEADER funding with the support of Worcestershire County Council in 2013-2014 to research and develop the geological assets of Martley as a Geovillage community. During 2015 further links were identified with Portugal, Greece, Ireland and Poland. In 2016 The Teme Valley Geological Society now has a membership of over 100 and an e-contact community of over 400.

This presentation will give both an opportunity to develop the theoretical and practical considerations of the Geovillage initiative with delegates, and to indicate the potential to enhance and compliment the geotourism infrastructure already enshrined within the European Geopark network

THE FLAVOURS FROM THE TETHYS SEA, SIERRAS SUBBÉTICAS UNESCO GLOBAL GEOPARK (CORDOVA, SPAIN)

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Keywords: *geotourism, local products, geo-menu, Sierra Subbéticas, GeoFood*

The Flavours from the Tethys Sea is an original menu inspired by the landscapes, geological formations and processes that take place in Sierras Subbéticas UNESCO Global Geopark. In the frame of GeoFood international project and in collaboration with a local restaurant, Zuhayra, the Geopark has developed this menu where local products and geological shapes stand out. This initiative provides a tasty promotion of Geological Heritage and Geoparks, and also contributes to the development of Geotourism.

The rocks from Sierras Subbéticas contain a 230 million years history, which is closely linked to the Tethys Sea. The sea bottom beds in this area registered the evolution of the South Iberian platform and, at the end of the Alpine Orogeny, marine sediments were incorporated to the Betic Mountain Range. The carbonate nature of the terrains in Sierras Subbéticas are the base for the development of an impressive karstic landscape. Sedimentary rocks also contain abundant invertebrate fossil fauna, especially ammonites, which provide information about ancient ecosystems and offer precise data of the evolution of life and the age of the rocks.

The history of the region, its climate, its soil are related to the existence of very high quality products in this area. Olive groves from these mountainous and karstic terrains yield the best olive oil, according to the World Ranking Extra Virgin Olive Oils. Goat cheese, quince cream, liquors, wine, turrolate or salt from brine springs,,, are other local quality products linked to the features of this territory.

In order to develop a Geo-menu, local products and geological features have been combined, resulting in original and tasty dishes like Cheese crinoids, Dinosaur bites, Belemnites stuffed with seafood, Salmorejo polje with toasted bread hums, Puff pastry ammonite stuffed with mushrooms, and Bailón River cake with ponor. Although some dishes have been managed to be very similar to geological features, an oral presentation is recommendable for the diners to deeply appreciate and enjoy the meal.

THE FOUNDATION OF A GEOPARK'S DEVELOPMENT: SUSTAINABLE CONSERVATION IN A SCIENTIFIC WAY

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¹Shennongjia Global Geopark

Keywords: *Shennongjia Geopark, nature conservation, sustainable development, geosciences research, geotourism*

Shennongjia Geopark was established in September 2005 and admitted into the Global Geoparks Network in September 2013. During the 10 years since its establishment the Geopark has gone through three stages in respect of nature conservation: from “passive static protection” to “initiative dynamic protection” then to “sustainable scientific conservation”, and found that “conservation means development, green means treasure, and culture means advantage”. With the Geopark’s experience and measures in nature conservation as an example, this presentation explains the purpose and significance of nature conservation by analyzing its objects, subjects and specific methods, and proposes an approach to sustainable conservation of geoheritage and natural resources that is based on in-depth science research and guaranteed by geo-tourism. By sharing these experiences the authors wish to inspire all geoparks to achieve sustainable development with their own characteristics by holding to the fundamental concept of geopark, following universally agreed values, presenting their local culture and adopt innovative ways of thinking.

THE GEOLOGICAL TRAIL OF CILETUH NATIONAL GEOPARK, WEST JAVA, INDONESIA; SELF-GUIDED TRAILS FOR ALL VISITORS

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Keywords: *geosites, geotrails, geotourism, Ciletuh National Geopark*

The Ciletuh National Geopark is located in the west coast of West Java Province, Indonesia. The geological heritage within the geopark is the occurrence of “ophiolite complex as fossil of the subduction zone between Eurasia and Indo-Australian plates during Cretaceous. The tectonic event afterward also created the spectacular geomorphological landscape called the Ciletuh Amphitheater as well as the erosional process by sea water resulting the unique rock appearances and shapes such as dragon, buffalo, turtle, etc. Geotrails (one of Geotourism activities) are a powerful means of disseminating geological information through a trip around geopark as easy walking trails allow direct contact with the geological environment.

The aim of this paper is to present some geological trail maps of Ciletuh Geopark containing interpretation of various geological sites (geosites). The method used to develop the trails was divided into three processes starting with a literature study of research areas and field research to create an inventory of geosites. Data analysis followed to identify and classify the geosites into geological trails.

The geosites are grouped in accordance with the meaning and morphology, namely; old rocks, geomorphology, fossils, sea caves, unique rock formations, waterfalls, and sedimentary structures as a basic substance in the manufacture of geotrek line. There are 3 geological trails which have been adapted to the type of trip and geosites that have relevance, namely, The Magical of Ciletuh Amphitheatre (The trip focuses on enjoying the morphology of Mega Amphitheatre Ciletuh), The Ciletuh Melange's Journey (The trip to learn about the oldest rocks in West Java) and the Spectacular of Ciletuh Bay (Sea lanes journey for enjoying a variety of different shapes of rocks in the Ciletuh Bay).

GEOPARK ACCESSIBLE TO ALL

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Keywords: *Azores Geopark, geotourism, social inclusion, partnership*

Azores UNESCO Global Geopark is a well defined area with an exceptional geological heritage, in a network of 121 geosites on nine islands and the surrounding marine area. Azores Geopark's exceptional geological heritage supports a strategy that promotes the well-being of the population and maintains respect for the environment.

Azores Geopark's strategy for promoting the well-being of the local population and tourists, and getting local communities involved in promoting and protecting the geological heritage in the geopark includes a social inclusion program, called "Geopark accessible to all". The aim of the project is to create a series of activities and materials that can be adapted to any group, depending on their needs, to promote social inclusion, a very general term which embraces persons with disabilities and persons that are generally excluded from many activities in society.

To pursue this goal, Azores Geopark has established partnerships with various socially inclusive organizations, such as ALTERNATIVA, which provides support for former drug addicts and their families; ACAPO, an association for persons with visually impairments; and CRESAÇOR, a regional cooperative that has an inclusive cultural tourism agency.

The program "Geopark accessible to all" includes the following steps: (1) studying and evaluating the needs of the communities in and around Azores Geopark; (2) creating adaptive experimental activities, such as organizing small circles and providing information in different formats, such as Braille and audio; and (3) creating activities that develop all the senses and emotions of the participants.

Over the years Azores Geopark has organised inclusive activities in its calendar, such as visits to the Ilhéu de Vila Franca do Campo and Serra do Cume geosites with interpretation and activities about volcanoes for institutions for children with disabilities.

THE GEOPARK NEEDS CULTURE CREATIVITY TO KEEP ITS SUSTAINABLE DEVELOPMENT – CASE STUDY OF DEVELOPING CULTURE CREATIVITY INDUSTRY OF DINOSAUR MUSEUM OF ZIGONG GEOPARK

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¹ Dinosaur museum of Zigong Geopark

Keywords: *culture creativity, dinosaur museum, sustainable development, friendly image, the public*

How is it possible to create a closer relationship between the public and the museum of geopark? Equally, how is it possible to revive precious treasures housed by the museum?

In recent years, the dinosaur museum of Zigong Geopark has utilized internet technology and taken advantage of its platform to develop and refine the most creative images of mascots for the museum. Then the museum started with the mascots to explore and develop the culture creativity industry, through multi-media to cooperate, design and produce creative products of the mascots and extend the boundary-crossing culture creativity industry chain. As a result the cold dinosaur fossils have been gradually warmed up and brought alive before the public and subsequently have become more and more popular. The development of the culture creativity industry does not only help to facilitate the geological knowledge spreading, but it upgrades the friendly image and influence of the geopark, thus strengthening the sustainable development ability of the geopark. This example of the dinosaur museum of Zigong Geopark using internet technology in a creative way demonstrates that embracing the internet is a necessary for geopark success.

GEO-STORY BETWEEN LUXURY FOODS AND GEOLOGICAL FEATURES IN THE SAN'IN KAIGAN UNESCO GLOBAL GEOPARK

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Keywords: *Sea of Japan, snow crab, back-arc basin, volcanism, Japanese beef cattle*

Catching of snow crab and breeding of Japanese beef cattle are representative primary industries in the San'in Kaigan Geopark. Furthermore, there are many sake breweries in the Geopark all of which are closely related to the geology of the Geopark.

The geological history of the San'in Kaigan Geopark is divided into the following three stages.

Stage 1 (Late Cretaceous to Early Paleogene) is characterized by the intrusion of large granite batholiths in the margin of the Asia Continent. Most of the sake breweries are located on the granites. Ground water through granite is suitable for brewing of sake, because it contains the desired quantity of minerals (Ca, P, Mg and others) which activate yeast, and are poor in iron ion as this damages the flavour of sake.

Stage 2 (Early to Middle Miocene) is characterized by rifting and expansion of a back-arc basin. As a result, a deep ocean basin and shallow bank are formed in the Sea of Japan. The basin is good fishing ground for snow crabs. We can get fresh crabs because the coastal area of San'in Kaigan Geopark is near the basin.

Large scale andesitic to basaltic lava flowed in the mountain area of the Geopark at Stage 3 (Late Pliocene to Present). Stockbreeding of Japanese beef cattle ("Tajima Ushi") is popular in this area. They are calved before fattened in various regions, and 99.9% of their genes have been inherited from the bland cattle in Japan. Lava flows formed deep valleys and gentle highlands. Deep valleys have a complicated association with the next villages and kept a good pedigree of cattle as a result. Furthermore, flat highland provides good pasture for the cattle.

Mentioned above, there are stories between foods and geology, and we call them geo-stories. Generally, the earth sciences are unfamiliar for people in the area but appropriate and relevant geo-stories help to promote people's understanding of earth sciences.

GEOTOURISM AND GEOEDUCATION ON VOLCANOES IN KULA GEOPARK

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Keywords: *Kula Geopark, volcano, geotourism, geoeducation, Strabo*

Volcanoes and volcanism has been a major human interest since the birth of our civilisation as we know from the 15 thousands years old prehistoric cave paintings depicting eruptions within Kula Geopark. Volcanoes have deeply influenced our culture and within myths are often related with the underworld. The great Greek philosopher Strabo, two millennia before today visited the Kula volcanic area and claimed the coal-black lava must have been related with fire originated from inside the Earth thus naming the area “Katakekaumene” (Fire-born).

In modern times volcanoes and volcanic landscapes geomorphologies became major tourist attractions as a form of adventure tourism. Geoparks, with well organised accessibility and interpretation have pushed volcano geotourism one step further where volcanoes are not only for adventure seekers but for wider society.

The miniature volcanoes of the Kula European and UNESCO Global Geopark are an ideal volcano geotourism destination where the originality of the landscape and the ease of accessibility sit on a unique equilibrium. Sandal Divlit miniature cone is an excellent geosite with a crater inside and surrounding basaltic lava flow plain.

In order to open this outstanding geosite for Geoeducation and Geotourism activities, through the “Explore the Kula Geopark ”project financed by the Zafer Development Agency, 540 meter long wooden walking trail has been constructed to climb the steep cone in comfort accompanied with bilingual direction signs and information panels. Another 760 meter long circular geotrail has been arranged to allow a round trip at the rim of crater. Additional necessary visitor infrastructures like parking, wooden shelters and toilets have been installed in minimalistic manner at the foot of the cone. Kula Geopark is organizing guided tours for the Sandal Divlit Cone which is now becoming the flagship or the iconic geosite of the Kula Geopark with slogan of “Learning is adventure”.

GEOTOURISM EDUCATIONAL IN GEOPARK ARARIPE

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Keywords: *geopark Araripe, geotourism, educational practises*

This paper addresses the Geotourism initiatives in the region of Cariri, Ceará, Brazil, in the context of Araripe Geopark based on educational practices and regional development. It looks to understand and analyse local Geotourism and highlight ways for their vocations and the potential that permeates between culture, history, leisure, health, education, events, business and nature.

Despite the fact that Araripe Geopark is a territory with defined borders and with the presence of geological heritage, it is important to emphasize that this adds value to the territory. In this work we used the field class to analyse geosites and their values, with the support of learning resources assigned by the Araripe Geopark to bring practical knowledge of the theoretical. The work enabled students to understand the asset in question, get to know it and value it.

The key objectives are the protection of geological heritage, management of natural resources, support to the economic and cultural development of communities, and particularly the great potential of educational projects to benefit in training human resources.

It is necessary to develop strategies to promote the implementation and ongoing development of these projects, which will assist in the conservation of geological heritage and regional sustainability of Geoparks.

The work in the field is a major aspect of the study for the students and consequently the community. We were able to note the importance of the Araripe Geopark and its contribution to the development of the area in which it operates through geotourism, promoting the territory's heritage, natural tourism, adventure, religion, rural, community, and especially the educational aspects of geotourism.

GEOTOURISM IN SIERRA DE ESTRELA: NEW TERRITORIAL OPPORTUNITIES

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Keywords: *geotourism, Serra da Estrela, local development, identity*

Geotourism arises as a new paradigm of sustainability and opportunity for different territories, whose greatest feature is the landscape itself. In this context, there are three main premises associated with the Geotourism concept: the patrimony (biotic, abiotic and cultural), the interpretation and the sustainability. Those reflect a distinctive approach to territories and their appropriation by tourism, in which the landscape is at the heart of the concept itself. In fact, the landscape is the materialization of tangible and intangible processes through which is built the uniqueness and character of the territories.

According to the Declaration of Arouca (2011), Geotourism is defined as "tourism that sustains and enhances the identity of a territory, considering its geology, environment, culture, aesthetic values, patrimony and the well-being of its residents". The geology should play an important role, of course, but complementary with other values and resources that, together, give the territory a greater capacity for tourist attraction. We are faced with a holistic view that includes culture, history, communities and the landscape itself, reflecting the identity of the territory, and being an important territorial appreciation strategy that can be understood as sustainable tourism that allows conservation and enhancement of the geological, biological and cultural patrimony, to the benefit of local communities.

Serra da Estrela is the most important mountain of mainland Portugal, enclosing a vast natural patrimony associated with geodiversity, biodiversity and amazing natural scenery, but also has a rich cultural heritage, related to the *modus vivendi* and adaptation of populations over the time in this territory. We believe that the intrinsic relationship between the geological and morphological nature of this territory, its ancient lifestyles and its landscape, as a reflection of all its elements, are a pertinent asset from which the Geotourism can constitute a more sustained, inclusive and genuine new opportunity for this mountain areas.

GEOTOURISM TREKKING DEVELOPMENT BASED ON COMMUNITY PARTICIPATION IN INDONESIAN RINJANI NATIONAL GEOPARK

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Keywords: *geotourism, geotrekking, rinjani, community, Indonesia*

Rinjani volcano (3726 m above sea level) on the island of Lombok, West Nusa Tenggara province, Indonesia, became a national geopark in November 2013. With high tourism visits, especially for mountain climbing either to the top or to the caldera lake, Rinjani is feasible to be developed as a geotourism destination under the management of geopark. However, communities and people in the geopark area need to be nurtured in the development of this kind of tourism that is relatively new to them. Even the understanding of the geology and geopark itself is a big challenge for the communities.

For that reason the Ministry of Tourism of the Republic of Indonesia in collaboration with the Provincial Office for Tourism and Culture of West Nusa Tenggara province with the help of the Center for Planning and Tourism Development, Bandung Institute of Technology (ITB) implemented a training program in the development of geotourism trekking that fully involved the entire communities in Rinjani National Geopark. The pilot project was conducted in 2015 in various forms of activities, namely dissemination, stakeholder meetings, workshops, and training, including field excursions. The result was that the communities decided to develop four geotourism trekking themes: 1. Geotrekking of Ancient Traces of Volcanic Eruption in West Coast of Lombok Island, 2. Geotrekking of Ancient Caldera of Sembalun, 3. Geotrekking of Rinjani's Youngest Volcanic Activities, and 4. Geotrekking of Rinjani's Cultural Landscapes.

The result of the project also consists of implementation guidelines for: (a) socialization of program development in geotourism trekking, (b) development of geotourism products, (c) synchronization of the geotourism trekking development plan, (d) increasing the capacity of tourism human resources, and (e) monitoring and evaluation of the implementation of the geotourism attraction development plan.

GEOTRAILS ON TARUTAO ISLAND, SATUN ASPIRING GEOPARK

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Keywords: *geotrails, aspiring geopark, Tarutao*

The area of Satun aspiring geopark also belongs to the Tarutao National Marine Park. It is now a quiet, peaceful tourism area and has received status as a ‘natural heritage area of Asia’, designated by UNESCO in 1982. There are many attractions on Tarutao Island such as beaches, cliffs, caves and wildlife. In addition, Ao Mo Lae or Mo Lae bay is also fascinating, it is reported as the oldest fossil site in Thailand and Southeast Asia. This is the most important aspect in terms of geology which creates added value to the island. Consequently, the ideas of geo-conservation and geotrail development have started on the island.

After field investigation, geotrails on Tarutao Island are defined into three routes depending on geological value and topography. For determining the geological value, the methodology considers two main criteria; scientific and management, with their respective series of sub-criteria. Three potential geotrails are introduced as: 1) Tarutao headquarters – Ao Talo Wao, composed of the oldest rock unit in Thailand together with structural diversity, fossil diversity and historical sites; 2) Ao Pante Malaka – Crocodile Cave, representing the gorgeous karst topography and biodiversity; 3) Ao Pante Malaka – Pha Kalok, remarkable as a perfectly continuous succession of stratigraphy. Various kinds of geological features were found on this route e.g. cliff, sea stack and gravel beach. However, white sand beaches on Tarutao Island seem to be more popular than its other geological values, so, some activities are set up in order to give the basic geological information to visitors as well as to make them realise the importance of the geological and natural resources.

A GREAT VARIETY OF GEOTOURISM OFFERS VISITORS OPPORTUNITIES TO ENJOY THE ACTIVE VOLCANO

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Keywords: *Sakurajima Volcano, Kagoshima Bay (Kinko Bay), active volcano, eruption, volcanic tourism*

Sakurajima-Kinkowan National Geopark is in the southwestern part of the Kyushu islands, Japan. The volcano Sakurajima is in the centre of the Geopark; one of the world's most active volcanos, it has been continuing vulcanian eruptions on a daily basis over the past 60 years. Sakurajima is also surrounded by Kinko Bay on almost all sides. Kinko Bay was created by a huge volcanic eruption about 29,000 years ago. Due to the enormous eruption, the land caved-in and seawater entered the area. Kagoshima City, a big city with a population of over 600,000, spreads out just 4 km from the active volcano Sakurajima. The area continues developing and coexisting with the volcano.

Sakurajima-Kinkowan Geopark plans and offers various forms of geotourism making full use of the volcano Sakurajima and Kinko Bay's unique characteristics. Our programme offers visitors a chance not only to gain knowledge of volcanoes and eruptions, but also to think about disaster measures and coexisting with the volcano. They can also experience benefits of the volcano through our harvest experience programmes. In addition, we have several programmes that focus on Kinko Bay. During the oral presentation, our various geotourism programmes will be introduced in more detail.

HOMEGROWN LODGE: A SOLUTION TOWARDS GEOTOURISM IN CILETUH ASPIRING GEOPARK

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Keywords: *Ciletuh, Sukabumi, homegrown lodge, aspiring geoparks, green economy*

The Environment is currently a big issue in the world, as agreed in Paris Agreement. Every single aspect in entire life should be urgently taken into account for keeping the Earth worth, with no exception geopark. Ciletuh Geopark which located in Sukabumi, West Java, Indonesia, holds paramount significance in which its geodiversity, biodiversity, and cultural diversity has been granted as a National Geopark in 2015.

In short, Geopark Ciletuh convinces people the pristine beauty of nature and captivates myriad tourist to visit. Geotourism activities support local people to raise welfare and livelihoods. However, if the geotourism development is not seriously managed people have a tendency to put profit over and above considering environmental and conservation issues. For example, the inappropriate positioning and rapid, non environmentally friendly construction of guest houses for tourists.

To prevent environmental and ecological risks, homegrown lodge concept could be more benign to displace guest house constructions to the geopark surrounding areas. The concept of homegrown lodge is where tourists of Ciletuh Geopark will stay together with local people in their homes during a visit. Homegrown lodge is expected not only to lessen environmental risks but also to engage social acceptance amidst tourist and local people inclusively. Providing opportunities of communication, both tourist and local people will experience a distinct style of tourism activities.

Economically, homegrown lodges are a business solution to boost the rural economy with respect to natural diversity by implementing green economy concept. The concept enables all local people in Ciletuh area take on the practice. Furthermore, the homegrown lodge solution supposes to deliver positive beneficence to the environment for better future life.

THE IMPROVEMENT OF LOCAL COMMUNITIES (FOCUSING ON WOMEN) IN QESHM GEOPARK

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Keywords: *local communities, local art, handicraft, Qeshm geoparks, Iran*

Qeshm Island, located in the Persian Gulf, is the biggest island in Iran. The people follow the traditional lifestyle, fishing and raising livestock, and follow traditional customs and religious beliefs as well. The women in this rural environment do not normally go to school and are responsible for maintaining the home and looking after the children, though in some cases they do farm work. They do not have an important role in social activities.

In 2006, the island became the first geopark in the Middle East to join the Global Geoparks Network. Becoming a global geopark resulted in a number of changes. One of the most important involved the women because of the handicrafts they made. They were very skilful, but their handicrafts were not recognised beyond the island. As part of the geopark activities, their handicraft skills were supported by various organizations, such as SGP (the GEF Small Grants programme). This resulted in raising the women's self-confidence and eventually their handicraft products were sold to visitors as souvenirs.

Today, assisted by geopark staff and through geopark activities, the local women have become more aware of their skills. Some cooperatives have been established to enhance the development of their handicraft products. Now everyone who visits the geopark learns about the handicraft skills of the local women, and the local handicrafts have become popular souvenirs. The women in Qeshm now serve as role models for other villages and even provinces. Today, Qeshm is looking for new ways to meet the needs of women and encourage them to play an even more important role in the geopark.

INNOVATIVE PROJECTS IN MAGMA UNESCO GLOBAL GEOPARK - NORWAY

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¹Magma Geopark

Keywords: -

Magma UNESCO Geopark is a private Company financed by public and private institutions. Magma UNESCO Geopark (MGP) is actively involved in the sustainable development since 2008. From 2012 MGP until now, MGP set up tailored strategy to develop products that could effectively support the local rural economy. Specifically, MGP define these products with the acronym “GEO” that stands from “GEA”-mother Earth in Greek. The “GEO” projects are: the GEO2NOR project, the GEOfood project and the GEOvr project. GEO2NOR project ran from 2012 to 2014 in cooperation with Shetland Stonehamer and Katla UNESCO Geoparks, the TORA traffic in Faroe Island, and Blue Ice Explorer in Greenland. The project allows partners to involve and promote the local small and medium sized enterprises in the tourist field, supporting Geoparks in developing tours.

Main results achieved: northern georoutes web page: www.northerngeoroutes.com and the GEORoutes app (available for Android and Apple) with interactive educational games, virtual tours, commercial and events pin.

GEOfood is a project involving Rokua, Odsherred, Rejkýanes and Stonehammer Geoparks in the constitution of criteria for developing local food products in the Geopark area. We have set up the criteria and signed contract with producers and user.

GEOvr: www.geoVR.no, is the virtual exhibitions supported by the UNESCO Norwegian Commission and other Regional and International funds. It allows people to explore the geological and cultural heritage worldwide sitting indoor! GEOvr includes 3d localities and hotspots from. From 2017 Magma will include contents from the Faroe Islands Geopark project, the Ilulissat UNESCO WHL Sites in Greenland and Katla UNESCO Geopark in Iceland. GEOvr will be presented at the Jæren Scientific Museum in June 2016 The virtual platform will be soon implementable and it will be commercial in 2017.

GEOgreen aims to develop local strategy for increasing use of green transport connecting the Magma geosites.

INTRODUCTION OF SALT DOMES COLLECTIONS AS DIAPIR PARKS IN ZAGROS, IRAN

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Keywords: *salt domes, Diapir, Hormuz, Zagros, Fars*

Iran is one of the few countries that have a potential to manipulate geo-tourism. This is a consequence of geological diversity due to diapirism and the resulting salt domes and plugs that form. Tectonic activity, different outcrops of rocks, various geomorphological phenomena and changes in soil and salinity in both surface and ground water can be mentioned as proper evidences. The Zagros Mountain-range has global fame due to the abundance and diversity of outcrop phenomena that results resulting from this activity. The various kinds and most of these forms are in Fars province. So far, 120 salt plugs are reported within Zagros belt-zone. The origin of these salt deposits is called "the series of Hormuz", which is located in the boundary between the sedimentary cover and the Zagros basement. "The series of Hormuz" penetrate into the sedimentary cover of Zagros in diapir form and nourish a flow of salt that moves on earth's surface as a plastic flow. Some of these phenomena are very attractive which makes them wonderful potential geo-sites. In addition, some are associated with ancient cultural and historical monuments. A lot of research has been done in Fars province regarding these natural landscapes all of which are unique and valuable. In this article it is tried to introduce the most beautiful plugs or salt-domes that form in Zagros Mountain and their effects on geotourism industry development.

JAMES COOK 250 AND GEO-HISTORICAL LINKAGES

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Keywords: *James, Cook, Cabox, geo-historical, 250*

Cabox Aspiring Geopark in the Canadian province of Newfoundland & Labrador is spearheading a project that maximizes opportunities related to 'Geo-Historical' linkage.

In 2017, the Aspiring Geopark - in conjunction with the International Appalachian Trail - will be celebrating the 250th Anniversary of renowned English explorer and cartographer James Cook completing his survey of Western Newfoundland (location of the Aspiring Geopark) and his five years of surveying Britain's oldest overseas colony. The quality of this work led to his selection by the British Admiralty and Royal Society to sail to the Pacific Ocean the following year on his first of three voyages to the Pacific.

Next year's James Cook 250 will be combined with Canada 150, a national celebration of the 150th Anniversary of the Confederation of Canada. The combined Cook 250 / Canada 150 celebration is poised to become a "signature" event that showcases geo-historical links to and between Britain and Canada.

Cook Museums and National Trails in England have already accepted invitations to participate in a James Cook commemoration that will continue for 12 years, until the 250th anniversary of his death in 1779.

Geo-Historical links such as James Cook 250 provide a unique opportunity for UNESCO Global Geoparks and Aspiring Geoparks to connect - both geographically (e.g., geologically) and historically - to other regions and Geoparks around the world, in a way that increases both cultural content and promotional opportunities.

LAMMEFJORD AS A FLAGSHIP SITE IN GEOPARK ODSHERRED

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Keywords: *geology and landscape, history, local food, collaborative network*

15,000 years ago the last glacier from the Weichsel Ice Age covered Lammefjord. When the ice disappeared the glacial depression turned into an inlet. The inlet was reclaimed 140 years ago when the baron of Dragsholm Castle needed land for agricultural use. Today Lammefjord has become the vegetable garden of Denmark with specialized crops from which Lammefjord has earned a national and international reputation.

The Lammefjord-project is based on the development of the inner most part of the old inlet as a "flagship site" in Geopark Odsherred and to disseminate the link between geology and landscape, local history and local produce. The project will visualize and communicate the connection and unique roving qualities between the formation of the landscape since the last Ice Age and the agricultural use of the land today.

The goal is to create a mental link between the landscape and the target groups of local inhabitants, tourists and visitors. This goal will be achieved through a marked bike cycling route and a demonstration field with vegetables from Lammefjord. Also sites showing the old coast line and oyster beds from the Stone Age are milestones in the overall project. To support the dissemination of the landscape formation The Geological Survey of Denmark and Greenland are doing research to clarify the strange soil composition and to highlight the mysterious mud holes appearing along the edge of the inner part of the old inlet.

The project idea has been developed in collaboration between local farmers, The Drainage Association of Lammefjord, Odsherred Municipality, VisitOdsherred and Geopark Odsherred etc.

MAKING GEOTOURISM ATTRACTIVE UTILIZING PROMOTION MOVIES, CGI AND AERIAL FOOTAGE

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Keywords: *geotourism, media, cgi, aerial*

Geotourism is a relatively unfamiliar concept in Japan, and making the Geopark an attractive destination for a wide range of visitors is a challenge. Recent surveys have suggested that the vast majority of visitors to the Oki Islands UNESCO Global Geopark are satisfied with their experience, however, over 70 – 80% of people in the nearby regions on mainland Japan have never visited, revealing that despite their geographical closeness to the geopark, it is not an appealing destination. In the last year, the Oki Islands Geopark has been developing a Geopark Promotion Movie which is designed to portray the geopark as a fun, active and eye-opening destination, highlighting the wide-range of things to discover and enjoy, including outdoor activities such as sea kayaking and hiking, and cultural activities. Alongside this, the geopark has utilized drones to capture aerial footage of the geopark, revealing the scale and stunning views of the geological features, and CGI to describe the formation of some of the main sites of the geopark. These allow visitors as well as local people to visualize the formation of the land making geological concepts accessible to a wide-range of people. The geopark intends to use this media online, around the geopark, and at promotional events in order to promote the geopark as an attractive, dynamic destination.

MAKING THE IMAGE OF GEOPARK – CASE SAIMAA

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Keywords: *Finland, identitybuilding, image making, Saimaa Geopark*

Geoparks, like any other places and regions, have their role in image making and identity building processes of both local people and regional administrative bodies. Images of certain places or regions may be based on locally recognised features of material or symbolic resources. The aspiring Geopark of southern Lake Saimaa is a good example to analyse the concepts of regional identity and place promotion in terms of critical cultural and regional geography.

The aim of this presentation is to analyse image making of Saimaa Geopark initiative. The presentation will seek answer to the following questions: how the aspiring Geopark area will support local and regional identities, and can the objective of Saimaa Geopark refresh and develop the image making approaches in the local and in the international level?

I will approach the Saimaa Geopark area from two viewpoints that are symbolic and material image resources. I will include those resources for two important features of Lake Saimaa: the Saimaa Seal (*phoca Saimensis*) and typical esker landscape of lake area and islands.

I will argue that the Saimaa Geopark can be used as practical tool to improve regional vitality and local tourism industry but also to deepen and remake local and regional identity, basis of image making strategies and political coherence of regional authorities supporting objective of Saimaa Geopark.

MOUNT KUNLUN – A BRIGHT PEARL ON THE ROOF OF THE WORLD

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Keywords: *geoparks, geotourism, glacier, Qinghai-Tibetan Plateau, Suture Zone*

Mount Kunlun UNESCO Global Geopark is located in the southwest part of Golmud, Qinghai, China. Belonging to the eastern section of Kunlun Mountains in the northeast of Qinghai-Tibetan Plateau and covering an area of 7,033 square kilometers, Mount Kunlun UNESCO Global Geopark joined the Global Geopark Network (GGN) in 2014.

Since the Phanerozoic Eon, the Geopark has undergone complicated multiphase crustal movement as well as ocean-continent transformation, developing Mesoproterozoic-Neoproterozoic-Jurassic stratas, with active and intense magmatic activities. It records the whole geological evolutions of the south of Palao Asian tectonic domain and the north of Tethyan tectonic domain. As one of the uppermost stress release belts in the north of Qinghai-Tibetan Plateau, the Geopark is endowed with diverse earthquake relics, periglacial landform and contemporary glaciers that are of global correlation significance.

Reputed as the Ancestor of Mountains, Mount Kunlun has held supreme status in the Chinese civilization since ancient times thanks to Mount Kunlun myth system, the most important Chinese myth systems. This thesis is to focus on introducing special geological relics in Mount Kunlun UNESCO Global Geopark and its global correlation significance as well as the contributions to be made after the Geopark became a member of GGN.

PAIVA WALKWAYS: A NEW TOURISTIC ATTRACTION IN THE AROUCA UNESCO GLOBAL GEOPARK (PORTUGAL)

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Keywords: *Paiva walkways, Paiva river, Arouca Geopark, geosites, biospots*

Since 20th June 2015, the northeastern area of the Arouca Geopark is provided with a new touristic infrastructure, which allows the contact between the visitors and the wild nature on the banks of the Paiva River. The latter carved impressive geomorphological features in the Arouca Geopark separating two important mountains: Freita, in the south, and Montemuro, in the north. This river is a national and international reference for whitewater adventure sports such as rafting, kayak and canoeing.

The Paiva Walkways are a wooden pathway, which extends about 9 km along the left bank of Paiva river, between the Espiunca village and Areinho fluvial beach. This pathway cross an area with five geosites (Paiva gorge, Aguieiras waterfall, Vau, Salto and Espiunca fault) and belonging to the Natura 2000 Network, allowing the contact with several important wildlife species of fauna and flora, some of them presented and explained over nine interpretative panels along the walkways – the “biospots”. A journey through the Paiva Walkways allows the observation of this specific geodiversity and biodiversity, as well as the practice of adventure sports. There are also two viewpoints with interpretative panels on the white-water rapids, as well as their geological explanations/origin.

This infrastructure is managed by the Municipality of Arouca and its accessible through a previous reservation at an online platform (www.passadicosdopaiva.pt). Several educational and touristic services are being promoted providing a growing source of opportunities for enterprises development and employment creation. Since its inauguration about 300.000 people, from around the world, visited this pathway creating a great economical impact at the Arouca UNESCO Global Geopark namely in the touristic trade such as accommodation, foodservice, local commerce, transfer services and touristic activities.

As result of this impact, the Paiva Walkways were designated for the «World Travel Awards 2016» - category «Europe’s Leading Tourism Development Project».

A PALEOZOIC WALK IN VILLUERCAS-IBORES-JARA UNESCO GLOBAL GEOPARK

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Keywords: *geological trail, paleozoic, tourism, Villuercas-Ibores-Jara UNESCO Global Geopark*

The Appalachian-type relief of Villuercas-Ibores-Jara UNESCO Global Geopark is its most representative visual characteristic. Mainly formed of Paleozoic orthoquartzites and lutites rocks, it is considered of global relevance for its geological context under the Spanish Nature Conservation Act.

Geological trails are a powerful pedagogic tool to disseminate geological facts. They provide visitors with direct contact with the geological environment and complementary information about other local relevant features as paleontology, wildlife, history and culture.

A new geological trail close to Castañar de Ibor village lets the visitors enjoy a journey through 100 Ma, moving around in a beautiful landscape of relevant geology. The itinerary starts from the Natural Monument of the Cave of Castañar Interpretation Centre, close to the paleontological deposits of *Cloudina carinata* (the oldest shelled metazoans of the fossil record). It continues through a series of ridges and valleys that are the result of two orogenies and different erosion processes. On the way forward, faults, folds, fanglomerate deposits (“rañas”), contact metamorphism and amazing outcrops of different kinds of rocks, can be observed. The trail is rich in paleontological deposits that witnessed the Cambrian explosion, the Ordovician radiation, the big extinction of the Late Ordovician and the life’s regrowth in the Silurian. The final viewpoint hides a treasure to behold: the canyon of the River Gualija, where ancient shelters called “casitas de papel” (small paper-houses) due to the thin shale sheets used in their walls.

Despite geology and paleontology, this trail goes through olive trees farmlands and riparian forest with living fossils trees as *Prunus lusitanica*, a survivor of the Paleogene-Neogene laurisilva forests, junipers, chestnut trees, oaks, etc. Vultures, black storks, small birds, mouflons and deers can be frequently observed.

The geopark promotes this trail as an important educational and tourist resource.

PARTICIPATION IN THE ITB, THE WORLD'S LEADING TRAVEL TRADE SHOW: A FIVE-YEAR NETWORKING EXPERIENCE TO PROMOTE OUR COMMON GEOPARK BRAND

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Keywords: *ITB-Berlin, B2B, B2C, GGN “Embassy”, GEOPARK destinations*

Geoparks are innovative tourism destinations with an active role to play in the development, promotion and commercialisation of sustainable tourism experiences based on local geodiversity and cultural heritage (geotourism). In the very competitive tourism market, geoparks cannot rely only on well-organised, high-quality services at competitive prices; they also require substantial marketing and promotion. ITB Berlin is one of the world's leading tourism fairs, attracting more than 120,000 tourism and media professionals to meet over 10,000 exhibitors from over 180 countries in a 160,000m² area. Geoparks have been promoted regularly in ITB Berlin in the Pow-Wow Symposia for Tourism Professionals, organized in the Adventure Travel & Responsible Tourism Hall. Since 2012, UNESCO

Naturtejo Geopark has been coordinating the Global Geoparks booth in partnership with several German, European and Global Geoparks from China and Uruguay, some of which, such as Messel Pit, Germany, have World Heritage Sites. In this partnership, which is open to any UNESCO Geopark, the aim is to promote the Geopark brand as an integral part of the tourism trade. Individual geoparks share the high cost of participating in such international events and cooperate to reach a wider audience among the international media and tour operators.

The 30-36m² booth is the main stage for cultural events, educational activities, business meetings, information for trade professionals and the public, and traditional geopark products. The stands are built in Portugal and have won the Best Exhibitor Award several times. This exhibit frequently serves as the first contact between trade professionals and the geopark world, allowing global geopark introductions through personal contact, brochures and the European Geoparks Magazine. In Germany, which is the world's largest market for nature tourism, geoparks that have developed tour packages can speak direct with specialised media representatives and tour operators.

PERGASINGAN, A NEW GEOTOURISM DESTINATION AS NEW SOURCE OF REVENUE WHEN RINJANI CLOSED FOR TREKKING

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Keywords: *geotourism Pergasingan, Sembalun Village, ancient volcano caldera, Geopark Rinjani-Lombok, trekking business operator by local people*

Pergasingan hill is a new geotourism destination in Sembalun, at the foot of Mount Rinjani, aspiring Geopark Rinjani-Lombok. In geology, Pergasingan is the remains of caldera wall of an ancient volcano before Rinjani existed. Geotourism of Pergasingan is a kind of soft 3 hours walk including breakfast in the fresh air on the top as the final destination. On the top, the tourists would see the remains of Sembalun ancient caldera and the majesty of Rinjani Mount. The development of this new Pergasingan walking tour for tourists, has opened up the opportunity to integrate and include all of the other surrounding features including , waterfall, cultural and local products are all integrated. The introduction of the new tours of Pergasingan also offered alternative employment for tour operators, guides, porters and other trekking business operators when Mount Rinjani is seasonally closed.

Sembalun Village, the gateway to Rinjani, is most effected by the introduction of the new offer. With a population of 2.134 people, 586 peoples are farmers and more than 300 peoples are trekking business operator. Previously during ‘trekking-closed time’ (January – March), local people could back to their works as farmers, but this is not the case for people who work purely for the trekking business.

Since Pergasingan opened for tourism in December 2014, the average numbers of tourists was 627 persons per month in January – March 2015 and this increased sharply in the trekking time. Moreover, geotourism of Pergasingan benefits the village government, porter, guide, T.O, restaurant, mini stall owners, even some peoples yards are used for parking. Geotourism of Pergasingan opened by local people after geopark introduced socialization and education. The socialization and education give the significant impact because people are becoming aware that Sembalun is a potential area, rich in geological, biological and cultural heritage and should be developed for their prosperity. Finally, the geotourism in Sembalun is sustainable as it is managed and maintained by the local people.

THE POTENTIALS OF GEOTOURISM OF UPLAND SYNCLINES IN ZAGROS MOUNTAINS

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Keywords: *geotourism, Fars, Ghalat, upland synclines, Zagros*

The Zagros Mountains in Fars Province contains exclusively beautiful geomorphologic specialties such as upland synclines. From the morphological view, the cause creating such as significant phenomenon is morphotectonic. In addition the work of erosion has created upland synclines, being sheared apart by the fault beautiful tectonic landscapes. Some of them such as Ghale Mountains, having the shape of two high towers, culminate right from the Marvdasht plane and narrow up towards the top whilst the Ghalat upland syncline has a beautiful natural landscape. Neighbouring some of these with the historical monuments and cultural reserves of international importance, such as Persepolis and Pasargadae, where a variety of ethnic groups and attractions of tribal life, as well as the mineral and fossil reserves of the province, cause the region to become one of the most important sources of tourism not only in national but also in an international scale.

Considering the importance of geology and the exclusiveness of some phenomena, the aim is to preserve this heritage, according to sustained growth framework. It is also necessary to prepare welfare facilities for those who would like to travel and visit these historical, cultural and geomorphological heritage sites. In this article it is tried to introduce the most beautiful upland synclines of Fars Province and their effects on geo-tourism industry development.

PROMOTING COMMUNITY DEVELOPMENT IN DANXIASHAN GEOPARK

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Keywords: *geotourism, cultural tourism, sustainable development, local products*

There are more than 30,000 indigenous people living in 76 villages in Danxiashan and surrounding areas. They are mostly engaged in agricultural activities such as fruit and tree cultivation. They are characterized by lower income and living standards when comparing with the urban residents. However, villages near the main entrance of the park, such as Yaotang, Dusanshi and Qinghutang, have greatly benefitted by the positive results of the geopark development, becoming a successful example to be shared with others.

In the development of the geopark, the local residents have been participated actively to plan and establish Danxiashan Geopark. With the support of the geopark authority, the rural infrastructure has been upgraded, leading to village renovation such as improving, design of village houses, promoting environmental hygiene, cleaning and beautification of the villages. To support the geopark development, motels, hostels and restaurants with special characters are set up to provide necessary services to the visitors. The villagers modify the traditional agricultural production mode and adapt to the changes brought about by the geopark development particularly to be part of the tourism industry as well as participating to protect geological relics and ecological environment so as to play an important role in the park's management, operation and services.

A RECIPE OF TWO INGREDIENTS: GEOLOGICAL HERITAGE AND GASTRONOMY (TERRAS DE CAVALEIROS GEOPARK, PORTUGAL)

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Keywords: *gastronomy, geodishes, geotourist, economic and touristic development*

The Terras de Cavaleiros Geopark, located in the heart of the region of Trás-os-Montes, has to offer a gastronomy as rich as its geological heritage. In addition to the geological history of more than 500 million years, the tourists will remember the smells, the flavours and the “hospitality at the table” once they have tasted it.

In March 2015, the Terras de Cavaleiros Geopark Association (TCGA) invited all hotels and restaurants of the territory to participate in an awareness activity and in a field trip to the Geopark’s geosites. The participants had the opportunity to learn about the reasons for the creation of the Geopark as well as its objectives, in order to be able to pass on this information to their guests.

In June 2015, the TCGA organized a Gastronomic Festival with 26 restaurants of the territory, who offered Geodishes – dishes inspired by the geology of the Geopark. The Geopark aims to implement as many dishes as possible in the menus of the participating restaurants. With a small description of the dishes’ names the tourists should get curious to visit the geosites that the dishes are named after, since it is at the table where many times the tourists start to discover a territory formerly unknown to them.

Following this strategy the TCGA wants to promote its territory, in particular its geology, while at the same time highlighting its gastronomy, thus giving a boost to its economic and touristic development.

ROCKS CREATED BY HUMAN CULTURE: THE ARTIFICIAL MARBLE OF RIMA - VALSESIA

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Keywords: *intangible heritage, local products, local history, human living treasure*

The history of the artificial marble begin in the second half of eighteenth century putting together plaster art, geology, architecture, emigration and local development. In Rima, a small village on the slopes of Monte Rosa (Italian Alps), the old plaster art, developed in the north of Italy in XV century became a thriving industry, able to impose itself throughout Europe. The reason of this success was the unique ability of Rima's master to perfectly reproduce any kind of natural marble. The creative process implies many different phase that in a way reproduce the real petro-genetic process, by means of cracking, stretching, injecting, melting, etc. The artificial marble industry reached its peak in the first years of XX century, followed by a long period of decline. At the end of XX century the artificial marble techniques was in danger of extinction: a sole master, Silvio Dellavedova, was keeping alive the Rima's tradition. Fortunately a new wind started to blow in XXI century. The Rima community, the municipality; the local and regional administrative body decided to invest their effort to give a new future to these ancient techniques. Nowadays a new generation of masters, all former students of master Dellavedova, continues the tradition, and teaches to other students the techniques in the new Artificial Marble school, that also host a small museum to show to the general public the artificial marble techniques and its history.

ROKUA GEOPARK DEVELOPS ACTIVELY THE LOCAL ECONOMY

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Keywords: *local economy, tourism product, local companies, geofood*

Rokua Geopark has an active role in developing the local economy of its region. After its founding in 2010 the Geopark has gathered a group of forty five local companies to promote and develop the services and products of the area under the Geopark visibility. The companies ranging from tourism service producers to the local hardware store have applied to join the group and by doing so they have agreed to follow and respect the Rokua Geopark rules of cooperation.

The joint activities are diverse ranging from meetings and product development to joint marketing. In the monthly open meetings the companies gather to learn from each other's and to hear the latest developments in the region. In 2015 Rokua Geopark joined the VisitOulu marketing company with a full membership granting the Geopark and its businesses visibility in the marketing of Oulu region.

The companies form one of the three Rokua Geopark Action groups and thus are able to have their say in how the Geopark is developed and what kind of activities it needs to do. For the moment the most important tool for development is the Attractive Oulu Region 2018 ERDF project in which the companies develop and market their tourism products in cooperation with tourism market professionals from Central Europe, China and Japan.

Interesting new product developments for the moment are the new activity products like the under ice diving experience in which divers are taken to dive into the ice age shaped kettle hole ponds in freezing winter conditions. Other new developments are the food products the companies are developing under the Geofood brand. In Geofood products the geological story behind the locally grown and produced food is given a strong emphasis.

SEEING A GLOBAL GEOPARK THROUGH INDIGENOUS AND GEOLOGICAL EYES: THE FUNDY RIFT, HOME OF KLUSCAP

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Keywords: *Nova Scotia Department of Natural Resources, Confederacy of Mainland
Mi'kmaw*

The Mi'kmaq of Nova Scotia embrace the concept of 'Two-Eyed Seeing' – indigenous and non-indigenous perspectives informing and complementing one another. Such a vision is embraced in the Fundy Rift Aspiring Geopark in Nova Scotia, which is both a crucible of Pangean geology and sacred home of Kluscap, the principle deity of the Mi'kmaw people. Dramatic seascapes and coastal cliffs record the breakup and life of Pangea in the late Triassic and early Jurassic periods. Early dinosaurs and their predecessors continue to be revealed by the waves of Fundy, as are superlative examples of the flood basalts of the Central Atlantic Magmatic Province that poured forth as lava as the Pangean supercontinent ripped asunder. These flood basalts proved to be harbingers of one of life's mass extinctions at the close of the Triassic. This dramatic sea and landscape also tells the creation story of Kluscap, his exploits and family history shaping the islands, headlands, capes and sea stacks, and the very Bay of Fundy, home of the world's highest tides. The rocks provided its people hematite for red ochre, basalt for sweat lodges and fire hearths, and much more. So vital is this place to the Mi'kwaw culture that one basalt island particularly central to the Kluscap legends is called Wa'so'q – in English, "Heaven". The Fundy Geopark is imbued with this rich tapestry of cultural and geological storylines, both of which call the visitor to these shores to ponder the wonder and history of our planet Earth in this sacred and special place.

SETTING UP INDICATIONS OF THE ECONOMIC EFFECT FOR THE REVALIDATION OF THE KOREAN GEOPARK

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Keywords: *geopark, economic effect, indicators, revalidation, sustainable development*

The Korean national geoparks have been certified since 2012 and now some of them are waiting for their revalidation. Though there are many things to be inspected, many people simply want to know whether or not there is a real economic effect created by the operation of the geopark. Also, as local governments have allocated large sums of money to its geoparks, the evaluation of economic effect is really important in terms of its promotion.

The economic effect, benefit or impact of each geopark was measured by several methods such as the Scarborough Tourism Economic Assessment Model (STEAM) used in the Fforest Fawr Geopark or questionnaire survey used in Langkawi Geopark, Malaysia etc. While these are good methods to see the state of the effect or impact of geoparks, we can not be sure whether or not it is truly sustainable to the local area. So we need a more reasonable tool to be used in evaluating the sustainability.

Generally, the economic effect, benefit or impact can be measured using the parameters such as baseline data, input, output, outcome and target etc. For example, the impact is the amount of outcome minus baseline, effectiveness and efficiency are the ratios of outcome to baseline, output to input, respectively, and the performance is the ratio of outcome to target etc.

With the above basic concept, we are now selecting some indicators or indices to be used in the test of the sustainability of geopark which will be used in the revalidation of each geopark in Korea.

THE SOIL MATTER THE STRONG RELATIONSHIP BETWEEN GEOLOGY AND WINE

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Keywords: *Alto Piemonte, supervulcano, terroir, wine*

Geoparks are not only about geology. The purpose of a geopark is to explore and develop the link between geological heritage and all the other aspects of the area's natural and cultural heritage. In the last years Sesia Val Grande Geopark has worked hard to study, develop and celebrate the extraordinary relationship between geology and wine.

The Alto Piemonte wine region, unless the limited size, presents a wide geodiversity, reflected directly in the great variety of wine and denomination. In few kilometers the rhyolitic lavas of the supervulcano give way to Pliocene marine sand or to Pleistocene alluvial deposits. Recent moraines or Triassic carbonates enrich the soil diversity, generating a truly unique terroir.

In the last years Sesia Val Grande Geopark has organized many public conference, wine tasting event and field trip to explain the strong relationship between rock, soil, climate, human heritage and finally wine. Moreover starting from this year, thanks to an active collaboration with Italian Universities we launch a new research project to “geologically” characterize wines.

The goal is to demonstrate that the geological heritage of a wine glass is clearly present and detectable. Moreover the system could become a standard to prevent fraud and sustain the local wine producers.

SPORTIVE EXPLORATION OF NATURAL, CULTURAL AND GEOLOGICAL SITES

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Keywords: *geotourism, regional development, community participation, involving stakeholders, active engagement*

Mountainbike trails in the German UNESCO Global Geopark Bergstraße-Odenwald - Situated between the Rhine-Main and Rhine-Neckar metropolitan regions, the UNESCO Global Geopark Bergstraße-Odenwald represents an ideal destination to explore nature and find relaxation in enjoying sportive elements. With its variety of low mountain range landscape (constant change in elevation) and geological highlights, the Geopark offers many opportunities for hiking and mountainbiking.

On proposal of local bikers and cycling clubs the Geopark's management body started implementing a network of circuit trails for mountainbikers in 2011. Within four years 38 trails were established, offering more than 1.000 kilometers of marked tracks. Courses of different length and difficulty have been chosen to enable and motivate bikers of every training level to visit the region.

In addition to the consisting hiking and Nordic walking trails, the MTB network acts as binding element of the overall Geopark infrastructure highlighting natural, cultural and geological sites: e.g. Geopark-trails and so called Geopoints. The website www.mtb-geo-naturpark.de contains all specifications of the trails: length, altitude, difficulties, but also references to historic, natural & cultural sites, as well as restaurants. Guided tours are available with local Geopark-on-site-Guides, special MTB events are carried out throughout the year.

Developing the trails required an intense coordination process with concerned stakeholders like local authorities, forestry administration, hiking clubs and leaseholders of hunting grounds. Volunteers are in charge of the local trails, manage the monitoring and renew missing marking signs.

The mountainbike project is seen as best practice and attracted attention far over of the region. Especially the community participation and involving all stakeholders at an early stage raises acceptance for a sport, which becomes more & more popular. Furthermore, possible conflicts can be avoided between different visitor groups to guarantee recreation and adventure in nature for everyone.

TOURISM AND EDUCATIONAL ENHANCEMENT OF THE MONT BROUILLY'S GEOSITE

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Keywords: *Beaujolais, Mont Brouilly, geosite, geotourism, sustainable development*

Mont Brouilly is a 484 meters high hill located in the middle of the Beaujolais vineyards apart from the rest of the mountain area. Cultivated on its slopes, the cru “Côte de Brouilly” holds its particularity from a corneal dioritic-based rock locally called “blue rock” which composes the mount. Several small quarries illustrate phenomenon of magmatic oceanic affinity.

This iconic site is like a beacon in the Beaujolais landscape, well known by all the inhabitants. Mont Brouilly played a significant role in the lives of indigenous people: it was both a place to work and live. Gradually abandoned, the site has deteriorated until the Pays des Brouilly (gathering of the six villages surrounding the hill and local winemakers) joined in 2011 the international network of the vineyard landscapes, named Charter of Fontevraud. This charter is based on knowledge, preservation and the importance of vineyard landscapes, most of which are located in France and Switzerland.

Shortly after, the Geopark project was launched in Beaujolais and Mont Brouilly became a major geosite thanks to its many values (geological, natural, economical, historical, cultural...). Then, the project of site development has included a specific space for the scientific mediation of the local geology (a geoscope, few interpretive panels and landscape reading).

The whole project shows a very good example of what a geosite can be in a Geopark. In addition to the tourism and educational enhancement of the site, the management was carried out in respect of values of sustainable development (using local resources, participation of local populations, sawing on site and horse skidding).

Today, thanks to the Geopark project, Mont Brouilly is again a lively place where locals and tourists can find relaxation areas, equipments to discover the geological heritage, interpretive trails inviting to rediscover the history of this hill.

VOLCANIC TOURISM IN ASO UNESCO GLOBAL GEOPARK

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Keywords: *active volcano, conservation, national park, volcanic tourism, safety*

Aso Geopark possess a gigantic caldera which is formed by a super eruption occurred about 90,000 years ago and an active volcano. Clear view of the caldera formation reminds us huge impact of the past super eruption. Unique culture formed by humans who has lived in harmony with the volcano. Aso was highly credited as an educational place to learn about activity of the Earth and the cohabitation with its forces, thus integrated to GGN in 2014.

Various geo-tourism courses over 33 Geosites within the Geopark were developed together with local community, NPO and the government by considering its safety and conservation. Among the sites, active Nakadake crater is a popular destination for tourists and educational travels. Visit to the crater has been carried from long time ago for religious reasons. However it becomes more popular for tourism since 1930. From about 200,000 visitors in 1930s have increased to 1 million at present annually. Tourism is successful because of well monitored systems on volcanic activities and several environment improvement projects. Zone management system includes 24 hour volcanic gas monitored sensors around the crater. The entry in the zone is only restricted where the SO₂ concentrations exceed the set out values. Moreover, for the case of eruptions, evacuation drills and training workshops are held regularly with the community.

Regarding conservation, the majority of Aso Geopark area lies within Aso Kuju National Park which is managed by Ministry of the Environment. Nakadake Geosite is designated under the National Park Law as a special protection zone. Modifications to geological features and collection of wild plants and resources are strictly regulated to preserve the landscape near to primitive state. Therefore volcanic geological formation and unique ecosystem can be seen.

Aso has actively carried improvement on safety and conservation on geological sites, and develop volcanic tourism to achieve better understand story of Earth's activity.

ZIGONG UNESCO GLOBAL GEOPARK: A CREATIVE CULTURAL INDUSTRY

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Keywords: *geoparks cultural industry, Zigong Geopark*

Zigong UNESCO Global Geopark is a typical urban territory, located in Zigong city, the southern part of Sichuan Basin, South-west China. About 2000 years ago, ancestors here found salt brine of the Triassic Period and drilled deep well to produce salt. Then the splendid Zigong salt culture were created, leaving abundant salt relics and annual Zigong Lantern Festival. The prosperous salt industry made the city thriving, people from various places gathered here.

An American geologist, George D. Louderback found the first piece of dinosaur fossil here in 1915, which opened the discovery of Zigong dinosaur fossils. Zigong is praised as the salt city, dinosaur hometown and southern lantern city. In this context, Geopark embraces all the natural and cultural relics and take good advantage of them.

Today, Zigong produce 3000,000-ton rock salt every year, accounting for 97% production of the whole country. With good understanding and practice about UNESCO Global Geoparks Programme, Zigong steadily transfer from heavy industry to tertiary industry, and in this sense a new creative Geopark cultural industry is beginning to take shape.

The Geopark plans different geo-tourism products crisscross with salt relics, fossil sites, and other natural and cultural resources. Already is created a unique Geopark industry, affording science education, promoting publishing and itinerant exhibitions. Furthermore, cooperation with local enterprises have been developed and a series of salt products, mechanical dinosaurs and colorful lanterns have been developed and produced.

Nowadays, the Geopark it has its own special stories through cartoons and Geopark-related productions. In this context, our practice indicates that develop a Geopark cultural industry could be a good way for bold approaches, especially for those cities with heavy industry.

THE EMERGING ROLE OF LOCAL COMMUNITIES (FOCUSING ON WOMEN) IN GEOTOURISM OF ASPIRING QESHM ISLAND GEOPARK

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Keywords: *Geotourism, Womens Empowerment, Community Involvement, Cultural Value Conservation, Intangible Heritages*

Tourism has the potential to contribute to greater gender equality and the empowerment of women. Tourism offers women opportunities for income-generation and entrepreneurship. Tourism involves social and economic activities in which women can play a crucial role.

Qeshm Island, located in the Persian Gulf, is the biggest island in Iran. The people follow traditional lifestyle, customs and religious beliefs. The women in this rural environment do not normally go to school and are responsible for maintaining home and looking after children, though sometimes they farm. They do not have mostly an important role in society. Becoming a Geopark resulted in a number of changes and it has expanded the role of women in society, by support of various organizations. One of those who have been working hard is the Department of Qeshm Island Geopark. The most outstanding intervention involved with women is to produce handicrafts and sell them to tourists. They are very skilful, but their handicrafts were not recognised beyond the island. As the results of continuous efforts to motivate women, more women have started to show their presence, utilising their traditional skills and knowledge. Consequently, women recognize ways to earn money and contribute to the household income, and some of them establish cooperatives to support each other. Nowadays many visitors in the Geopark buy the local handicrafts as souvenirs. The women in Qeshm now serve as role models for other villages and even provinces. Today, Qeshm is exploring new ways to meet the needs of women and encourage them to play an even more important role in the Geopark.

To support those women's initiatives, more active involvement with tourism businesses will be promoted by utilising local women's traditional knowledge such as local medicine and cuisines. It will also contribute to preserve the cultural heritage of the local communities.



Geotourism, Cultural Tourism, Sustainable Development and Local Products

Poster Presentations



AIK BERIK VILLAGE AS A PILOT PROJECT OF GEOTOURISM IN GEOPARK RINJANI-LOMBOK

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Keywords: *Aik Berik, geotourism, pilot project, women in geoparks, Geopark Rinjani-Lombok*

Aik Berik Village is one of geosite in Geopark Rinjani Lombok. There are some waterfalls that have high scientific and cultural worth such as Benang Stokel, Benang Kelambu, Tiara Dewi Anjani, Pengkelep Udang dan Sesere. Not only geology and culture, Aik Berik area even has biological diversity and interesting for tourists and scientists. Besides having geological, biological and cultural diversity, Aik Berik has some reason to be a pilot project in developing of geotourism in Geopark Rinjani-Lombok.

With the enactment Geopark Rinjani as a National Geopark in the end of 2013, the number of visits to Aik Berik increased sharply from 43,334 people in 2013 became 93,979 people in 2014. The awareness of potencies, the natural heritage and the spirit to go forward from housewives to village government and its location that not so far from Mataram City (ease coordination) were the other reasons why Aik Berik appointed as a Pilot Project.

In Aik Berik a working group for geosite management was formed and four program/geotourism package plans will be developed. Furthermore, geotourism development has involved many women as the agents and driving force in tourism. The women's group in Aik Berik has developed a processed food product from the plantation crop in the area and are even involved as guides and female motorcycle's drivers also support the syariah tour program.

In fact, Lombok has been recognised as World's Best Halal Tourism Destination and World's Best Halal Honeymoon Destination in 2015. So, in addition to being a site in the geopark, Aik Berik is a syariah tour destination. If this Pilot Project is successfully developed, the domino effect will be felt by many people and will inspire other geosites in Geopark Rinjani Lombok.

BASE STUDIES FOR THE PROMOTION OF A HIGH-QUALITY GEOTOURISM IN THE TOURIST STATE PARK OF ALTO RIBEIRA (BRAZIL)

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Keywords: *geoheritage, carrying capacity, geotourism, Tourist State Park of Alto Ribeira, Brazil*

The Alto Ribeira Tourist State Park (PETAR) is located in the Ribeira River valley, in the Brazilian State of São Paulo, and it is one of the main tourist destinations in southeastern Brazil. Its scenic beauty combines the Atlantic Forest (included in the UNESCO's World Heritage List) and caves with a large variety of speleothem systems. The main lithological types in the study area are Cenozoic sedimentary deposits, Jurassic-Cretaceous basic dykes, Neoproterozoic to Cambrian granitic and metamorphic rocks. The carbonate rocks and their varied compositions are responsible for the regional karst systems, the Açungui Speleological Province. Given the high geodiversity of the region, this project currently under development, aims to: (i) refine the inventory of geological heritage in PETAR, carried out in 2014 by the Geological Survey of Brazil (CPRM); (ii) quantify both the value and risk of degradation of these sites; (iii) identify and characterize the target audience and the tourist offer of the region; (iv) calculate the carrying capacity of geological sites; and (v) produce contents for the geological interpretation, integrating the cultural heritage and other aspects of the natural heritage in order to promote a high-quality geotourism in the region. At the end of this work, it is expected that the carrying capacity assessment of geosites will contribute as a management tool for the tourism planning in PETAR and its surroundings. Moreover, it is also expected that the introduction of a proper geological interpretation of these sites will contribute to the safeguarding of PETAR's geoheritage, to the sustainable economic development of the region and to the dissemination of culture and geoscientific knowledge.

BLENDING NATURE AND CULTURE IN DESIGNING OF FACILITIES IN GEOPARKS

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Keywords: *conservation, geoparks design, geotourism*

A UNESCO Global Geopark is a kind of heritage site that is highly attractive to the public. Visitors to each UNESCO Global Geopark need some necessary recreation facilities, such as small service structures, paths, interpretation system, seats, and other facilities. Those facilities actually affect the experience of the tourists, and at the same time, are an interference with nature, including the topography, the vegetation, and the ecological system. First of all, how can UNESCO Global Geoparks merge with nature, minimize the influence and interference to the nature? It is the crucial criteria of the plan and design of the recreation facilities in Geoparks. With regards to the volume of recreation facilities, the amount, scale, style, material, colour, and technique of those recreation facilities should adapt with the local specific environment, be harmonious and unified with the natural landscape so as not to cover or damage the aesthetics of nature. Another important point is to use the natural characteristics and cultural originality in the design of the facilities, which will make the Geoparks more familiar, enhance the interest of the tourists, and promote the understanding of the public on the Geoparks, including the geological value, the flora, the fauna, the environment and the local culture.

This paper will discuss how to ensure that recreational facilities blend with nature and culture in Geoparks. In some instances examples of different types and from different regions will be given. Appropriate and distinctive recreation facilities will contribute to the conservation of the Geoparks, and will be a representation of modest creativity of mankind, which express the respect to the nature and the indigenous culture.

GEO-BRANDS: EARTH FRIENDLY AND EDUCATIONAL BRANDS IN GEOPARKS

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Keywords: *geo-brand, geo-logo, local product, geo-knowledge, geoparks*

Destination branding (DB) is considered as one of the most important and effective strategies in the marketing area of tourism destinations. Nowadays, geoparks are new tourism destinations for who are especially interested in earth sciences. As geoparks are a sustainable model in protected areas their activities should minimize the negative impacts on the ecosystem. Therefore, geoparks should take advantage of national or international certification brand or Eco-labels for their products, services and activities. In two recent decades with the emergence of geotourism and geoparks new concepts of “Geo-brand and Geo-logo” (an earth friendly brand creating an image that identifies geo- heritage of a territory) entered tourism marketing.

Geo-brand and Geo-logo on one hand help a quality product stand out in the market, and also allow customers to recognize and choose the products with a low negative impact on the environment. On the other hand, they can guarantee and support entrepreneurs, small and medium size businesses, products and services. Furthermore, geopark advertising logos on a product in the form of a special geo-phenomenon stimulates consumers’ curiosity and encourage him/her to think more about that phenomenon and completes their information.

The presented study deals with the use of Geo-logos in geoparks according to the integration of their geo-heritage. Data for this study were collected through a questionnaire and among the geopark web sites.

Among 87 geoparks, 51 geoparks use a logo with one topic (36 geological, 4 special animals or planet spices, 11 nature and culture). 24 geoparks use a logo with two or three subjects (one of them is geological).

In conclusion, it can be stated, thatgeo-logos in geoparks are not only effective strategies in the geotourism marketing but also tools for geo-knowledge transfer.

GEOPRODUCT STRATEGIES IN THE QESHM ISLAND ASPIRING GEOPARK

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Keywords: *geoproduct, Qeshm, Iran, geopark, local community*

One of the geoparks aims is to empower the local community economy alongside the introduction and promotion of the earth science concepts. The production of Geoproducts has created new employment opportunities for the local community, the revival of hand crafts and promotion of local culture, increasing income, etc. It also can acquaint visitors with the cultural and geological characteristics of geopark.

Qeshm Island Aspiring Geopark over the past year started to develop the first geoproducts standards based on the national, local and Halal criteria. The standard concerns elementary requirements of geoproducts production and commercialization, including: health issues, determining the origin of raw materials, controlling unallowed materials to use in the production, proper packaging, etc. Those interested in the geoproduct production, have to undergo inspection by geopark staff to ensure compliance with the standards and product quality grading checks. Once approved producers, will receive a certificate. Among other steps, new geoproducts have been designed and produced based on natural, cultural and geological elements in the geopark with the help of artists and experts. In addition, existing products have also been optimized (quality improvement, package reformatting, adding the interpretative contents, etc.)

Finally, along with the geopark goals, training courses and workshops have been held for women and school children to participate actively in designing, manufacturing and packaging geoproducts, to gain economic benefits, as well as learning more about geopark and geoproducts concepts. Separate workshops or briefing sessions are held for local producers, tour operators and local tour guides, geopark partners, crafts shops, and also for hotels and restaurants to make them aware of the benefits of cooperation in the field of introducing and selling geoproducts.

At present there is an increasing demand from local producers to join this program; it is a proof of achievement for the Qeshm Island Aspiring Geopark Goals.

GEOTOUR ASSOCIATED LOCAL FOLK TALES WITH EARTH SCIENCE – THE FOLK TALES GEOTOUR

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Keywords: *folk tales, local recite's group, Unzen Volcanic Area UNESCO Global Geopark*

There are many folk stories in Japan that have been passed from generation to generation. In general, most of the contents described in folk tales are unscientific and unreal. However, folk tales become very excellent tools for geotours because folk tales describe culture, history and lives of local inhabitants. Some of them also express impressive experiences of natural phenomena; i.e., natural disasters such as volcanic eruptions, earthquakes, tsunamis and so on. Folk tales, therefore, have played an important role to hand down experiences of big disasters and great nature to the next generations in Japan where natural disasters happen frequently.

The Council of Unzen Volcanic Area Geopark have held brand-new types geotours using local folk tales, collaborating with a local reciter's group "Ariake Douwa no Kai Kusunoki" in 2014. Geotours using folk tales were held 2 times and 56 people with wide generations from 7 to 80 years old participated. In the geotours, first a reciter introduced the folk tales concerning the geosite being visit

ed. After the introduction, staff of the geopark office explained the real historical episodes described in the story and the earth scientific significance about the geosite. By performing this story telling and explanation at several geosites, participants could recognize the relationship between local culture, history and earth scientific significance easily, as well as natural disasters happened on historical age in a living area. In this poster, we show examples of scientific description including in folk stories and introduce the achievements of the geotours.

GRUTAS DEL PALACIO GLOBAL GEOPARK: FIRST NATIONAL GEOTOURISM WEEK IN URUGUAY

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Keywords: *geotourism, Grutas del Palacio Global Geopark, Uruguay*

During the Easter week in Uruguay, the Grutas del Palacio Global Geopark organized the First National Week of Geotourism. The national interest of the Ministry of Tourism was declared and counted with the University Geological Institute didactic materials and technical support. Six different field trips to geosites (one per day) and all week rock and mineral exhibition in the Wildlife Reserve were the main activities. The fully technical staff and guides resources of the Geopark attended these activities too.

Both field trips and exhibition were accompanied by eight geology university students and the supervision of the Geopark geologist. The field activities attempt geological features, landscapes explanations, rock and mineral associations, geological history and cultural heritage of each geosite. Previous national press media communications explains almost 850 visitors in the field trips. About two hundred were from southern Uruguay. More than 250 people could observe and talk about several geology concepts with the students in the exhibition.

Some other activities like two boat travels by Negro and Yi rivers, ceramic artist atelier visit, a field theater show by a local amateur group, handmade typical food tasting by local women's community were extremely approved by visitors. Also this was a very good formation opportunity for the geology student group because the possibility to share and communicate Earth's geological story to public. For the Geopark coordination committee it was a great challenge and very good experience to evaluate the organizational capabilities. Surely, it will be more Geotourism Weeks in the future.

INTRODUCING DINOSAUR TRACKS TO VISITORS IN EUROPEAN, ASIAN AND NORTH AMERICAN UNESCO GLOBAL GEOPARKS

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Keywords: *dinosaur, tracks, Jurassic, Cretaceous, geotourism*

Dinosaur tracks show dinosaurs were living creatures and provide us with information about what they did, where they did it, and how they did it. Dinosaur tracks are normally preserved in situ, in open-air sites, so they provide opportunities for local development in natural areas, as in geoparks.

Three UNESCO Global Geoparks – Maestrazgo (Spain), Yanqing (China) and Tumbler Ridge (Canada) – use their tracksites to foster regional sustainability by means of geotourism. They provide facilities and activities to help visitors learn about and enjoy the unique dinosaur fossils in their original geographical and geological location.

In Maestrazgo, seven dinosaur tracksites have been declared “Property of Cultural Interest”, the top level of protection under Spanish Heritage Laws. In the village of Galve, two Late Jurassic sites have been set up for free visits, in the municipality of Miravete, a trail has been built, and the town of Abenfigo was the destination for the “Spanish day of geology” in 2010.

The Qianjiadian Scenic Area of China’s Yanqing Geopark has interesting Late Jurassic tracksites, with a dedicated visitor centre and information signs on site.

In Canada’s Tumbler Ridge, there are several Late Cretaceous tracksites featuring ankylosaur and theropod tracks, including the only known tyrannosauroid trackways, and large ornithopod (hadrosaur) trackways, with skin impressions. In addition to a palaeontological museum, there are several trails and activities, such as tracksite lantern tours, which focus on these tracksites.

In both Maestrazgo and Tumbler Ridge, tracks have been discovered in active quarries (clay and coal, respectively), so palaeontologists regularly survey the mining works. A paleontological visitor centre in Galve displays some original tracks recovered from a quarry.

Thanks to contacts established through geopark cooperation, palaeontologists from all three geoparks are currently collaborating in scientific research and sharing information on how to manage dinosaur tracksites.

MARS-RELATED ROUTES IN LANZAROTE AND CHINIJO ISLAND GLOBAL UNESCO GEOPARK

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Keywords: *geo-education, geotourism, Lanzarote, Mars, planetary*

Volcanism and liquid water-related processes were particularly important and active on Mars during the first stages of evolution of the red planet. Some Martian areas show widespread evidence of hydrovolcanism and hydrothermal activity. The study of earth analogs has been demonstrated as an extremely useful way to help the understanding of planetary processes, test instrumentation and scientific models and also for promoting geoeducational and geotouristic activities. Several areas of the Canary Archipelago have been (and are) used as analogue sites for performing studies in relation with the exploration and research of Mars and the Moon. Specifically, the Lanzarote and Chinijo Islands Global UNESCO Geopark (Canary Archipelago) is, to our knowledge, the only one which comprises the evaluation and characterization of some specific areas as potential analogs for the geological and astrobiological exploration and research of Mars. In this framework, four “planetary routes” have been identified and defined in the Lanzarote and Chinijo Islands Global UNESCO Geopark. These routes are located at the areas of Caldera Blanca, El Golfo, Montaña Señalo and Tinguatón and are proposed, for the first time, as worthy geological-planetary examples, which will be incorporated to the more classical features of the geopark. Different types of ancient and modern volcanism-water interactions are well represented in the routes: hydrovolcanism, mineralizing hydrothermal activity and water venting episodes, erosive surficial run-off (ruts and gullies) and a lake. This contribution outlines the main characteristics of the routes, stressing their scientific, geoeducational and geotouristic potential.

MONGOLIAN CULTURAL TOURISM IN HEXIGTEN UNESCO GLOBAL GEOPARK

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Keywords: *Troodos ophiolite, oceanic crust, geosites, geotourism, Cyprus*

Hexigten Global Geopark is located in Hexigten Banner, northwest of Chifeng City in the eastern Inner Mongolia Plateau. During eleven years of construction, HGG has played an important role in the development of Mongolian culture, making some progress in cultural tourism, sustainable development and local products.

The area as a whole is culturally rich with ancient and simple customs even the name Hexigten is a Mongolian word, meaning Genghis Khan's guards. In order to promote the local cultural tourism, HGG hold a series of activities every year such as Grassland Culture Tourism Festival, Obao Fete, Winter Camel Festival and Dalai Nur Lake Winter Fishing Festival. At the same time, Mongolian food, clothes and handicrafts jumped into popularity.

Nomad life experience, Mongolian song-dance performance, Mongolian entertainments, etc. popularize the Mongolian cultural tourism as well as increasing employment rate.

All the things make a contribution to the spread of Mongolian culture and territorial economy.

MOUNTAIN, LAKE AND ANCIENT CITY

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Keywords: *unique geological relics, glacial landforms, ancient city, fault subsidence lake, sustainable development*

Dali Mount Cangshan UNESCO Global Geopark is located in the junction of Hengduan Mountains and Yunnan-Guizhou Plateau, covering an area of 933 square kilometers. Due to the unique geological relics and the profound history, the geopark became a member of Global Geopark Network (GGN) in 2014. Mount Cangshan is a metamorphic mountain with superlative natural beauty. At the top of the mountain which is more than 4000 meters, cirques, knife-edges crests and glacial erosion lakes are widely distributed. From top to bottom, we can view four seasonal landscapes at the same time. Along the Yudai road, the colorful marbles show unique rocks' beauty. In the piedmont, an ancient city tells its legend 25 nationalities here are making history. Through the pastoral scenery, the fault subsidence lake(Erhai Lake) measuring 42.58 kilometers long comes to our eyes, echoing Mount Cangshan which is 2000 meters higher. Mount Cangshan, Dali Ancient City and Erhai Lake formed an amazing picture which includes geological relics, natural scenery, culture and history. The local population here enjoy happy lives, the tourists here can also enjoy the leisure and entertainment time and have a visual feast, all of which can promote the sustainable development of Dali Mount Cangshan UNESCO Global Geopark.

THE ROLE OF INFRASTRUCTURE DEVELOPMENTS ON QESHM ISLAND GEOPARK GEOTOURISM (CASE STUDY STAR VALLEY GEOSITE)

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Keywords: *Qeshm Island Geopark, infrastructure, geotourism, geosite, Star Valley*

Qeshm Island has long been one of Iran's tourist areas and a lot of tourists travel to the island from around the country every year. Development of tourism infrastructure as well as local and rural tourism development has been one of the goals of the Geopark which in turn results in economic, social and cultural developments of rural and local communities.

This research demonstrates the effect of infrastructure development and the impacts in Qeshm Island Geopark from Geotourism at the Star Valley geosite. The main objective of the study was to assess the overall condition of the geosite from visits during a 7-year period and to compare and provide analysis to tourism infrastructure organization with respect to the Global Geoparks criteria.

Investigating the number of visitors to Sitar Valley geosite between 2009 and 2015 shows a growing number of specialized native and foreign visitors and with a satisfaction rate of 93%, April is the most visited month in 2015.

THE SEA AND BIG MODELS FOR MANAGING GEOSITES AS RESOURCES FOR LOCAL COMMUNITIES

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Keywords: *geotourism, geosite, geopark, management, community*

The Geopark concept becomes a reliable approach for territorial development and more and more effort is being invested in identifying, classifying and comparing geosites. In practice the main challenge is not to identify and quantify geosites, but to make them work towards achieving the goals of a Geopark: environmental protection, education, heritage conservation and social, cultural and economic sustainable development. A first important milestone is to anchor the conservation of the geological heritage and the initiative of its sustainable use within the local community.

We propose two complementary geosite management models that consider the possible economic and socio-cultural impact of the sites on the local community. A positive impact will generate a sense of local ownership and pride. This in turn assures the local support that is needed for conserving and using the sites. Our SEA (Science-Education-Aesthetics) and Big S (Big-Story) management models take into consideration this impact, and separate potential geosites in attractor and non-attractor sites (from a visiting point of view). This helps identify which sites are already grounded in the local consciousness and already generate a good a priori perception for visitors. By taking into account the two management models and the spatial distribution of potential geosites, the a priori perception of the SEA model sites can be used to include the Big S model sites in the economic and socio-cultural networks. In turn, the Big S sites contribute to the overall experience and to the a posteriori perception of visitors. From a touristic and economic point of view, the SEA geosites attract visitors, and the Big S geosites improve their experience and likelihood to return. This ensures an optimal and integrated management of the sites, and supports both attractor and non-attractor geosites in having positive economic and social impact on the local communities.

WINE-TOURISM IN THE LUBERON GLOBAL GEOPARK

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Keywords: -

Since 2011, in collaboration with the wine industry, including the Luberon's wine label organization, the Luberon Natural Regional Park has set up a wine-tourism approach. Building on existing local initiatives and national movement of wine tourism, the Park has created an identity, a logo, a wine tourism map, conducted qualification actions of the offer and collaborated with the tourist offices etc ...

As part of the Geopark it animates, the Luberon Natural Regional Park leads with interested professionals a project of understanding and appreciation of the relationship between viticulture and geology, in order to continue their roots in the territory. This knowledge already exists in the professional environment; it is generally expert but is also primarily local, empirical and wears most often on the floor and not the basement. It allows them to propose some already locally geotourism products.

The purpose of the poster presented is to show the stages of the project: a first job is to trim the links across the territory through a cartographic work and geographic data: how to juxtapose the vine and geological outcrops? What about land, sandwiched between the basement and varieties of plants? a second is to formalize work through the expertise of a few motivated professionals, the role of other parameters of the soil: soil, exposure, altitude ... which also have a strong connection to the basement and the history of its establishment .



Health and Wellbeing through creative and active engagement

Oral Presentations



ASPIRING GEOPARK “ALTAI” AS A PLACE OF PHYSICAL AND SPIRITUAL HEALING

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Keywords: *tourism, medicinal herbs, health, healing springs, inner balance and peace*

The Altai Republic, located in southern Siberia between Kazakhstan, Mongolia, and China, is a unique region notable for its abundance of natural resources essential for human health and well-being since ancient times. It is an Earth's nook that has preserved its virgin woods, crystal-clear waters flowing down from glaciers, and rich biodiversity. It is one of the strongest power centers of our planet where ancient barrows, caves, magic petroglyphs, stone sculptures, and other historical monuments are located. Not without reason this "Russian Tibet" became the inspiration source for Nicholas Roerich. People come here to clear of negative thoughts, charge with energy of nature, and reach balance of their mind, body, and spirit.

This natural potential is widely used for health tourism development and in particular in the territory of Geopark “Altai.” Unique medicinal herbs, such as *Rhodiola rosea*, *Rhaponticum carthamoides*, *Hedysarum neglectum* Ledeb., and others used for making teas, tinctures, and balsams grow here. Numerous healing springs treated as sacred since ancient times are concentrated in this area. Thanks to the purest mountain air and Alpine meadows local honey is one of the best in Russia. Special attention should be paid to the banya (Russian sauna) and various Spa procedures with medicinal plants, apicultural products, and local clays.

Specificity of local soils and plants influence the quality of livestock production, especially in Maral Deer breeding. Unique medicinal products from maral deer antlers are in great demand not only in Russia, but also in East Asia. Numerous positive feedback and research proved their high healing properties.

Peaceful co-existence of different religions, including Orthodox Christianity, Islam, Buddhism, and Shamanism creates a unique opportunity for pilgrimage tourism development. Besides, being far from noisy cities, admiring bright stars, enjoying warmth of burning fire and traditional throat singing, everyone can gain inner balance and peace.

CASE AND EXPERIENCES OF THE ASPIRING GLOBAL GEOPARK SAIMAA GEOPARK AS HEALTH AND WELL-BEING PLATFORM IN THE GEOTOURISM CONTEXT

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Keywords: *health and wellness tourism, creative industry, collaborative strategy, geotourism, empirical cases and experiences*

Saimaa Geopark, located in Finland, provides a unique geological and experience-rich platform for local people, tourists and local businesses. Saimaa Lake is one of the largest lakes in Europe and one of the best-known tourism destinations in Finland.

One popular activity for tourists from other countries is to live like a local to experience the Finnish and Scandinavian way of life. The pure nature, silence, secure environment and unique natural phenomena in Saimaa Geopark create an attractive environment for leisure activities and businesses focusing on health and well being. The stories behind the scenes provide a solid background for engagement and collaboration among communities and businesses in the geotourism, and health and wellness industries.

This presentation uses content-rich cases to demonstrate how Saimaa Geopark operates in line with the objectives and guidelines of the Global Geoparks Network. We show how a sustainable, co-development model and modern digital services are used in the region. We identify current development needs in order to develop a roadmap that will lead to official global geopark status. Other geoparks present ideas on how to develop cooperation within the geopark and with other geoparks. Given the large geographical area of Saimaa Geopark, which includes several cities, we present a picture of the present network.

One central element in our presentation is the support for SMEs offered by the public sector: e.g. start up assistance, consulting and development advice, and financial services. Our presentation also demonstrates a few examples of how the Saimaa region offers possibilities for the creative and education industries. The key findings are summarised at the end of the presentation, where we show a roadmap for Saimaa Geopark to become a global geopark, which includes also some of our findings and suggestions for other aspiring global geoparks on how to prepare and operate during the application process.

INTERACTIVE MESSEL PIT WORLD HERITAGE “JUNIOR OFFICERS” LINKING UP EARTH SCIENCES, FOOD, HEALTH AND HUMAN ABILITIES AS BASIS FOR PEACEFUL FUTURE

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Keywords: *geotourism, education, interpretation, science transfer, world heritage*

Nowadays the young generation seems to be flooded by IT, smartphones use and sports in a way so that they could forget about what life is and about and where they live on: Planet Earth. Basic topics about survival and human skills seem to be endangered to lose them. To develop science societies, UNESCO's priority no. 1, it has become obvious that many of them as well as adult people do not know anything e.g. about the origin and formation of water across the geological cycle on Earth and about the connection of soil and food.

Transferring paleontological topics for the famous Messel Pit in general is for many scientists related to skeletons, environment or climate. In this context, the mentioned topics do not seem to fit. In the year 2015 the team of the Messel Pit WHS has reflected the necessity to pick up these topics. Therefore a new program focused on children was developed to connect human existence in a different way with the geological cycle and geo-themes. The aim is to enthusiast young people across this approach for Earth Sciences, in an active way and to link them up with the achievement of human mankind: responsibility, respect, tolerance and communication for a peaceful common future of different cultures.

The new program was started end of 2015. First results will be given on the resonance of children on the scientific topics: volcanism and climate. As third topic “fossils” will be added this year. Within the program the Time Travel Crew of the Messel Pit WHS is being used as element to support the transfer of scientific topics. Details of the program implementation will be presented. Comments of the young participants as well as difficulties that have been discovered, best accepted action units and necessary improvements will be given.

REINFORCING THE VALUE OF NATURAL SPACES IN UNESCO GLOBAL GEOPARK CHABLAIS, FRANCE THROUGH SPORT AND LEISURE EVENTS

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Keywords: *sport, art, wellbeing*

UNESCO Global Geoparks are natural territories, they are treasure troves of geological, cultural and vernacular heritage. Research has increasingly shown the important contributions made by both urban parks and wild open spaces to the quality of a region. Direct and indirect benefits have been identified, for example, to local economies, and in the well-being of resident populations. By seeking to achieve regional sustainable development, UNESCO Global Geoparks valorise their heritage and implicitly their natural environments. Local populations and visitors are invited to discover and experience the many different facets of their surrounding landscapes. Thus Geoparks, through the exploration of the links between man and the Earth, actively contribute to the health and welfare of their visitors.

In addition to a population density of 154 people per km², that is higher than the French national average, the Chablais region is also experiencing strong population growth. The wild natural spaces of the territory, together with its lakeside parklands are key assets. Geopark Chablais uses these as a stage for broad appeal events for the benefit of local residents, to stimulate their well-being. Participants are encouraged to practice sports, learn new activities and share experiences. As demonstrated through an analysis of Geopark Chablais linked actions (the Nordic Walking Tour of Lake Lemman, the Rendez-vous du Geopark, the Pass Portes Portes Pédestre), novel experiences and new locations are enjoyed by a broad spectrum of the population (when considering age, residence, interest). To conclude, Chablais UNESCO Global Geopark serves as a practical example of the important role that Geoparks play where the benefits of the local environment are further reinforced through the promotion of well-being events for its inhabitants and visitors.

UNDERSTANDING ANCESTRAL DIET & EXERCISE – CAN GEOPARKS FOSTER HEALTH?

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Keywords: *ancestral, diet, exercise, education, solutions*

In much of the developed world an obesity crisis threatens to overwhelm national health budgets. Geoparks interpret the present in terms of the past. Applying this kind of approach to human health and well-being requires an understanding of evolutionary biology, anthropology, and the variety of ancestral diet and exercise patterns.

Such an approach receives little attention in most medical schools, and is not regularly factored into traditional dietician curricula. Combining such thinking with scientific knowledge of nutrition and physiology (and resulting evolutionary “mismatch diseases”) promises an effective means of advancing lifestyle and dietary education, and achieving healthy outcomes.

Global Geoparks may have a critically important role in this process: they promote interaction with a target audience that is receptive, is interested in earth sciences, and is likely ready to be physically active.

Appreciating the benefits and costs of the agricultural revolution, the relentless societal pressures that promote disordered eating patterns and unhealthy lifestyles, and the current environmental effects of food production, form a starting point. The potential solutions which logically follow are surprisingly simple.

Many Global Geoparks celebrate the way in which their residents relate healthily to the land. The Tumbler Ridge Global Geopark has developed literature on healthy eating, and exercise through the enjoyment of geological attractions: Geosites are accessed through a 100 kilometre network of hiking trails. And we educate participants in our mountain half-marathon on the geology they encounter.

We believe the result is a population that is more in tune with its origins and genetic inheritance, and therefore more responsive to its current predicament. While each Geopark is unique, there are sufficient commonalities to make such initiatives a potentially effective tool for members of the Global Geoparks Network.

USING THE GEOPARKS TO IMPROVE HEALTH AND WELLBEING: THE ARARIPE GEOPARK (CARIRI CEARENSE / BRAZIL) SCIENCE PLAN

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Keywords: *araripe geopark, health, wellbeing*

The relationship of humankind, sustainable context and biocentric perspective, suggests that the quality of our health is a result of the planet's health. In this circumstance, the concepts of healthy parks and people and the nature deficit disorder, suggest that natural spaces might have therapeutic properties and health policies should consider them. Thus, UNESCO and the University of Trás-os-Montes e Alto Douro (Portugal) have approved the first UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyle"..

Considering that a Geopark is a living area, interactive and inclusive, where healthy lifestyles should be promoted among the local communities, it is important to develop studies in this field. Thus, the study conducted in Araripe Geopark located in Cariri Cearense-Brazil, analyzed the benefits of physical activity outdoors and has categorized areas based in ecosystem health services, focusing especially the potential of trails and resources, establishing the degree and type of interaction inherent to the interests and expectations of the users.

This study was based in biomechanical analysis of bipedal locomotion that quantifies the overload applied to the performer during the trek, setting the predictability of motor difficulty and the behaviour of different parameters, minimizing the risk of injury due to exposure and enhancing the benefits of scheduled or incidental physical practice. With geoprocessing and geocoding, the study done will seek to determinate the ratio of active lifestyle and healthy, in natural areas, based on indicators and frequency measures.

This project proposes an ecosystem analysis tool for physical activity on the backdrop of the Araripe Geopark. If in recent generations we manage to live longer, now for future generations, it is important to live better. This can only be achieved on coherent choice, based on social behavior. So, the answer is in humankind, but probably the solution can be found in Nature.



Health and Wellbeing through creative and active engagement

Poster Presentations



ACTIVITY OF ASO GEOPARK GUIDES ASSOCIATION

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Keywords: *geoparks guide, opportunity, stimulation, community, science popularization*

Aso Geopark Guides are experts at introducing the charms of Aso UNESCO Global Geopark. They undergo a specialised training and certification program on Aso volcano, geological formation of the landscape, bio-diversity, culture and history which connect to the volcano. They deliver stories to visitors in order for them to better understand and enjoy experience the park. Aso Geopark Guides Association was established in 2012 with support of Aso Geopark Promotion Council. At present, there are 59 certified Geopark guides in the association. Most of guides are in their 60s and retired following a wide variety of careers, such as ex-teachers, engineers, nurses, fire fighters or bus tour guides etc. Having no specialised geological background, however they grow up and live in Aso and neighbouring areas and so feel attached to the region and sharing the amazing story of their mother land. This geopark activity stimulates the guides intellectual curiosity and stirs enthusiasm for learning, moreover it creates an expanding support network among guides, local community and enterprises. As long as they develop their guiding skills, they do not only take a role as a tour guide but also plan and carry activity of geo-conservation, grassland regeneration and geo-education programme for kids by themselves. From 2015, the guides have organized 6 major group activities which include trekking, wildflowers, photography, computers, gourmet and English language. The aim of the activities is to contribute to geopark activities while taking advantage of their field of expertise and likes. This also helps the guides deliver geo-story from various points of view and promote geopark concepts. The joy of Geopark has enlightened the local guides to grow and enjoy earth science. Their style and attitude also encourages our local community for science popularization.



Mature Geoparks sharing success and challenges

Oral Presentations



‘ANTHROPOCENCE’: A COMMON SUBJECT AND A GREAT OPPORTUNITY FOR UNESCO GLOBAL GEOPARKS WORLDWIDE

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Keywords: *Antropocene, communication, education, stratigraphy, sustainability*

Human impact on the Earth system has long been recognized, but it has received greatly increasing attention in the media since the 'Anthropocene' was proposed as a new epoch in the Geologic Time Scale. Are we living in a different geological epoch? Is this idea only a cultural and political concept?

The word combines the root "anthropo", meaning "human" with the root "-cene", the standard suffix for "epoch" in geologic time. However, the proposal for the 'Anthropocene', as a unit of the Geological time scale, must be examined critically by the International Commission on Stratigraphy (ICS). This debate underlines, like probably never before, the importance of geology to understand global change and talk about sustainability.

Geoparkea has promoted several activities to reinforce this debate. A new research project has studied the sedimentary filling of our estuaries to provide information about the sea-level rise during the Holocene, as well as to detect first indicators of contamination related to the human activity. The new documentary “Anthropocene” by the Canadian film director Jennifer Baichwall has been recorded partially in our geopark with the chair of the ICS, Prof. Stan Finney. This outcrop has been also used like a reference in the recent paper “The 'Anthropocene' epoch: Scientific decision or political statement?”, which was the cover of the GSA Today vol. 26 renowned magazine.

As a result of this activity we have organized a conference for the general public and got more than ten media publications about the geopark and the idea of “Anthropocene”. Many geoparks have got geological elements and global change evidences that can be turned into an effective communication tool linking geology and sustainable development related to this contemporary concept.

A CASE STUDY ON THE GEOTRAIL REVITALISATION IN THE JEJU ISLAND GEOPARK, REPUBLIC OF KOREA

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Keywords: *Jeju Island, geotrail, geotourism*

Suwolbong tuff ring has priceless geological values known worldwide as an ideal place to find sedimentary layers of tuff ring. Despite its academic values, the public could not get easy access to this site.

A turning point occurred in 2011 when Jeju government promoted the Geopark Trail Festival. At the beginning of the first event, the villagers doubted its success and sustainability and did not expect it to make their village invigorated. But things have changed: annually held events attracted visitors from everywhere. In addition, this special event held for five consecutive years has made a big difference in the villagers' awareness of the Geopark. First of all, they got the chance of realizing the village's values through active participation in trail promotions and continuous training programs. Consequently, villagers are passionate join to the events, and as well, the magnificent scenery and geological values are well known to the public. This has brought more and more visitors to the area, reaching 330,000 visitors as of 2015. Now, Suwolbong area has become one of the most popular touristic destinations. Especially, this site is recognized as an ideal outdoor classroom for students. With such a huge increase of visitors, villagers' profit from tourism and fishing on boats and sales of dried squids, the main source of income, renews the highest record every year. Most importantly villagers from Suwolbong area realized the global values of their hometown, and with their rising pride they are even well aware of protecting this wonderful heritage for themselves. This change tells us that the Geopark program plays a crucial role in local communities in terms of positive advance of locals' mind, and activation of the local economy through Geotourism like Geotrail events with a rising number of visitors.

CULTIVATING A LIFELONG TEAM OF SCIENCE POPULARIZATION

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Keywords: *communication, Danxiashan, training, volunteering*

Danxiashan is the namesake of Danxia landform, a base for international Danxia landform research, and is entrusted with the great mission to display and popularize geosciences. Danxiashan has been training science popularization volunteers and recruiting thirty volunteers every year for its own training camp.

Danxiashan set up the training camp in a local resident building in 2014. Every year thirty volunteers from all over China are accepted with knowledge and experience in geology, tourism, biology, media and other relevant areas for the territory. In a week's time, the volunteers learn about the geoscientific value of Danxiashan through field investigation, workshop, sharing and communicating with local people. Danxiashan has built an online communication platform to support these volunteers.

As a result these volunteers from different cities of the country turn out to become dedicated, lifelong volunteers of Danxiashan they write and publish their works about Danxiashan in newspapers and magazines as well as using the social media and workshops to share their experiences and feelings about Danxiashan..

DRONES: THEIR APPLICATIONS IN GEOPARK AND GEOHERITAGE MANAGEMENT

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Keywords: *Danxiashan, drone, geopark management, conservation management, geotourism*

Drones have long been used in military surveillance to observe and gather images of targeted objects and scenes from positions which cannot be normally and safely reached by photographers. Their full potential in civilian uses are only noticed in recent years due to improvement in the designs, particularly in the reduction of their body sizes and weights, development of durable and impact resistant materials, upgrade of remote control, aerodynamic stability and anti-vibration devices.

The availability of light, high density (HD) zooming cameras and the addition of powerful GPS system and high quality, long life batteries make possible the flying machine to fly longer distance, higher elevation and closer to the target objects. Such technological advancements have made flying drones much more reliable and easier manipulate. It therefore opens up tremendous application opportunities in the management of geoheritage and geoparks. Danxiashan Global Geopark is among the world's first geopark to extensively use this latest drone technology to manage their geopark.

Drones have been used to gather geological and ecological data for scientific research and conservation management. They are also used to reach inaccessible areas such as steep slopes, valleys and cliffs. They are also applicable in exploring and locating new, potential sites for geotourism development, monitor potential geological hazards and changes of the ecological environment as well as implementing crowd and vandalism controls within the geopark. This paper shares the experiences and challenges in the application of drones in geopark management. This cost effective and time-saving flying machine will eventually fly over the sky of most geoparks in China and play a vital role in making better geoparks around the world.

EXPANDING NATURTEJO UNESCO GLOBAL GEOPARK AND ITS INTEGRATION STRATEGY

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Keywords: *geosites, local development, Naturtejo Geopark, natural heritage, Penamacor*

In recent years, the municipality of Penamacor located in central Portugal at the northeast part of Naturtejo UNESCO Global Geopark has been trying to change its development policy in order to enhance local resources and to preserve and promote the cultural heritage. Naturtejo Geopark provided an opportunity for Penamacor to improve its tourism using the philosophy of the Geopark. Expanding Naturtejo Geopark to include Penamacor it was also a great opportunity to complete some of its most important geodiversity.

The geological heritage inventory for the municipality of Penamacor, which is now part of the municipal master plan, included 15 geosites related to Cadomian, Variscan and Alpine orogenies, orogenic granites and mining areas: the prominent Alpine Orogeny-related mountains consisting of Neoproterozoic rocks, granite inselbergs associated with the Penamacor-Monsanto plutonite, Appalachian-type mountains composed of the Armorican Quartzite Formation constituting the syncline of Penha Garcia, where Iron-age mines of iron and manganese were exploited.

In order to foster the responsible and sustainable development of local communities, several initiatives prioritized by the Naturtejo Geopark, such as conservation of geosites, education and geotourism, have been developed in Penamacor. Naturtejo has integrated Penamacor in its Tourist Packages and its Educational Programs. For example, visits to the Roman Gold Mine were organized. Penamacor participated in the Landscape Festival 2015, under the auspices of European Geoparks Week promoted by Naturtejo Geopark, with a Geoconcert at the Iron Age mine. One-year temporary exhibition at the Municipal Museum «Ab initio - geologically» aims to raise the local community's and visitors' awareness of the geodiversity of Penamacor. These and other actions were part of an integration strategy of the Penamacor geological heritage, together with the remaining natural and cultural heritage, to the Naturtejo UNESCO Global Geopark, which also includes the application of the territory to the European Charter of Sustainable Tourism.

GEOTOURISM INITIATIVES AND LOCAL DEVELOPMENT IN BEIGUA UNESCO GLOBAL GEOPARK (ITALY)

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Keywords: *geotourism, geoparks, geoheritage, local development, Liguria*

In the last ten years, with the recognition as an international Geopark, Beigua's territory carried out new initiatives to develop the concept of geotourism with the involvement of local communities and stakeholders. The project especially worked through networking activities to enhance several values in the area concerning geodiversity, biodiversity, historical and cultural heritage linked and promoted with a holistic approach. Many interventions referred to thematic trails, interpretative panels, visitor centers and information points, which have been carried out in the most interesting sites of the Geopark. In parallel with this structural phase promotional tourism activities have been implemented through guide-books, leaflets, advertising campaigns on newspapers, magazine, TV and radio, but also using the web site and the social networks. Local municipalities gave a fundamental contribution to the common action plan supporting the local public transport, improving road signage, ensuring information services through their offices. They also participated in the definition of new projects to acquire specific European Community funds concerning environment and tourism issues. Great efforts have been aimed to create a strong network of local businesses and entrepreneurs engaged in the field of tourism, local products, handicraft, forestry and farming. Based on local agreements several collaborative initiatives have been launched in order to develop geotourism offers linking geotrails, outdoor activities, tasting of local products, museums and cultural sites visits. Nowadays the district of Beigua UNESCO Global Geopark is growing more and more in visibility and as an active and attractive tourist destination with several opportunities throughout the year.

GROWING OUT OF THE “YELLOW”

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Keywords: *yellow card, best practise, geo-education, signing, tourism pressure*

Establishing a geopark is a large and rewarding task. Katla Geopark was born in a time of economic and volcanic crisis in Iceland 2010 and perhaps due to its vivid nature, the aspiring geopark was submitted to The Global Geoparks Network without complete or adequate “primary succession“ .

Huge steps were taken in the first years to interpret the landscape to the public and to engage with the local community. However, the efforts were found insufficient at the first re-validation in 2015. Now a year later wheels have been turning in this blustery area in the subarctic, with no EU funds nor governmental support, to hold and claim the status of UNESCO Global Geopark for another four years. The horizon changes fast in this part of the world – now there is a nature-tourism frenzy in Iceland with 300 annual tourists per inhabitant of Katla Geopark in 2015, and growing (at the rate of 37% in the first four months of 2016). The need for the UNESCO Global Geopark status and standards has never been greater in Katla Geopark. The demands of UGG are what can save the area from low horizon - quick fix planning due to tourism pressure and will enhance public interpretation, geo education and legal protection of vulnerable sites in the future.

Katla Geopark presents ongoing practice in overcoming the yellow card in 2017.

INVESTIGATION INTO THE ROLE OF SCIENTISTS IN JAPANESE GEOPARKS

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Keywords: *geopark, geoscientists, local community, branding, heritage*

Geoscientists and scientists of various fields obviously have an important role in Geopark activities. In addition to that, geo-scientists seem to contribute to geopark activity in a variety of ways in many geoparks. Through the use of questionnaires and interviews the author conducted an investigation into the diversity of roles geoscientists have in geoparks.

The research on scientists in Japanese geoparks confirmed various roles of the geoscientists in the geoparks. Among them, activation of local people and their community is considered remarkable though it is not the main purpose for geopark managers to hire scientists in their geoparks.

In most of the geoparks of Japan, the geo-scientists are not local and as such they bring new ways of thinking as well as new points of view on the local natural and cultural resources. For local people it is clear they act as coordinators, as catalysts that makes new activity happen in the local community and as producers of new community projects through the use of their logical and flexible way of thinking.

Concurrently, the Geopark managers (who in the majority of Japanese Geoparks are local government officers), who thought that the scientists would simply bring scientific knowledge, have now begun to recognize the versatility of contribution they make. Geo-scientists in Japanese geoparks bring new added value.

LESVOS GEOPARK: PROMOTION OF NATURAL AND CULTURAL HERITAGE, GEOCONSERVATION AND GEO-TOURISM DEVELOPMENT

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Keywords: *geopark management, geotourism, local development, geoconservation*

Lesvos island, is characterized by a complex geology and rich geodiversity dominated by Miocene volcanoes and the Petrified Forest, its biodiversity and protected areas presenting a variety of birds and wildflowers, the ancient olive groves, pine forests and unique landscapes. Lesvos presents important archeological sites and monuments, medieval castles, traditional villages, industrial architecture, monasteries and churches.

The Petrified Forest area (15.000 ha) declared as Protected Natural Monument in 1985, was recognized as Geopark in 2000 and included in the Global Geoparks Network in 2004. After submitting a Geopark extension application in 2012, the whole Lesvos island (1630 Km²) became a Global Geopark. In 2015 Lesvos was awarded the title UNESCO Global Geopark.

The Natural History Museum of the Lesvos Petrified Forest in collaboration with the Lesvos Municipality and University of the Aegean are responsible for the Lesvos Geopark management. The Geopark's management plan is linking geoconservation and promotion of geosites, natural and cultural heritage with geotourism, environmental education and sustainable local development.

Although geotourism was initially focused in the Lesvos Petrified Forest, the planning and implementation of Geopark activities including interpretation and promotion of geosites, guided tours, exhibitions and events spread to the whole island. These activities were funded under the NSRF 2007 – 2013 Operational Programme "Crete & Aegean Islands" approved in 2013.

A broad variety of educational activities in Lesvos Geopark make it an ideal destination for environmental education. Community support is expressed by the Municipality and various social organizations fostered through the holistic development strategy of the Lesvos Geopark. The Geopark collaborates closely with women's agrotouristic cooperatives and local organic food producers to promote local gastronomy.

Lesvos Geopark contributes to the local economy by creating new employment opportunities directly but also in tourist enterprises, hotels, guest houses, restaurants, local artisans and handicrafts which are permanent Geopark collaborators.

MEASURING SUCCESS THROUGH SOCIOECONOMIC INDICATORS

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Keywords: *measurement, management, socioeconomic, indicators, collaboration*

Stonehammer UNESCO Global Geopark has a unique management structure that has the geopark owning and operating no assets. Instead the geoparks management structure is built on partnerships with existing public and private entities and/or sparking the creation of new ones. This has led to challenges around defining the geoparks impact on our communities from a socioeconomic perspective. This is a question often asked by partners including but not limited to tourism operators, government funders, private funders and the geopark management team itself. Thus a partnership has been struck with the University of New Brunswick, Saint John to research this topic.

The research team at UNBSJ is led by Dr. Rob Moir, Professor of Economics and includes professors from multiple disciplines including finance, psychology, business, marketing, and tourism. Their goal is to establish socioeconomic indicators for two types of geoparks that could be used across the network, not just for Stonehammer. The two types of geoparks are; (1) Gated site, (2) Un-gated site with existing tourism infrastructure.

After initial documentation review it has been determined there have been few academic studies on the socioeconomic indicators for geoparks and the ones executed have been in conjunction with other designations or solely looked at a specific territory. This research project will endeavor to determine a range of indicators for the two types of geoparks identified so any geopark can utilize the formulas to demonstrate their socioeconomic impact on their territories. This research will assist in fulfilling the deliverable of creating sustainable management models for the Drifting Apart project as well. Drifting Apart is a three year project part-funded through the European Regional Development Fund's Northern Peripheries and Arctic Region Programme involving six countries including Canada, Iceland, Norway, Northern Ireland, Scotland and Russia.

PRESERVING CULTURAL AND NATURAL HERITAGE IN MULTIPLE-DESIGNATION SITE (UNESCO WORLD HERITAGE, MAB, UNESCO GLOBAL GEOPARK, MEDITERRANEAN DIET)

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Keywords: *stakeholder, Lab_Museum Network, young people*

This paper shares best practices in sustainable development within a multi designation territory. Through coordinated projects with municipalities (Took), coordinating stakeholders in Three Caves – Three River, Life+ FAGUS, MU-VI as Lab_Museum Network, Custodian Farmer as multifunctional agriculture, Alburni Heritage Core Areas Business, Geopark Take Carers as self-motivation identity for young people.

Cilento 4IDA is the acronym for the 4 International Designation Area (MAB-World Heritage- Geopark and MeDiet), managed coherently through a set of projects. Our solution is based on a unique institution for governance and the involvement of the local communities and government, following the subsidiarity principle. All together they preserve agricultural heritage for MeDiet and cultural and geo-biological heritage to maintain the touristic value of our landscape.

The main challenges are the community's negative attitudes and avoiding landscape abandonment by young generations.

A successful solution can be seen from the results of an impact study of a prototype project introduced at Veneris Hair Geosite - an agreement was established between the local government, local professionals and park management to create new opportunities for engaging young people in the geosite management. The young professionals need to have good knowledge about the specific geosite and connections with local tradition, culture and economy, and of the Geopark's geodiversity and trails. This type of management increased the tourism by 5,000 people in 4 years.

ROLES OF ACADEMIC EXPERTS IN GEOPARKS OF JAPAN

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Keywords: *national committee, scientific value, natural disaster prevention, think tank, people's own words*

The activity of academic experts for supporting geoparks in Japan can be summarized; 1) As members of the National Geopark Committee, they evaluate new applications for involvement in the national geopark network and provide their comments during and after the evaluation missions, based on their academic experiences. 2) As advisers of each geopark area, they confirm scientific significance of their heritages, teach scientific values to the local people, and promote the geopark activity through educating the local people and attending of themselves. 3) As a think tank of the geopark activity, they discuss on what geoparks should be in Japan, with non-scientists of geoparks, in the Geopark sessions of their academic society conferences or working groups.

There are five academic societies involved in the national committee, including those of seismology and volcanology, reflecting the geological situation of Japan. As earthquakes, tsunamis, and volcanic eruptions are serious natural hazards, minimizing the damage caused becomes the inevitable issue. Academic experts support the geopark people and young students to learn disaster prevention, and also help the geo-guides to teach natural disasters to visitors through their heritage and human experiences.

Although the existence of the international scientific values of geology is the fundamental background of a global geopark, sometimes, people cannot understand the real values due to too professional words being used. As a result, in such geoparks, stories of cultural or biological sites are guided without any connection to the scientific values. Scientific significance should be explained with the guides and local people's own plain words. We, academic experts, are making efforts for the local people to understand the values that ought to be linked to their own lives and heritages. If the local people and guides cannot tell the geological values with their own words, that geopark will fade away.

“THE ROUTE OF GEOSITES”: A NEW APPROACH FOR THE PROMOTION OF THE AROUCA UNESCO GLOBAL GEOPARK GEOSITES

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Keywords: *Arouca Geopark, geological heritage, geosites, interpretation, route of geosites*

The systematic inventory of the Arouca geological heritage was concluded in 2008. A final amount of forty-one geosites with scientific, educative and/or touristic value has been inventoried under the scope of a Geological Heritage and Geoconservation master thesis developed in the University of Minho. Since 2009, the Arouca UNESCO Global Geopark management structure has made intensive efforts towards the preservation, valorization and promotion of the inventoried geosites. As result of this work, “The Route of Geosites” was recently developed, which involved an intensive and meticulous process of territorial analysis and integrated thirty-one of the forty-one inventoried geosites of the Arouca UNESCO Global Geopark presently well signalized in the entire territory.

The selected geosites are divided in three itineraries that seek to define, briefly, the main geographical areas of the Arouca UNESCO Global Geopark: Freita Mountain (11 geosites), Mining areas (8 geosites) and Paiva River valley (12 geosites). These itineraries were designed to be made by car and walking only by short distance paths, to access to some geosites. The geosites of this route are equipped with geological interpretative centers, observation platforms and/or interpretative panels. The “Route of Geosites” can be done using a guide book, which includes an explanation of the geological history of Arouca UNESCO Global Geopark and of its geosites. Through this route, people are also invited to visit other natural and cultural sites, to taste local gastronomy, to get acquaintance of local traditions and to contact with the Arouca’s local communities.

During 2016, the Arouca Geopark management structure developed several activities in order to enhance this scientific route with touristic and cultural interest. With this work we intend to share some results of this important territorial initiative.

SCIENCE POPULARISATION IN ZHANGJIAJIE GLOBAL GEOPARK OF CHINA

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Keywords: *landscapes, science popularisation, Zhangjiajie, geotourism, geology*

The continual growth and popularity of geoparks around the world have presented an excellent opportunity for geopark managers, visitors and scientists to communicate the significance and substance of the geoheritage. This is very important for promoting broader understanding of geological and geomorphological values of geoparks and for arousing the awareness of the public on geoheritage protection. To date, however, many geopark managers have faced difficulties in telling the public ‘what kind of scientific story the landscape tells’.

The distinct sandstone landscapes in Zhangjiajie Global Geopark of China were discovered in 1979 and considerable efforts have been made on uncovering the formative process of the landscapes in recent decades. Based on the research results, this presentation shows how the scientific knowledge can be used to arouse the awareness of the public on geoheritage protection and geotourism promotion.

Importantly, it is found that when the link between the scientific knowledge and local customs and culture is highlighted, the value of the geoheritage can be reinforced *and consequently lots of tourism products can be produced.*

TOURISM DEPARTMENT AND REGIONAL DEVELOPMENT USING GEO-HARVEST IN TOYA-USU UNESCO GLOBAL GEOPARK, JAPAN

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Keywords: *volcano, geo-harvests, geo-story, tourism, community engagement*

We have attempted a wide range of projects, using local product called “Geo-harvests”, to express charms of the geopark for visitors and residents from 2013-2016, in Toya-Usu global geopark.

Such as the exhibition of geo-harvests which renewed and opened on March 2016, many kinds of geo-food developments (hot spring boiled egg, Toyako-shaped hamburg steak, bun with local beans, pizza baked on lava stone, etc.), The illustrated cards of stories of local industry associated with the earth and a geo-cooking course themed healthy food.

While carrying out these projects, the name recognition of geopark gained popularity among the region. In addition to that, it shows ripple effects such as branding unused products, building relationships with local businesses, serving geopark-related local products for a regional school lunch and a new distribution development.

THE TUMBLER RIDGE “MATURING” UNESCO GLOBAL GEOPARK

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Keywords: *discoveries, maturing, trackway, tyrannosaur, waterfall*

The Tumbler Ridge Global Geopark was admitted to the GGN in 2014, becoming the second Global Geopark in North America and the first in the western part of the continent. Our area was only settled in the 1980s. Fully understanding our region’s geological and fossil wonders therefore began more recently than in most Global Geoparks.

Our presentation on the Tumbler Ridge Aspiring Geopark in 2014 focused on the ongoing discoveries and associated research. Remarkably, 2015 saw further monumental discoveries, meaning that as we develop our educational and interpretive programs, we are still learning who we are and what we can be. As we transition to becoming a “Mature Geopark”, we go through an invigorating phase of maturation.

In 2015 we discovered new geosites, hiking areas, waterfalls, canyons, caves, an underground stream passage, crocodilian trackways, dinosaur trackways, new fossil fishes and marine reptiles, giant clams, a Devonian reef, Pleistocene sites, icefalls, and another tyrannosaur footprint. We held an inauguration ceremony, hired our first Geopark Manager, and developed new products to complement our standard educational programs and interpretive hiking activities: driving tours, ATV destinations, four-wheel drive tours, geosite brochures for cross-country skiing, snowshoeing and ice-climbing, plus a brochure for ten wilderness waterfalls (where all we provide are GPS co-ordinates for the geosite destinations and starting points).

Maturing can be challenging, especially when you are a bit remote and your main role model is over 4,000 kilometres away. However, such times are exciting and full of novelty, when patterns are formed about what kind of mature adult you will become.

Each new discovery brings us a step closer to maturity. Our presentation reflects this sense of celebration and awe for the privilege of being a member of the UNESCO Global Geopark community.

UNESCO GLOBAL GEOPARK BERGSTRASSE- ODENWALD: SUSTAINABLE DEVELOPMENT BY ENVIRONMENTAL EDUCATION, COMMUNICATION, REGIONAL PARTICIPATION AND INTERNATIONAL COOPERATION

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Keywords: *environmental education, participation, vocational training, intercultural workshop, partnership*

Since more than 15 years, the connection between Earth history, nature, man and culture has been developed by Geoparks worldwide as holistic approach sustainable development.

Based on this multifaceted frame the UNESCO Global Bergstrasse-Odenwald has developed a wide range of projects on environmental education, communication and cooperation – together with local partners as well as within the wider UNESCO Global Geopark community.

Besides the implementation of Geopark infrastructure like information centres, biking trails and geosites, the Geopark has developed regional cooperation network including tourism agencies, museums, schools, universities, World Heritage Sites and partners from the economic sector. In parallel, a comprehensive double-stage visitor service has been developed, which is performed by a team of 45 Geopark Rangers and currently 21 groups of so-called Geopark-on-site guides (more than 200 volunteers). Rangers as well as Geopark-on-site guides have received a comprehensive vocational training by the Geopark, operated together with local experts and cooperating scientists. They are responsible for environmental education programmes and activities and represent the Geopark at local trade fairs and events.

The community and local expert participation approach as part of the Geopark's visitor service has been adopted by several Geopark partners in Europe and worldwide. In this context, intercultural workshops and partnerships have been performed together with the Global Geoparks Hong Kong (PR China), Mt. Lushan (PR China) and Lesbos (Greece). Sharing knowledge and best practice, close cooperation and the development of new concepts for the protection and the communication of our geological, natural and cultural heritage are promising aspects for sustainable regional development within the Geopark itself as well as worldwide between the UNESCO Global Geoparks.

VARIOUS ROLE OF GEOSCIENTISTS IN JAPANESE GEOPARK

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Keywords: *branding, geoparks, geoscientists, local community, heritage*

Geoscientists obviously have an important role as scientists in various activities in geoparks. In addition to that, geo-scientists seem to contribute to geopark activity in various ways in many geoparks. The author conducted hearing investigation to geo-scientists in Japan and is conducting a questioner investigation to them. The preliminary research on geoscientists in Japanese geoparks revealed various roles of the geoscientists in the geoparks.

In the most of the geoparks of Japan, geo-scientists in geoparks are “alien” in the area. They came from the outside world to the geoparks and brought new point of view on the local natural and cultural resources. They act as a coordinator of local people, a catalyst that makes new activity happen in the local community or even a planner and producer of geopark projects as well as scientific advisor.

Managers of the geoparks, who are local government officers in most of the geoparks in Japan, begin to recognize the versatile role of the researcher including geo-scientists from outside for the branding of their areas. Geo-scientists in Japanese geoparks brings new added value to the areas.



Mature Geoparks sharing success and challenges

Poster Presentations



ASPECTS, BOUNDARY, FUNCTION AND GOAL IN GEOPARK SYSTEM

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Keywords: *cultural tourism, sustainable development, geopark conservation*

Geopark is a complicated open system. It includes two aspects, value and management. Value contains biodiversity, geodiversity, cultural diversity, landscape diversity and ecosystem service. And management covers manager, object and stakeholder. Boundary is divided into geological boundary and functional boundary. The function of geopark is to protect geological ecosystem, spread earth knowledge and promote sustainable development for community. The goal is to reach harmonious relation between human and earth.

EFFECTIVE PROTECTION AND RATIONAL UTILIZATION OF GEOLOGICAL HERITAGES IN WUDALIANCHI

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Keywords: *protection, utilization, geological, cultural, value*

Effective protection and rational utilization of geological heritages address the problem of seeking balance between protection and utilization for the locals. New-period basaltic volcanic cones of intercontinental tectonic setting, barrier lakes and lava landform have superb geological scientific value. Locals are mainly relying on agriculture, fishing and farming industry. Government planned sightseeing and organic agriculture, souvenir shop and local cultural industry to make sure protect geo-heritage resources well after relocate residents from lake side. Eco-tourism and mineral industry have developed to ensure the benefit and promote employment of locals.

Through adhere to the legislation, strengthen cooperation and popularization internationally, rational development and sustainable economy, Wudalianchi became the first Global Geopark implementing protection and supervision with legislative support in China. Since 2004, Wudalianchi stopped cutting trees to protect vegetation. Wudalianchi has relocated residents who lived near the pools, lava platform and springs, returned farmland around pools and lavas to forestry, strictly controlled the area of construction and tourism. As a result, the volcanic geology and geomorphology is kept in good condition, natural ecosystems are well recovered, structure and function remains no change, environment indicator plant has increased in quantity as well as fishes and birds, and wildlife habitat is under effective protection. Wudalianchi improves its international influence and make positive contribution in spreading ecological and geological knowledge and researching sustainable development. Residents are able to find suitable alternative industries, and the development of new souvenirs emerging industry, spring processing industry and folk culture industry are promoted in coordination with resources and environment capacity.

GEOMORPHOSITES AND ITS APPLICATION FOR GEOTOURISM IN HONG KONG UNESCO GLOBAL GEOPARK, SE CHINA

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Keywords: *geomorphosites, geotourism, Hong Kong Global Geopark*

In addition to being a world famous metropolis, Hong Kong also boasts a wealth of geomorphosites with scientific, aesthetic, ecological and cultural values, especially the representative and comprehensive coastal landforms which are good example of the variety and complexity of geological processes and morphogenetic events in Hong Kong and presents a wide range of geological and geomorphological topics. For the purpose of protecting the world-class geoheritage and efficiently promoting geotourism, the national geopark of Hong Kong was established in 2009, and listed as Hong Kong Global Geopark (HKGG) by the GGN Bureau in 2011. HKGG was developed under the well-established Hong Kong Country Parks and Marine Parks with nearly 40 years of experience in park construction. In light of the good management foundation and a whole series of initiatives and activities conducted to promote geotourism, HKGG becomes a pioneer in the development of geotourism in China and could be used by the geoparks in other countries as model of good practices for geotourism at present and in future. Within this framework, this paper focuses on the geomorphosites and geotourism of the Hong Kong UNESCO Global Geopark. It gives a list and a description of the geomorphosites and presents the situation of geomorphosite assessment in HKGG. It also analyzes the development of geotourism in this area. Finally, it summarizes geomorphosite enhancement experience for the promotion of geotourism in HKGG.

INTEGRATED PROTECTION OF HUANGSHAN GLOBAL GEOPARK

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Keywords: *protection, integration, conservation*

For a geopark is not only about geology, it also concern about biodiversity, culture and community. The protection work should cover every aspects of geopark to reach sustainable goals.

Recent years, Huangshan Global Geopark has change the protection idea from separated geology protection to integrated protection. Our master plan includes several protection plans refers to different fields like biodiversity, cultural heritages, environment, eco-service and ecosystem etc.. And we have done lots of scientific researches with the help of professional to know what we have, what's the value. We have different partners like university, institute and museum. They give us professional and scientific support.

And for conservation monitoring: the Geopark has updated geo-site list. It has now 336 sites under protection; Biodiversity baseline survey was conducted in the Geopark. The Research Center for Biodiversity Conservation in Huangshan was set up. The GEF Project of the Conservation of Biodiversity Resources and Sustainable Use in Huangshan Municipality was approved and began its official implementation; The Implementation Plan for the Monitoring of the Biological Indicators of the Key Protected Pine Trees and their Living Soil was drafted; Monitoring work on air quality, drinking water sources, surface water quality have been continued and the results are released. Latest survey indicates the forest coverage and forestation rate in the Geopark register at 98.29% and 98.53% respectively, a conspicuous rise against the previous survey; in terms of monitoring on cultural resources, researches on the conservation and use of the ancient trails in Pipeng scenic area was completed and the registration of movable relics inside the Geopark started.

Cooperating with surrounding areas is also important, because geopark is not isolated. A protection cooperation with neighbor province is taken, which shares the same water system with us.

LOOKING AT THE IMPACT OF GEOPARK ACTIVITY ON TOWN POLICY AND MT. APOI GEOPARK'S FUTURE POTENTIAL

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Keywords: *impact of geopark, conservation and protection of vegetation, education, tourism, indigenous people*

Mt. Apoi UNESCO Global Geopark is the 8th Japanese Geopark to be designated a Global Geopark this past year. The main feature is Mount Apoi (810m), which consists of peridotite formed when part of the upper mantle was thrust up from the depths of the Earth. Mt. Apoi Geopark is operated by the local government, Samani Town (population: 4,600) and Mount Apoi is a popular symbol of Samani.

Besides the geopark being a strong branding power of local resources, a very important aspect to consider is how the Geopark has become the driving force behind various town policies. Samani Town started Geopark activity in 2008 and through the process of being designation a global geopark, the stagnating town policies relating to conservation, education, and tourism started to grow. In the case of conservation activity, due to rapid decline in recent years, full-scale investigation research has started to protect and restore the valuable alpine plant vegetation growing from the ultrabasic peridotite. Moreover, the Geopark started new initiatives to get schools and local people involved in various departments such as education, tourism, and promotion of indigenous peoples' culture.

By means of the Geopark framework, many activities which functioned separately have started working strategically to achieve a common goal.

Centering on conservation activities, Mt. Apoi Promotion Council will discuss the effect the geopark has had on existing policies and its future potential to sustain and grow the Samani area.

A MISSION OF ACADEMIC EXPERTS IN GEOPARKS: A CASE OF JAPAN

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Keywords: *national committee, scientific value, natural disaster prevention, think tank, people's own words*

Rolls of academic experts for supporting geoparks in Japan can be summarized; 1) As members of the National Geopark Committee, they evaluate new applications for involvement in the national geopark network and provide their comments during and after the evaluation missions, based on their academic experiences. 2) As advisers of each geopark area, they confirm scientific significance of their heritages, teach scientific values to the local people, and promote the geopark activity through educating the local people and attending of themselves. 3) As a think tank of the geopark activity, they discuss on what geoparks should be in Japan, with non-scientists of geoparks, in the Geopark sessions in their academic societies' conferences or working groups. There are five academic societies involved in the national committee, including seismology and volcanology, reflecting the geological situation of Japan. As earthquakes, tsunamis, and volcanic eruptions are serious natural hazards, minimizing their damages becomes the inevitable issue even in geoparks. Academic experts support the geopark people and young students to learn disaster prevention, and also help the geo-guides to teach natural disasters to visitors through their disaster heritages and human experiences. Although the existence of the international scientific values of geology is the fundamental background of a global geopark, sometimes, they cannot understand the real meaning of the values due to too special explanation. As a result, in such geoparks, stories of cultural or biological sites are guided fragmentally without connection to the scientific values. Scientific significance has to be told with the guides and local people's own words. We, academic experts, are making efforts to support the local people to grasp the scientific values, linking to their own lives and heritages. If the local people and guides cannot tell them with their own words, that geopark will fade away.

TEN YEARS OF JINGPOHU GLOBAL GEOPARK: OPPORTUNITIES AND CHALLENGES

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Keywords: *geoconservation, geoeducation, interpretation, Geotourism, culture*

Jingpohu Global Geopark, located in Southeast of Heilongjiang Province, China, was approved as a Global Geoparks Network member by UNESCO in 2006. It covers an area of 1400 square kilometers, including the largest volcanic dammed lake (Jingpo Lake) in China, volcanic craters, forests and tangible and intangible cultural heritage. Year 2016 is the tenth anniversary of the establishment of Jingpohu Global Geopark, which is one of the mature geoparks in the world. During the last ten years, the Geopark has made great achievements in geoconservation, management, geoeducation, infrastructure and geotourism. It demonstrates that a geopark is a sustainable way to advance geoheritage conservation and improve the livelihood of local people, particularly ethnic minorities. Meanwhile, the current challenges, implications and suggestions for its future development and scientific popularization are discussed.

EVOLUTION AND SUCCESS OF ACTIVE TOURISM AND ECOTOURISM DURING THE LAST DECADE IN CABO DE GATA-NÍJAR GEOPARK

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Keywords: *Active Tourism, Ecotourism, Cabo De Gata-Nijar*

Cabo de Gata-Níjar was declared Maritime-Terrestrial Natural Park back in 1987. It is located in a coastal area between the Costa del Sol (Malaga) , the Costa Tropical (Granada) and the Costa Cálida (Múrcia) at the southeast of the Iberian Peninsula. With blue skies and gentle temperatures most of the year, this land is the perfect place for real state investors, but also the agricultural sector, due to the ideal conditions for the intensive and under plastic agriculture, main economical active of the Almeria province.

The Andalusian Enviromental Administration has always supported an alternative model of sustainable development in this territory, and has been the driver of the statment of the area as Biosphere Reserve in 1997 and as Geopark in 2006. While the implantation of the model is slow, right now we have great examples which allow us to notice that the whole work that has been done trough all these years is bringing positive results.

A paradigmatic case is represented by all the ecotourism and active tourism bussinesses, activities that demands spaces with recognised enviromental values for their development. Just one decade ago, only 5 bussinesses were working on this area. Currently, the number has risen by a factor of eleven and still growing every. The main activities offered are hiking , kayaking, 4x4 routes, boat tours, diving, mountain biking, windsurf, paddleboarding and paragliding. The Reserve Management of the geopark supervises, authorises, and advises all the companies, ensuring that all the activities are develop with deep respect to stric enviromental values.

The communication will analize and interpret the evolution of the number of active tourism and ecotourim bussinesses which operates in the area and the administrative conditions required for the bussines start up, over the last decade.



Regional and International UNESCO Global Geopark Collaborations Oral Presentations



AZORES UNESCO GLOBAL GEOPARK: AN ARCHIPELAGO WITH MULTIPLE INTERNATIONAL DESIGNATIONS

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¹Azores Geopark

Keywords: *multiple designations, Azores Geopark, geodiversity, world heritage*

The Azores Archipelago is a Portuguese Autonomous Region consisting of nine volcanic islands and several islets located in the North Atlantic Ocean

The islands' volcanism is associated with the Azores Triple Junction of the North American, Eurasian and African Plate tectonic plates, and is characterized by 27 main volcanic systems and about 1750 monogenetic volcanoes. This geoheritage is expressed in a wide range of structures such as calderas, lava fields, lakes, caves, hot springs, among others.

The Azores are also rich in biodiversity, as evidenced by the presence of about 4,400 species of plants and terrestrial animals - including a significant number of endemic species - and being a stopover place for many migratory birds, and one of the world's largest whale sanctuaries.

The archipelago received its first international designation in 1983 when the Angra do Heroísmo Historical Center was listed as a World Heritage Site. In 2004 a second WHS was established for the Landscape of the Pico Island Vineyard Culture.

The Azores archipelago also comprises four Biosphere Reserves: Corvo and Graciosa islands inscribed in 2007, Flores Island inscribed in 2009 and São Jorge Island designated in 2016.

Other international designations are: 13 UNESCO Ramsar sites (inscribed from 2005 to 2012); 12 OSPAR areas; 23 Special Areas of Conservation and 15 Special Protection Areas from European Natura 2000 Network.

The Azores Global Geopark was designated a GGN member in 2013 covering an area of 12,884 sq. km and encompassing a network of 121 geosites spread over all the islands and the surrounding seafloor.

Thus, under the umbrella of the Azores UNESCO Global Geopark co-exist multiple international designations, including 4 UNESCO designations. Such a fruitful, promising and challenging multiple designations characteristic is only seen in the Azores (Portugal) and Jeju Island (South Korea) Global Geoparks.

BE A GEOPARTNER IN THE LUBERON GLOBAL GEOPARK

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¹Luberon Global Geopark

Keywords: -

Like other Geoparks, the Luberon Global Geopark defined and formalized a GeoPartners network, that is to say a set of private companies, self-employed workers or associations (hotels, holidays centres, providers in outdoor sports, touristic sites ...) sharing activities and global values around the heritage of the Earth, geotourism and for voluntary exchange or collaboration within a network.

After the presentation of the network's genesis and its principles (formalization tools, elaboration of a convention, link with the European Convention for Sustainable Tourism ... etc), the presentation will consist in the testimony of experience of a GeoPartner mountain guide, operating in the territory of Geopark : shared values of geotourism and ecotourism, access to communication media and information, contribution to the network organization and project development opportunities with other GeoPartners

THE CASE OF THE UNESCO CHAIR “GEOPARKS, REGIONAL SUSTAINABLE DEVELOPMENT AND HEALTHY LIFESTYLES” – A STRONG CONTRIBUTION FOR CAPACITY BUILDING IN GEOPARKS

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Keywords: *capacity-building, cooperation, education, sustainable development, UNESCO*

During the 38th General Conference of UNESCO, the Member States ratified the creation of a new label - the UNESCO Global Geoparks - expressing the governmental recognition of the importance of managing outstanding geological sites and landscapes in a holistic manner. Taking into account this new framework, the University of Trás-os-Montes e Alto Douro (Portugal) decided to present an innovative UNESCO Chair on “Geoparks, Regional Sustainable Development and Healthy Lifestyles”. This process counted with the partnership of the Portuguese National Commission for UNESCO and two UNESCO Offices: Montevideo (Uruguay) and Nairobi (Kenya), along with eight universities spread around the world: Agostinho Neto University, (Angola), Atacama University (Chile), Autonomous University of San Luis de Potosí (México), Complutense University of Madrid (Spain), Eduardo Mondlane University (Mozambique), Federal University of Pernambuco (Brazil), National University of Tucumán (Argentina) and Regional of Cariri University (Brazil). The proposed domains of this UNESCO Chair, particularly those that support its theme, comply with multiple national and international priorities. In this sense, they are in line with UNESCO's priorities, in particular with the Earth Sciences Programmes and its motto "Geosciences in the Service of Society". Moreover, the holistic approach, whose current implementation is a requirement of the management entities of the territories classified as Geoparks, implies approaches able to address the social, environmental and economic dimensions of sustainable development [1], reaffirming the founding principles of UNESCO. More specifically, the focus of this Chair in cooperation with higher education institutions of Portuguese-speaking African countries (PALOP) and of countries in Latin America and the Caribbean (LAC), will contribute to the creation of an academic and scientific cooperation platform capable of strengthening a worldwide dialogue, stimulating cooperation and partnerships, with particular emphasis on capacity building for the establishment and effective implementation of new UNESCO Global Geoparks in these continents.

CONTINUING GROWTH OF GEOPARKS IN CANADA

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Keywords: *Canada, aspiring, geoparks, guidelines, UNESCO*

An historic landmark in the evolution of Global Geoparks was reached last year when UNESCO declared the new UNESCO Global Geoparks Programme. Canada's two existing Global Geoparks, Stonehammer in New Brunswick and Tumbler Ridge in British Columbia, are now UNESCO Global Geoparks. At present, the Canadian National Committee for Geoparks (CNCG) operates under the Canadian Federation of Earth Sciences, and now makes recommendations for Global Geopark nominations to the Canadian Commission for UNESCO. The CNCG comprises a diverse membership from across the country and has been supported financially by the federal Department of Natural Resources. The committee developed guidelines for geoparks in Canada several years ago and it has received formal Letters of Intent from aspiring geoparks, has responded to them and has conducted site evaluation visits before formal applications have been made to the Global Geoparks Network and UNESCO. Members of the CNCG have been actively promoting Global Geoparks in Canada and there are now ten communities with Aspiring Geopark status, representing a great diversity of geological story telling. The committee recently developed criteria for assessing aspiring geoparks to better track the progress of each project. Communities in British Columbia, Alberta, Ontario, Québec, Nova Scotia and Newfoundland and Labrador are at various stages of working towards application and we expect that new proposals and nominations will be ready in 2016. The Percé Aspiring Geopark in Québec is one that hopes to apply to UNESCO later this year. Canada is a large country with diverse geoheritage and the community of people gaining experience in the development of geoparks is steadily growing. The Global Geopark movement has now become firmly rooted in North America and we look forward to a healthy population of UNESCO Global Geoparks in the coming years. Visit www.canadiangeoparks.org for up-to-date information.

COOPERATION BETWEEN THE PORTUGUESE NATIONAL FORUM OF GEOPARKS AND THE SHETLAND GEOPARK AND NORTH WEST HIGHLANDS GEOPARK (SCOTLAND): TAKING THE UNESCO GLOBAL GEOPARKS INTO THE SCOTTISH PARLIAMENT

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Keywords: *cooperation, sustainable development, bottom-up strategy, economic impacts, partnership*

The Global Geoparks Network (GGN) is a dynamic network where members are committed to work together and exchange ideas of best practise and collaborate in common projects which raise both the quality standards and practises of all products of a UNESCO Global Geopark (1). This is achieved when Geoparks cooperate together in strong partnerships which involve local communities, to try to attract support from different agencies. The Portuguese Forum of Global Geoparks was invited by the Shetland UNESCO Global Geopark and North West Highlands UNESCO Global Geopark, to participate in an event that took place in the Scottish Parliament (11th February 2016), in order to share its own experience by delivering the presentation: “Global Geoparks of UNESCO and Regional Sustainable Development - Socio-economic impacts resulting from the dynamics of these territories in Europe”. This presentation enabled the importance of the bottom-up strategy of the Global Geoparks and its fruitful combination of different activities and projects to be conveyed to members of parliament in attendance. The broad range of activities included science, education, culture and tourism and their positive effect on both empowering local communities and supporting sustainable economic development. Global Geoparks contribute positively to public outreach on sustainable development linked to issues such as geodiversity, environment, geohazards, climate change and sustainable use of natural resources. Examples were given of educational programs, cultural activities, scientific research and geotouristic activities promoted by the Portuguese Geoparks. These have contributed to the creation of vibrant regions. In these regions the sense of territorial ownership of its inhabitants has been strengthened, new local companies created and innovative local products developed. All this has contributed to effective regional development.

CREATING A NEW NETWORKING OF THE GLOBAL 'PERIDOTITE GEOPARKS'

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Keywords: *dynamic movement, Earth's interior, mantle xenoliths, peridotite, upper mantle*

Mt. Aposi (Japan), Terras de Cavaleiros (Portugal), and some other UNESCO Global Geoparks are organizing geosites of peridotites derived from the Earth's mantle. Because of the unique origin of peridotites, all the 'peridotite geoparks' have a common subject encouraging visitors to think about the Earth's interior such as basaltic magma source beneath volcanoes, and also about the global-scale dynamic movement such as mountain building during plate collisions.

Mt. Aposi Geopark was located between two major plates in the northern hemisphere during building stage of the Hidaka mountains. The uplifting event of the peridotites has been explained as a westward thrusting of the North American plate on the Eurasian plate. Also, Secia-Val Grande Geopark (Italy) has a couple of excellent geosites of orogenic lherzolites. Terras de Cavaleiros (Portugal) and Geopark Harz Braunschweiger Land Ostfalen (Germany) have geosites of old ophiolitic peridotites exposed in the European Variscan orogenic belt. Troodos (Cyprus) is one of typical Tethys ophiolites exposed along the global-scale suture zone from the European Alps ~ Greek ~ Cyprus ~ Turkey ~ Iran ~ Oman ~ Pakistan ~ Indus Suture ~ Andaman ~ Great Sunda toward the east, involving continent-continent collisions between Africa and Europe and between India and Asia. On the other hand, the Azores Geopark (Portugal) and Jeju Island Geopark (Korea), which are both on volcanic islands, have many geosites of volcanic rocks carrying a lot of peridotite xenoliths derived from the upper mantle beneath the volcanoes.

On account of the small number of 'peridotite geoparks' in the world, the networking through peridotites may be small in size. However, it is valuable for all members to establish a close collaboration to find how to study scientifically and how to explain educationally about the Earth's interior and also the dynamic movement the Earth.

DEVELOPING NATIONAL PROCEDURES FOR UNESCO GLOBAL GEOPARKS IN GERMANY

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Keywords: *national implementation of IGGP, sustainable development, coherence of UNESCO designated sites*

The guidelines for the newly established IGGP encourage UNESCO Member States to get actively involved in the development of UNESCO Global Geoparks and, if they wish, to establish national committees in their respective countries. Being responsible for UNESCO Global Geoparks in Germany, the German Federal Foreign Ministry has taken up this recommendation. A National Committee for UNESCO Global Geoparks in Germany was inaugurated in April 2016. It consists of a wide range of experts specializing in various subjects relevant to UNESCO Global Geoparks, including geosciences, global change, education for sustainable development, regional economic development, tourism etc. In its inaugural meeting, and in line with UNESCO's international guidelines, the National Committee adopted additional national criteria and procedures for UNESCO Global Geoparks in Germany. These criteria are tailored to the German context and specify the international criteria accordingly. They are applied within the framework of a two phase application/revalidation procedure. Potential applicants as well as established UNESCO Global Geoparks in Germany must first address the National Committee before the application or revalidation in question is forwarded to the IGGP Secretariat at UNESCO. Accompanying this new format, a UNESCO Global Geoparks Unit, which serves as the National Committee's secretariat, has been installed at the German Commission for UNESCO. This unit not only assists the National Committee and prepares its regular meetings but also provides guidance and advice to aspiring as well as existing UNESCO Global Geoparks. The new set of criteria and procedures tailored to the specific national context and the implementation of an official UNESCO Global Geoparks Unit at the German Commission for UNESCO aim to secure the high quality of the UNESCO Global Geopark label and to promote an ongoing development of geoparks, in coherence with other categories of UNESCO designated sites, as model regions for sustainable development and international cooperation.

DRIFTING APART: SUPPORTING THE DEVELOPMENT OF NEW AND ASPIRING UNESCO GLOBAL GEOPARKS IN CANADA, NW EUROPE AND RUSSIA

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Keywords: *collaboration, innovation, investment, research, education*

The establishment of a UNESCO Global Geopark is a substantial undertaking; however once operational the economic, environmental and educational opportunities are many. Causeway Coast and Glens Heritage Trust (CCGHT), based in Northern Ireland, is leading a three year INTERREG VB Northern Peripheries and Arctic Region project which supports the development of new and aspiring Geoparks in Canada, NW Europe and Russia. These peripheral areas share common challenges. Populations in many areas are static or declining, with younger generations moving to areas with better economic opportunities. By investing over €1.3 million across seven existing UNESCO Global Geoparks and six aspiring Geoparks, Drifting Apart aims to secure enhanced economic, environmental and educational prospects for those living and working in these areas. Drifting Apart draws upon the expertise of partners to deliver four work packages:

Marble Arch Caves UNESCO Global Geopark has developed the Drifting Apart Storyline. This outlines the common geological heritage of partner areas and provides a set of guidelines for best practice interpretation. Shetland UNESCO Global Geopark is developing geology based education resources for schools, community groups and local businesses. These resources will help partners enhance understanding of their fascinating and shared geological heritage and builds capacity in local communities to enhance and develop geological heritage based products and services. Magma UNESCO Global Geopark is developing 3D virtual learning and remote access platforms for those wishing to visit sites throughout the area. Stonehammer UNESCO Global Geopark is conducting research into the effectiveness of current management practices at geological heritage sites throughout the partnership area. The outputs of all work packages will result in the development of resources and best practice management guidelines for new and aspiring Geoparks in peripheral areas. Aspiring Geopark partners will use these resources to prepare applications for UNESCO Geopark Status in the period 2017 – 2020.

GEOCLIMHOME: AN ERASMUS+ STRATEGIC PARTNERSHIP FOR GEOSCIENCES EDUCATION WITHIN THE UNESCO GLOBAL GEOPARK

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Keywords: *geoheritage, climate change, Erasmus+, geosciences education*

GEOclimHOME (Geoheritage and climate change discovering the secrets of home) is a three years project funded in 2015 by the Erasmus+ Programme within the Key Action 2 Cooperation for innovation and the exchange of good practices which promotes strategic partnership for school education. It supports high school teaching and scientific research between Rokua (Finland) and Sesia Val Grande (Italy) Geoparks. It aims at improving general perception of climate and environmental changes in Europe and the appraisal of geoheritage.

Alternate Italy/Finland exchanges are organised by the project for groups of high school students (aged 16-18). High school teachers, University researchers, local administrators, environmental associations and managers cooperate within the project for developing basic and transversal skills by using innovative methods, enhancing digital integration in learning, teaching, training and youth work at various levels.

During the first year of the project, students participated in field and laboratorial research activities to collect scientific data, such as: dendrochronology, soil profiling, peat analysis, mire drilling, biodiversity and ecological studies, historical maps study, digital data collection, georesources evaluation, geomorphological landscape interpretation. This was useful for them to understand climate change as a multidimensional phenomenon and to recognise both the natural and the human induced aspects of it. Moreover, the hosting of students in families and the use of social media improve language and social skills. Final satisfaction questionnaires filled in by students reveal that they appreciated the experience, considering it very interesting.

First results testify that UNESCO Global Geoparks are unique areas for enhancing relationship between scientific and educational institutions and for improving a societal awareness on geodiversity and geoheritage.

THE GEOPARKS ACTIVITIES AND EVENTS OF CHINA IN 2015

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Keywords: *activities, China, events, features, geoparks*

Chinese Geoparks Network is a communication platform for all geoparks of China. As a promotion and research center, CGN organizes annual conference, workshops and activities every year. All of the activities and events have already become one of the features of Chinese geoparks. You can understand the style of them by viewing this activities and events.

1. Modification of three regulations on geoparks: “Operational Guidelines for Chinese National Geoparks”, “Acceptance criteria of National geoparks of China” and “Technical Requirements for Formulating the Overall Plan of National Geoparks”.
2. Organized the Annual Conference of China’s Global Geoparks 2015 at Dali Cangshan Global Geopark in Yunnan, with the theme of “Geoheritage Conservation and Global Geoparks Network 10 years”.
3. Held “Workshop on application and evaluation of Chinese Global Geoparks” at Mount Kunlun Global Geopark with MLR, to summarize and help geopark managers how to complete the evaluation missions.
4. Cooperate with UNESCO geopark secretariat and GGN Bureau, organized the revalidation missions of Tianzhushan and Hongkong Global Geoparks and evaluation of the proposed Zhijindong Cave Geopark and Dunhuang Geopark.
5. Assisting the MLR to recommend 4 China’s candidates for application of Global Geopark in 2017 and 2018.
6. Participation in the 6th and 7th UNESCO working group meeting on geopark as well as the 38th UNSECO General Assembly, witness the birth of the UNSECO Global Geopark.
7. Participation in the 4th APGN Symposium San’ in Kaigan and promoting coopration and exchange among geoparks.
8. Organized a forum “Development of Geoparks and Geotourism” during the China Mining 2015.
9. Exhibition Tour of All China’s Global Geoparks has been seen in Zigong, Dali Canshan, Wangwushan-Daimeisha, Xingwen, Yanqing, Kunlun and Tianzhushan, and will travel in the rest geoparks.
10. Runing the GGN website (www.globalgeopark.org) and editing 2 issues of “GGN Newsletter”.

THE GLOBAL GEOPARKS NETWORK: THE INTERNATIONAL ASSOCIATION OF UNESCO GLOBAL GEOPARKS

N. Zouros¹

¹GGN

Keywords: -

The Global Geoparks Network (GGN), established in 2004 under the umbrella of UNESCO, provides a platform for cooperation among global 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 is a unique worldwide partnership of 120 geoparks in 33 countries working to protect geological heritage and promote local sustainable development. The GGN's mission is to influence, encourage and assist local societies all over the world to conserve the integrity and diversity of their abiotic and biotic nature resources, to ensure that any use of natural resources is equitable and sustainable, and to support the economic and cultural development of local communities through the validation of their unique heritage and identity.

In 2014, after one decade of successful operation as a volunteer network, the GGN was given a legal existence. During the 6th International Geoparks Conference in Stonehammer Global Geopark, Canada, the GGN General Assembly agreed to the new GGN Statutes, and the GGN became an international non-profit association, subject to French legislation (the 1901 law on associations). It is a non-governmental organisation, which maintains formal relations with the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

The GGN is now an official partner of UNESCO for the operation of the UNESCO Global Geoparks programme under the umbrella of the International Geosciences and Geoparks Programme (IGGP). The GGN organises co-operation and mutual assistance among global geoparks and between global geopark professionals. The GGN also initiates and co-ordinates Regional Geoparks Networks to foster international co-operation and promote sustainable development. The GGN represents, advances, and disseminates knowledge in geodiversity management and other disciplines related to studies in geo-conservation, geo-tourism and geo-education, and the management and activities of global geoparks.

IDRIJA AND UNESCO GLOBAL GEOPARKS COLLABORATIONS

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Keywords: *EU projects, geoparks, UNESCO, partnership*

For organisations dealing with tourism, area promotion and partner connections, international cooperation is extremely important. Beside all of the advantages of gaining the Unesco Global Geopark title, the high value of the Geoparks network is its operations feasibility and the accessibility of potential partners at CC meetings and annual conferences.

Idrija Geopark has cooperated with foreign geoparks since its early beginnings. The first connection came with Arouca Geopark in Portugal. Our mayor and vice-mayor visited it in 2008 to see what a geopark is and how it works. We soon started cooperating with Magma Geopark from Norway and ran a Comenius project together in 2010. We did a bilateral exchange and best practices presentations and this was our first time taking representatives of the local community to a geopark abroad.

Idrija Geopark was first presented at the EGN conference in North West Highland Geopark in 2007. Since then it has been constantly presented at all EGN and GGN conferences. In 2015 we also participated in the 4th APGN network symposium in Japan. Since its beginnings Idrija Geopark has regularly applied for EU funding. The first leading partner was Idrija Mercury Mine which at that time gained Leader+ funds. After the official establishment of Idrija Geopark in 2010 and its integration into the Idrija Heritage Centre we gained significant funding from the Slovenian Unesco Commission (IGCP programme) as well as from Regional development fund. These means helped us organise activities to bring the idea of a geopark closer to the local population and connect them with the institutions. The National Unesco Commission funds are always applied for in cooperation with the transnational Karavanke/Karawanken Geopark.

At the moment we are intensively working on project applications with other European Unesco Global geoparks as project partners (Danube Transnational Programme, Erasmus+, Europe for Citizens, Alpine Space etc.).

KOREA GEOPARK ‘NATIONAL-INTIATED’ SYSTEM

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Keywords: *Korea Geopark, geopark system, national-initiated*

After Jeju Island became a Global Geopark in 2010, National Geopark System was first established through amendment of Natural Park Act in 2011. According to the law, Korea national geoparks are certified by government with the help of National Geoparks Secretariat which was first organized in National Park Service in 2013 and was commissioned to do business for geoparks. National government seems to control individual national geoparks, but individual national geoparks are planned and operated by local authorities. Korea national geopark system, so-called “national-initiated” geopark system has many advantages. It helps areas that have many significant geological heritage to start and develop geopark projects; presents a government budget to national geoparks; collaborates in promoting geoparks; trains geopark interpreters and issues certificates, obtains information and share it in effective way; helps create networking of national and international geoparks; researches on geological heritage; and develops and distributes geopark education programs books and tools. Korea geopark system, of course, needs improvements in many aspects such as law, certification processes, management plans, and so on. However, we suggest that Korea, ‘national-initiated’ geopark system could be introduced in countries, especially countries that will start, develop, and manage geoparks in more efficient way.

LEARNING FROM OTHERS: AN ERASMUS+ PROJECT INVOLVING GEO-EDUCATION

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Keywords: *geoparks, geo-education, Erasmus+, international collaboration*

One of the key aspects of global geoparks is active networking with other geoparks and aspiring geoparks. Another aspect is engaging local communities and interpreting both the physical and cultural environment for educating both the locals and the tourists.

In 2014 a two year Erasmus+ project was initiated involving four countries in Europe involving three UNESCO Global Geoparks, one Aspiring Geopark and four supporting organisations, one in each country. The project leader came from Poland where there is an Aspiring Geopark in very early stage of development in a rural area. The three Global Geoparks involved were Arouca in Portugal, Katla in Iceland and Papuk in Croatia.

The intellectual output of the project was to develop a methodology for Field-trip Geo education. For this purpose two groups were formed in each country, an expert group of five people in each country plus a group of eight teachers/trainers in each country. Each of these groups visited all the other three countries. All in all this involved 156 international visits. The experts groups had the responsibility of identifying and developing geo education activities while both groups got a firsthand acquaintance with such activities in the partner countries.

The paper will attempt to analyse the strengths and weaknesses of such an approach for developing the networking concept in Global Geoparks, the challenges and obstacles encountered, and the final output of the project, the methodology itself.

MUSKAU LANDSCAPE CONVENTION 2015 – THE CONTINUATION OF A VISIONARY CONCEPT OF PRINCE PUCKLER IN RECENT UNESCO WORLD HERITAGE SITE AND A UNESCO GLOBAL GEOPARK

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Keywords: *co-operation Germany-Poland, co-operation UNESCO Heritage and UNESCO Geopark, ice age, landscape architecture, sustainable development*

In the middle of the 19th century the famous landscape gardener Prince Hermann Heinrich Ludwig von Pückler-Muskau created a landscape park of international importance.

On May 1st 1815 Pückler published an invocation on the administration and inhabitants of the small town Muskau for support of his program. In the following time the project was very successful. Today the location is a cultural UNESCO World Heritage Site surrounded by Muskau Arch UNESCO Global Geopark.

Beginning in the time between 1998 and 2000 the World heritage and the nascent Muskau Arch Geopark began a successful co-operation. The idea was to develop touristic relationships and links between the “park spot” and the “park area”. Tourists should not only get the opportunity to spend some hours in the world heritage but to linger more extensively in the neighbouring geopark. Firstly, there is the Pückler landscape park and the castle. Secondly, the extended area with walking and cycling path as well a historic forest and mining railway supplement is well worth seeing. The connection between Pückler’s ideas and the geopark is the geological landscape image. Pückler purposefully used the geological conditions for landscape architecture (river terraces, creeks and river’s islands) and the geopark presents a largely natural preserved ice age landscape (big push end moraine).

A further aspect is the function of world heritage and geopark as gates from west to east and vice versa. That is why both UNESCO destinations are transboundary German-Polish items. To mark the 200 years anniversary of Pückler’s initiative 41 organisations, administrations and public personalities signed the “Muskau Landscape Convention 2015” in order to set a symbol for a future sustainable development.

NETWORKING EFFORTS OF THE CHINA GEOPARKS NETWORK

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Keywords: *networking, China Geoparks network, critical success factors, application, collaboration*

At present, out of 120 global geoparks, 33 are China. In addition to providing better protection for geosites, it is quite well known that China's geoparks deliver obvious benefits to local communities through ongoing local engagement activities and improvement initiatives. However, relatively little is known about the networking activities of the geoparks in China.

China has designated 185 national geoparks so far. Rich in geological resources, these geoparks have been developing rapidly under the umbrella of the China Geoparks Network (CGN). To cope with the increasing number of visitors and to meet their expectations, proper geopark management and operations, along with quality visitor services, are key challenges to all CGN members. Geopark networking is becoming a major tool for improving this work.

This presentation gives an overview of the networking efforts of the CGN. We will discuss some of its major characteristics, critical success factors and their application to other geoparks in the Asia Pacific region, as well as in the Global Geoparks Network (GGN). We will also explore opportunities for long-term collaboration between the CGN and other geoparks in the GGN.

RECENT PROGRESS IN THE DEVELOPMENT OF VIETNAM GEOPARKS NETWORK – AN UPDATE

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Keywords: *committee, progress, network, ministry*

First moves on developing geoparks in Vietnam started more than a decade ago, but after quite a few research works by Vietnamese geoscientists, the first geopark was set up only in 2009 in the Dong Van Karst Plateau, which became a member of the Global Geoparks Network one year later. Internationally, Vietnam UNESCO Natcom and Vietnamese geoscientists actively participated in geopark-related events e.g. the foundation of the Asia-Pacific Geoparks Network in 2008, the MOU between Vietnam and UNESCO General Director in 2010, the second Asia-Pacific Geoparks Network Symposium in Vietnam in 2011. Vietnam UNESCO Natcom also set up a National Contact Point at Vietnam Institute of Geosciences and Mineral Resources in 2009 and the Government has approved a nation-wide program on geopark development in 2014 and in the same year the Dong Van Karst Plateau Global Geopark successfully passed its first revalidation etc. Despite all these achievements, until recently Dong Van remains the only Global Geopark of Vietnam. Needs for a national geopark committee and network become obvious. This paper introduces results of the most recent workshop on improving all these issues in Vietnam which was co-chaired by Vietnam UNESCO Natcom, Ha Giang Province People's Committee and participated by 100 people, including leaders of other relevant ministries of Science and Technology (MOST), Natural Resources and Environment (MONRE), Culture, Sports and Tourism (MOCST), Education and Training (MOET) and Information and Communications (MOIC) as well as leaders of 8 other provinces of Vietnam.

UNESCO GLOBAL GEOPARK'S CAPACITY-BUILDING ACTIVITIES USING DEVELOPMENT AID PRINCIPLES

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Keywords: *capacity building, development aid, UNESCO, GGN*

The operational guidelines for UNESCO Global Geoparks (UGG) promote capacity building, recognizing the role that networking plays in this. UNESCO supports regional workshops in under-represented regions and encourages partnerships between UGGs and aspiring geoparks. Geoparks promote both sustainable development and heritage conservation using an innovative bottom-up approach, which suits areas with remarkable geology in developing countries.

To be effective, the geoparks' capacity-building activities in developing countries should follow the know-how acquired through development aid, with particular reference to the OECD's Paris Declaration on development aid and the Accra Agenda for Action. In the Paris Declaration, five principles were adopted: ownership, alignment, harmonisation, managing for results, and mutual accountability.

To integrate the UGG guidelines and the Paris Declaration, the supply-driven approach (our offer) should be replaced by a demand-driven approach (the actual demands of the geopark area). According to the Paris Declaration, no aid should be initiated without expressed demand from the developing area. Other potential problems include (1) Insufficient information available to decision-makers at the local level about what a geopark means in terms of sustainable development; (2) incompatibility with area development priorities; (3) capacity differences between geoparks and the surrounding area; (4) a lack of supporting institutions; and (5) insufficient or non-existent coordination between the capacity-building UNESCO IGGP and the public and private financial bodies involved with aid for development (harmonisation).

This paper summarizes the efforts of the authors following these principles:

1. Organising GGN information workshops and seminars about geopark concepts and the main value for the surrounding communities (UNESCO and GGN action).
2. Action to facilitate decision-making, such as visits by local delegations to global geoparks, associated with a financial body for aid to development (FELCODE); and technical assistance on the spot.

UNESCO GLOBAL GEOPARK COMMITTEES: CASE STUDIES FROM THE UK AND IRELAND

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Keywords: *UNESCO Global Geopark Committee, UK National Commission for UNESCO, Irish National Commission for UNESCO*

The creation of UNESCO Global Geoparks in November 2015 was a momentous occasion for both global geoparks and geological heritage around the world. For the first time, a designation was created that recognised the importance of our geological and related cultural heritage and the strong role that geology has in science, education and sustainable development.

Underpinning the UNESCO Global Geoparks are the various National Committees that have been established to advise and guide existing and aspiring UNESCO Global Geoparks in many of the member states. Two of the earliest National Committees were those in the United Kingdom and Ireland, both of which were instrumental in the establishment of the UNESCO Global Geoparks designation.

Both the UK UNESCO Global Geoparks Committee and the Irish UNESCO Global Geoparks Committee operate with the full support of their relevant National Commissions for UNESCO. They have many similarities, but also differences and the UNESCO guidelines were developed to allow for National Committees to operate in a format that is appropriate to each member state. While the overall functions of each National Committee remain the same, by comparing those of the UK and Ireland, it is possible to see the different approaches each has taken and how they are relevant to particular needs of each country.



Regional and International UNESCO Global Geopark Collaborations Poster Presentations



COMPARATIVE ANALYSIS OF THE VISITOR'S EXPECTATIONS AND BEHAVIORS IN CHINESE AND SPANISH GLOBAL GEOPARKS

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Keywords: *twinning agreement, geoparks cooperation, geotourism, tourist demands*

Twinning agreements are very common among geoparks. In 2015 and 2016, several Chinese and European Global Geoparks signed agreements. In order to obtain the common objective of telling the History of the Earth, the twinning geoparks must analyze their visitors' expectations and behaviours.

Sharing this information is a productive goal of the geoparks' twinning agreements. In a global perspective of having global visitors, the geoparks need to professionalize their tourism services including having a clear vision of their visitors' interests and demands. An exchange of local sources of information has served to select some indicators such as visitor lifestyle, factors favouring the decision: other countries, other cultures, other landscapes, activities and experiences, possibilities to customize, complementary offer –gastronomy, cultural heritage, sport, shopping, relax and spa -, safety, quality warranty and constraining factors: distance, language, culture, services, cost, etc.

The number of indicators is not high in order to produce rapid data exchange. They are considered sufficient to show the interests of visitors from each country and their way to organize their visit. In addition this simple study could encourage other global geoparks to add their own data for a more general knowledge of the visitors' expectations and behaviors around the globe.

This poster offers the preliminary results in illustrative graphs and tables.

DRIFTING APART – OUR JOINT HERITAGE

N. Maguire¹, A. Bratton¹, K. Lemon², G. Bremner³, E.S. Jónsson⁴, M. O'Neill⁵, A. Blain⁶, A. Yakoleva⁷

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Keywords: *networking, innovation, geoheritage, skills, collaboration*

Causeway Coast and Glens Heritage Trust will present a poster, on behalf of the Drifting Apart partnership, which outlines the outputs of this INTERREG VB Northern Peripheries and Arctic Region Project. This project brings together seven existing UNESCO Global Geoparks and six aspiring Geopark areas to unearth and strengthen the understanding, appreciation and enjoyment of the fascinating and interconnected geological heritage of Canada, north-west Europe and Russia.

THE EXHIBITION TO SHOW THE VALUE OF THE GEOPARKS NETWORK – TOYA-USU UNESCO GLOBAL GEOPARK, JAPAN

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Keywords: *volcano, geo-harvest, geo-story, tourism, geopark collaboration*

At present, there are 40 national geoparks in Japan. Each geopark has a unique history behind its land formations. Visitors can enjoy nature, culture and products developed in each area.

The exhibition of geo-harvests, themed “Water connects the earth and humans”, renewed and opened on March 2016, tells you a variety of geo-stories related with the local products and the bottled waters from each Japanese geopark.

The exhibition was realized by close collaboration with the Japanese Geoparks Network includes the 7 UNESCO Global Geoparks in Japan. We introduce the exhibition’s aim such as to discover the stories between the geological formations on the earth and the day-to-day lives of people, and to take advantage of the opportunity to visit each actual geoparks.

Also you can find information about the UNESCO Global Geopark and 120 regions in the exhibition.

UNESCO GLOBAL GEOPARKS IN ITALY: TERRITORIES AND NATIONAL ORGANIZATION

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Keywords: *geoparks, national committee, geoheritage, management*

Italy is known worldwide not only for history, art, traditions, culture, landscape and environment, but also for an extraordinary geological heritage. A region where volcanoes, mountains, coasts, lakes, glaciers, rivers tell a complex evolutionary history. This charming collection of geological, geomorphological, palaeontological, mineralogical, geomining, geothermal values and more fostered projects, initiatives and actions for the enhancement of the Earth Heritage, entirely consistent with the concept of "Geopark" as developed at a global level. For these reasons, Italy is well represented at an international level with ten territories accepted in the UNESCO Global Geoparks network: Madonie Geopark and Rocca di Cerere Geopark (both recognized in 2001) in Sicily, Beigua Geopark (2005) in Liguria, Sardinia Mining Geopark (2007), Adamello Brenta Geopark (2008) in Trentino, Cilento and Vallo di Diano Geopark (2010) in Campania, Tuscan Mining Geopark (2010) and Apuan Alps Geopark (2011) in Tuscany, Sesia Val Grande Geopark (2013) in Piedmont and Pollino Geopark (2015) in Calabria.

After the creation of the new label UNESCO Global Geoparks, in March 2016 the Italian National Committee of Geoparks has been established to coordinate common actions and activities at a national level. The main tasks of the Italian National Committee meet the requirements of both the UNESCO Global Geoparks Operational Guidelines (IGGP) and the Global Geoparks Network Statutes: to coordinate the UNESCO Global Geoparks in Italy; to guarantee the contribution of UNESCO Global Geoparks from Italy to IGGP, GGN and EGN; to promote the development of new UNESCO Global Geoparks in Italy; to provide information and popularize the IGGP, GGN, EGN aims and activities at the national level (through several tools: brochure, newsletters, workshops, conferences, etc); to act as the operational structure of the Italian National Commission for UNESCO to deal with regarding UNESCO Global Geoparks issues, assessing and endorsing applications, revalidations and extensions.

SYNERGY BETWEEN GEOPARKS AND BIOSPHERE RESERVES THROUGH HAKUSAN AS FOCAL POINT

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Keywords: *network, Geopark, biosphere reserve, UNESCO*

Hakusan Tedorigawa National Geopark is an aspiring geopark, partly overlapping with the Mount Hakusan Biosphere Reserve. As an overlapping site, we are seeking some ways to create synergy between these two designations.

For instance, when describing an area's ecosystem as a biosphere reserve, the topography, geology and climate that constitute its background are indispensable. Incorporating the essence of the geopark gives further depth to the story of the biosphere reserve's ecosystem and culture.

On the other hand, having two projects moving forward at the same time in the same area, raises concerns regarding competition on financial and human resources. To address this, the Hakusan Tedorigawa Geopark has adopted an organizational system that the same staffs are in charge of both projects. Staffs of the Hakusan Tedorigawa Geopark also work as staffs of the Mount Hakusan Biosphere Reserve.

During the reorganization of the Japanese Biosphere Reserves Network (JBRN), we have advocated for the importance of local initiative and face-to-face networking, which was later adopted, learning from its experience working within the Japanese Geoparks Network (JGN). This accomplishment has been presented in international conferences of both projects, such as the 4th Asia-Pacific Geoparks Network Symposium, the 14th Meeting of East Asian Biosphere Reserve Network (EABRN), and the 4th World Congress of Biosphere Reserves.

In the UNESCO Global Geoparks Celebration Forum held in Hakusan Tedorigawa Geopark in January 2016, which was organized together with JGN, the Operating Unit Ishikawa/Kanazawa (OUIK) in the United Nations University and other organizations, the experiences of biosphere reserves through the 40-year history as a UNESCO project served as input for the geoparks, which became an official UNESCO project. With Hakusan as the bridge between the two networks, we would like to deepen their ties so that they can learn more from each other.

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