



ADAMEZZO BRENTA GEOPARK
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Abstracts Book

Geoparks and sustainable development

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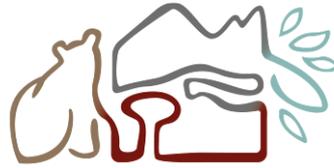
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1. Geoparks, sustainable tourism and sustainable local development
2. Conservation, science and research
3. Education, public awareness and communication
4. Geoparks, climate change and geo-hazards
5. Regional and International UNESCO collaborations
6. Aspiring Geoparks

and following the presentations chronological sequence.



ADAMEZZO BRENTA GEOPARK
Madonna di Campiglio - Italy

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Keynote

8th INTERNATIONAL CONFERENCE
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THE GLOBAL GEOPARKS NETWORK

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Keywords: Global, Geoparks, Network, UNESCO

The Global Geoparks Network (GGN) established in 2004, under the umbrella of UNESCO, as an international network, which provides a platform of cooperation among Geoparks. The GGN consists a unique worldwide partnership including 140 Geoparks in 38 countries working to protect geological heritage and promote local sustainable development.

The GGN mission is to influence, encourage and assist local societies all over the world to conserve the integrity and diversity of abiotic and biotic nature, to ensure that any use of natural resources is equitable and sustainable and to support economic and cultural development of local communities through the valorization of their unique heritage and identity.

In 2014 after one decade of successful operation as a volunteer network the GGN gained legal personality. The GGN General Assembly during the 6th Geoparks Conference in Saint John, Canada agreed to become an international non-profit association.

The GGN General Assembly is the Networks legislative body and the elected GGN Executive Board the managing body of the association in between two ordinary General Assemblies.

Global Geopark activities have been part of the UNESCO work plan since 2001 and, since 2004, UNESCO has offered ad-hoc support to Global Geoparks upon requests from individual Member States. In 2015 the 38th UNESCO General Conference ratified the statutes of the new International Geoscience and Geoparks Programme and the UNESCO Global Geoparks Operational Guidelines, introducing the brand UNESCO Global Geopark as a label of excellence for areas that meet the criteria set by the above mentioned guidelines. In doing so, the GGN became officially the partner of UNESCO for the operation of the UNESCO Global Geoparks programme. GGN has a seat in the programme's structure as well as an important role and specific duties on the Geoparks evaluation and revalidation process.

The GGN organizes co-operation and mutual assistance between the UNESCO Global Geoparks and the Global Geopark professionals to develop and promote the Geopark concept world-wide.

The GGN initiates and co-ordinates Regional Geoparks Networks which enhance international co-operation in Geoparks building and management, supporting local communities and fostering local development. The GGN includes the European Geoparks Network (since 2000) the Asian-Pacific Geoparks Network (since 2007) and the Latin American and Caribbean Geoparks Network (since 2017) and is working for the establishment of similar networks in other regions.

The GGN taking into account the need of coordination of Geopark activities at the national level and the increasing number of UNESCO Global Geoparks, encourages the operation of a GGN national body including all the members of the GGN in each country.

Working Groups have been authorised by the Executive Board to implement programmes and activities, and to serve as a channel of communication between members of the GGN with similar scientific and professional interests. Currently there are the following GGN Working Groups: on Geo-Hazards, on Geoparks in Volcanic Areas, on Geological heritage assessment, on Tourism, on Education, on Sustainable Development Goals, on Island Geoparks.

The GGN is collaborating with specialists and investing towards a global marketing and communication strategy on UNESCO Global Geoparks.

The GGN established a partnership with World Tourism Organization on the International Year of sustainable tourism. The GGN coordinates the Geopark participation and promotion in International Tourism Fairs such as (ITB Berlin, FITUR Madrid, ITB-Hong Kong, etc to promote Geoparks as sustainable tourism destinations and build new bonds with the international tourism market.

UNESCO GLOBAL GEOPARKS AND AGENDA 2030

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Keywords: Sustainable Development Goals

In September 2015, the member states of the United Nations, on the occasion of the Organisation's 70th anniversary, adopted the Agenda 2030 and the new Sustainable Development Goals. Agenda 2030 is a plan of action for people, planet and prosperity and recognizes that eradicating poverty in all its forms and dimensions is the greatest global challenge and the key requirement for sustainable development. Agenda 2030 comprises 17 sustainable development goals (the SDG's) and 169 targets which are integrated and indivisible and balance the three dimensions of sustainable development, i.e. the economic, social and environmental. The SDG's and targets will stimulate action over the coming years in areas of critical importance for humanity and the planet and now underline all aspects of work within all UN Organisations, including UNESCO.

A few months later, in November 2015, UNESCO adopted the new site designation "the UNESCO Global Geopark." This presentation will explore how the work of UNESCO Global Geoparks are also part of Agenda 2030 by examining how they are helping to deliver both the SDG's and some of the targets contained therein. For example, SDG 12 is "to ensure sustainable consumption and production patterns," while target 12.B is "to develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products. This is one of the core aims of UNESCO Global Geoparks. By using examples from across the Global Geoparks Network, this presentation will illustrate how integrated the work of UNESCO Global Geoparks are with other aspects of Agenda 2030.

UNESCO GLOBAL GEOPARKS AND THEIR CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS. THE NEW CHALLENGE OF ADAMELLO BRENTA UNESCO GLOBAL GEOPARK IN PARTNERSHIP WITH AUDI FOR EMISSIONS REDUCTION AND CLIMATE CHANGE MITIGATION

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UNESCO Global Geoparks can be considered key actors in the promotion and contribution to the 17 Sustainable Development Goals (SDGs) of the Agenda 2030. In this sense, in the framework of the SDG N. 13: "Take urgent action to combat climate change and its impacts", especially target 13.3 "Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning", the UNESCO Global Geoparks developed strategies and several activities towards the achievement of this goal.

In this context, the Adamello Brenta UGG, acting in partnership and cooperation between local and national stakeholders, wishes to bring and share its experience and a new project created with the Audi company aimed to combat climate change and its impacts, sharing knowledge, ideas and best practices internationally through the Global Network.

The mountain areas natural attractiveness represent both a value to preserve and a touristic resource to take advantage of. These two realities are related and, at the same time, in conflict because the anthropic pressure on nature involves environmental risks. People want to visit natural areas and most of the times need to use motor vehicles to reach important sites. Mobility is therefore one of the elements of this problematic relationship: it modifies the natural landscape, interferes with the cultural tissue and can lead to attractiveness loss of natural areas.

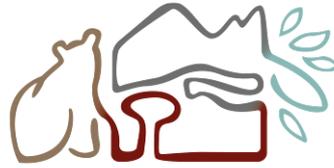
Adamello Brenta UNESCO Global Geopark developed several projects during the last years in order to plan sustainable mobility: efficient public transport, traffic regulation, pedestrians' and cycle's mobility have been the main goals to manage large tourist flows in the most important valleys of the protected area.

The Audi Company offers a leap forward to this strategy, making mobility and travelling a part of the Geopark experience. New "green" technologies and a long term partnership with this territory are the base of the synergy between Adamello Brenta UGG and Audi. The Audi e-tron, g-tron and e-gas projects started new technologies development and production of eco-sustainable vehicles which allows to reduce up to 80% of CO₂ along the entire production's process.

The natural proceeding of a path started with Madonna di Campiglio years ago, will lead Audi and the local authorities and stakeholders to the creation of a vehicle-closed city centre, the first mountain centre in Italy to apply sustainable strategies for emissions reduction. The eco-sustainable vehicles will be the only ones to be admitted. To complete the scenario, from the experimental area of Madonna di Campiglio, the eco-sustainable vehicles will arrive in the valleys, where the tourist flows deeply impact the natural environment. The worldwide-known company's loyalty to environmental cause is testified by previous experiences, such as the supporting to the One Ocean Foundation created in Costa Smeralda, partner of the Intergovernmental Oceanographic Commission of UNESCO.

The Adamello Brenta UGG necessity to deal with mobility, connected to more and more greater tourist flows, identifies in this partnership the best sustainable mobility solution, since it is made of concrete actions for emissions reduction and educative messages. A green synergy for a sustainable use of the Geopark's natural assets and for the education of the broad public to combat climate change.

Therefore, the Adamello Brenta UNESCO Global Geopark with this project together with AUDI can be as model regions for sustainable development in its regional and national context. On the other hand, this project can be an example that the Adamello Brenta UGG wishes to share with all the UGGs, allowing sharing solutions to effective contributing to the Sustainable Development Goals.



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PLANNING SMARTER, INCREASING IMPACT

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Keywords: *Management, Local Population, Event, Outreach, Marketing*
Session: Geoparks, sustainable tourism and local sustainable development

Many UGGp's have to carefully manage their financial and human resources to achieve their annual targets. The Chablais UGGp has been working with stakeholders to improve the effectiveness of its actions that focus on the local population. The objective was to maximize the impact of the UGGp events and to improve the returns on its invested resources. Chablais UGGp has a layered strategy for engaging with the local population and the visitors to the region. Within this context a number of events are scheduled for the summer months for the general public. However, it was felt that the Geopark could heighten the impact of its actions by concentrating its broad appeal events within a dedicated 10 day festival. Specific objectives included improving the impact of the communication campaign and to create an anticipation "buzz" ahead of the event. The new event was planned to take place during the European Geopark Network week in late May/ early June, which is a falls outside the main tourist season. A discovery program that spanned the territory was developed; this proposed starkly contrasting actions ranging from the Nordic walking discovery of geosites to the creation of a community fresco. Drawing on the network of Geopark partners, territorial visitor attractions offered discounted entry and special events. This new initiative commenced with a weekend of publicity at Evian that coincided with the annual parade of traditional Lake Geneva paddle steamers. This high impact opening to the new Chablais UGGp festival proposed free workshops, autonomous activities for the discovery of local heritage and was completed by a novel presentation of the Chablais UGGp, Lake Geneva and more at the top of a celebrated mature tree. Event management studies show that new initiatives generally take a number of years to achieve notoriety and realize their full potential. This presentation will however also share the results of the first Chablais UGGp festival in 2018.

ASO UNESCO GLOBAL GEOPARK: PROMOTING SUSTAINABLE DEVELOPMENT AFTER A SERIES OF DISASTERS

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Keywords: *Aso, sustainable development, disaster, education, tourism*

Session: Geoparks, sustainable tourism and local sustainable development

The Aso UNESCO Global Geopark encompasses a giant caldera formed by a mega-eruption approximately 90,000 years ago, and a volcano that is still active even today in the center of the area. A unique feature of the park is the communities in and around the caldera that have been built and developed around the blessings from the earth. Approximately 50,000 people live inside the caldera where they have been passing down their way of life for generations on generations.

In recent years, a series of natural disasters - volcanic eruptions, torrential rains, and earthquakes – have occurred in the Geopark and threatened the lives of local people. Most notably, in 2016, the Kumamoto Earthquakes destroyed much of the area's infrastructure. Even now, two years later, transportation systems are still in reconstruction and recovery, indicating the scale of destruction. Damages from the quakes were severe not only from the primary disaster, but also from secondary disasters. Tourism in particular has suffered.

The Aso UNESCO Global Geopark introduces the lives of local people, who coexist with the volcano: the development of their culture, and also the activities of local communities still recovering from the disasters. After the quakes, we developed a new program that visits disaster sites and offers ideas regarding disaster prevention and response from geological and geographical perspectives. We also promote the program as a geo-tour and a school educational travel program.

The Aso UNESCO Global Geopark aims to contribute to the world through activities promoting disaster prevention and education. As a one-of-a-kind place that allows people to feel and experience the moment-to-moment activities of the earth and where people can learn of the earth's systems, we encourage cooperation with national and global Geoparks, and are building an environment that people can truly feel global geological connections.

TRAINING AND DESIGN WITH LOCALS (GEO-DESIGN)

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Keywords: *conservation of intangible heritage, local participation, museum design*

Session: Geoparks, sustainable tourism and sustainable local development

Case study: Gouron Lench Building and Sailing Open Air Museum to support an intangible heritage of UNESCO, Qeshm Island Global Geopark, Persian Gulf, Iran

The classical purpose of “design” is to make the life more comfortable and enjoyable. Many people are enthusiastic to interfere in the design process but most of the designers don’t prefer to let them do so. People like to experience the delight of creating, while some designers believe ordinary people threaten the perfection of the project. It is our belief that designers and people can be complementary each other. According to our belief, a significant experience in Qeshm was practiced among one of JICA Pilot Projects through the process of formulating an Eco-Island Master Plan.

Gouron Open Museum Pilot Project started to discuss and plan with locals from May 2016. On the other hand, the implementation started in Feb 2017 in Gouon village in the western parts of the geopark next to the protected areas of mangroves that is a part of Man and the Biosphere Program of UNESCO as well.

Gouron village has a long history of building and overhauling of Lenchs (=Lenjs, dhows), a traditional type of wood-made vessels for long-haul sailings. “Traditional skills of building and sailing Iranian Lenj boats in the Persian Gulf “was also registered as an Intangible Cultural Heritage by UNESCO in 2011. The locals in Gouron village have been supported to unify, discuss, dream, and practice several activities in the framework of the project. They learned how to set up a goal, how to improve through training, how to involve women, how to develop a rural museum and how to operate it, and how to support other villages.

The Project also learned that designers should forget their perfectionism and trust the locals instead. Designers, planners, and architects can utilize their knowledge in order to make a good project, make sure that the works meet the professional codes that are technically acceptable.

The young people in Gouron village do not grace in traditional Lench building and only 2 out of 5 workshops are active in this area. A few international workers are working there. It is anticipated that the museum will blow a new life to the area through tourism.

The presentation shows the objectives, planned activities and actual events and lesson-learned through the implementation process of the project by emphasising on “design with people”.

GEO-SERVICES FOR PEOPLE - REFLECTIONS ON THE CONCEPT OF ECOSYSTEM SERVICES AND THE GEOPARK APPROACH

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Keywords: *Geo-Services, Ecosystem Services, Geopark concept, UNESCO Global Geopark, Swabian Alb*
Session: Geoparks, sustainable tourism and local sustainable development

The concept of Ecosystem Services was first presented by the Millenium Ecosystem Assessment (MEA) in 2005, captioned with “Ecosystems and human well-being”. Since that time, man increasing number of publications show huge interest in this concept, and currently e.g. in Europe there are joint mapping activities to provide the society with spatially explicit values of ecosystem services - in all types of landscapes - for human well-being. Sometimes, the so-called ecosystem services are interpreted as landscape services – what indeed they are – which means, that geographical units (and its systems` properties) provide those services. Therefor the term “Geo”, understood in its wider sense (and not limited to e.g. geology), can build a basis for geo-related services of “ecosystems”. We call them Geo-Services. The Geopark concept in general is based on earth history and shall make this to be experienced by people. Geology, soils and its properties as well as influences on land use are the themes to be transported to society. Basic units are geotopes (and therefor to be protected), but the whole landscape in a Geopark should contribute to education and awareness, to sustainable tourism as well as to regional development. Hence, the message of a Geopark is quite a holistic one, and shall contribute clearly to a (sustainable) well-being of the people. This was promoted also by the UNESCO Programme since Nov. 2015 to potentially certify the Geoparks as UNESCO Global Geoparks, and refer their message to the so-called Sustainable Development Goals (SDG). In this presentation we reflect and report about the meaning of the above mentioned concepts – Geo-Services and Geoparks - when they are brought together. Geo-Services, like Ecosystem Services, are essential for life fundamentals, for the provisioning, regulating and cultural services for human well-being. They are based on Geodiversity and the properties of landscapes (or ecosystems). They contribute to material fundamentals of good life, social coherence, health, as well a safety. This will be exemplified by some features of the UNESCO Global Geopark Swabian Alb, in order to show what we mean by “Geo-Services for People”.

MARKETING PLACE – THE STUDY CASE OF PAIVA WALKWAYS IN AROUCA UNESCO GLOBAL GEOPARK (PORTUGAL)

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Keywords: *Paiva walkways, Arouca UNESCO GLOBAL GEOPARK, Marketing Place, Geotourism, World Travel Awards*

Session: Geoparks, sustainable tourism and local sustainable development

The Paiva Walkways, located in the north of Portugal, in the Arouca UNESCO GLOBAL GEOPARK, are today an international reference. This project has twice won the World Travel Awards (2016 and 2017) in the category of “Europe's leading tourism development project” and is now again nominated in 3 categories for the 2018 World Travel Awards. Its unique engineering and architectural work has positioned this place as an icon in the context of Marketing Destinations and Place. The great motive of attraction is the possibility of establishing a contact with nature in Rio Paiva. The geotouristic journey through the Paiva Walkways, are integrated in the "Route of the Geosites of Arouca Geopark", allows the observation of several white water rapids that have interpretative panels on their explanations and geological origin, and where the visitors are called, in a responsible attitude, to understand the habitats and cultural heritage. This project is becoming a major driver of geoeducation and geoconservation actions among diverse audiences from the youngest to the oldest, through active management on reforestation with autochthonous species. In another hand, it is, in fact, a key infrastructure that has yet to have a real socio-economic impact on the region. More than 750.000 visitors, on less than 3 years, come from all over the world to feel this new touristic attraction. The Municipality of Arouca is the highest authority responsible for its management, and last years has demonstrated how it is possible, in an effective partnership between public and private organizations, to provide quality and differentiation of the destinations and promote a singular experience and feel the sense of this unique place. Now, new opportunities and new projects, public and private, are planned to complement this new offer promoting the increase of the overnight stay of tourists in the region.

GEOPARK SUSTAINS LOCAL COMMUNITIES: AN EXAMPLE IN ZIGONG UGGP

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Keywords: *Zigong, Sustainable development, Communities, GGN, UGGp*

Session: Geoparks, sustainable tourism and local sustainable development

Several geoparks within the Global Geoparks Network (GGN) have already proved that it can sustain local communities. A geopark will not succeed without the support of local communities. It is significant to give local people a sense of pride in their region and sustain communities through using geological heritage and all other aspects of the area's natural and cultural heritage. Geoparks, being the tourist hot spots in nowadays, encourage geotourism with the help of inspiring local enterprises, creating new jobs and offering training courses. In this paper, we provide Zigong UNESCO Global Geopark (UGGp) as an example and discuss in detail the cooperation among geopark and local communities. Zigong UGGp is an old member of GGN with a history of 10 years. This territory is well known for its dinosaur and vertebrate fossils of the Middle Jurassic Period and Salt mine of the Triassic Period. Due to these international significant geological resources, Zigong UGGp attracts millions of visitors from all over the world each year. However, only a few local communities can enjoy the benefits at first as the limited geopark boundary. It is a turning point after Zigong UGGp submitted its extension application that increasing communities are actively involved in the management and development of the geopark. Zigong UGGp cooperates with local communities to set up new connection, not only the peripheral hardware but also quality of personnel, management and services, covering conservation, education, geotourism and sustainable development. The geotourism transportation have been improved as well as the guidance system, which raising the status of geopark's accessibility and visibility. A fossil village near Zigong Dinosaur Museum has been jointly established as well as a community fossil conservation station which is close to another important fossil burial site. An ecological tea base, operated by geopark, tea company and local village, becomes a new hot spot blending of geology, ecology and tea cultural. Zigong UGGp signed partnership with local schools and launched a lot of education activities. Besides, Zigong UGGp offers local people a serial of training courses. So far, it has been proved that the geopark could not only support local sustainable development but also help local people to acquire earth knowledge as well as improve their lives.

THE INDIGENOUS VOICE IN LATIN AMERICAN UNESCO GLOBAL GEOPARKS

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Keywords: *Indigenous people, Sustainable development, Geotourism, Geoparks, Awareness*

Session: Geoparks, sustainable tourism and local sustainable development

50 million people living in Latin America are considered indigenous. They account for about 9% of the Latin American population, but represent 14% of the poor and over 17% of all Latin Americans living on less than USD 2.50 a day. Far from being a single group, the indigenous people of Latin America are made up of many different groups with very diverse languages, traditions and ways of life. Their use of a distinct language, as well as other indicators of identity such as dress, music and religious beliefs define their uniqueness. Although they made important social progress, they did not benefit to the same extent as the rest of Latin Americans. Indigenous people continue to be confronted with glass ceilings and structural barriers that limit their full social and economic inclusion. Some of the issues facing these groups today include poverty, land ownership, inequality and preservation of their traditional culture and language in the face of globalization. To successfully reduce their vulnerabilities, many reports suggest looking at indigenous issues through different lens which take into account their voices, cultures, and identities. UNESCO Global Geoparks can be that different lens. They give local people a sense of pride in their region and strengthen their identification with the area through local economic development. They create innovative local enterprises, new jobs and high quality training courses stimulating new sources of revenue generated through geotourism. UNESCO Global Geoparks ensure the active involvement of indigenous people as key stakeholders and protagonists. Geoparks recognize indigenous people's resource management systems, know-how, practices and governance structures. These are all valuable components of sustainable development. The development and implementation of co-management plans will include their specific social and economic needs, protect the landscape in which they live and conserve their cultural identity. It will be a reciprocal process as indigenous knowledge, practice and management systems should be included, alongside science, in the planning and management of the area.

GEO-IN WEB-BASED APPLICATIONS AS A USEFULL TOOL FOR GEOTOURISM SUPPORT AT PSILORITIS AND SITIA UGGPS

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Keywords: *geotourism, virtual route, web-applications, panoramas, story map*

Session: Geoparks, sustainable tourism and local sustainable development

The insular Geoparks of Greece and Cyprus, namely, Lesvos, Psiloritis, Sitia and Troodos are implementing a new INTERREG project, titled GEO-IN, to support geotouristic activities through the promotion of natural and cultural heritage, the development of new and improvement of existing infrastructure, the creation of new touristic products and the intervention of ICT technologies in all steps and products. The Natural History Museum of the University of Greece, as a partner of the project, is responsible for the development of new educational and promotional tools for both Psiloritis and Sitia UGGps that will focus in interactivity, usability and content quality. The e-geodiscover and the interactive web-based maps will assist the visitors to plan their trip in these two geoparks and provide them with the ability to virtual tour the natural and cultural sites of the geoparks using both mobile and desktop devices. In addition, will support various educational and promotional activities for locals and potential visitors. Core tools for both products will be the “Story telling maps” which offer a structural presentation of a specific area in relation to spatial reference and existing web maps. The “Story Maps” will incorporate virtual tours of the geoparks and existing trails or other paths that will be chosen (i.e. cultural trails). They will consist of certain number of interconnected 360 – 180 degrees spherical panoramas with linked multimedia products, to demonstrate the geosites, natural assets, tangible and intangible cultural heritage and broader wealth of the geoparks. The Panoramas enable the global overviewing of the sites placing the observer at the center of a sphere located either on the terrain or above, using drone cameras. All the interconnected digital assets will be spatial fixed and accurate regardless the scale of observation. The “Story maps” will be referenced in respect to simplified and popular geological and topographic maps to offer an alternative, ease and interactive experience through mobile devices. The interactive web-based maps and the e-geodiscover will be offered as free applications either on-line through the internet and mobile telephony, or off-line. The acquisition of data is almost finished, “Story Maps” are already been created and the two products are expected to be launched by the end of the year.

CROSS-BORDER PHOTO MARATHON IN THE SERVICE OF SUSTAINABLE TOURISM

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Keywords: *crossborder, best practice, sustainable, Photo competition, geotourism*

Session: Geoparks, sustainable tourism and local sustainable development

One of the main events during the European Geoparks Week of the transboundary Novohrad-Nógrád UNESCO Global Geopark was the Medves Photo Marathon this year. It was held on 1-3 June 2018. The centre of the programme sponsored by the Olympus company was the headquarters of the Geopark, in Eresztvény (Salgótarján, HU). This Photo Marathon was the 4th of its kind in a row. It proved to be an exceptionally effective tool for raising public awareness of nature conservation issues, for promoting the geopark idea and sustainable tourism and for strengthening the co-operation among the main stakeholders of the Geopark and of the local inhabitants. The field of these experiments was the picturesque Medves Plateau, the largest basalt lava plateau in Central Europe, a protected landscape, which extends from the Hungarian to the Slovak territory of the trans-border Geopark. This media event provided for amateur photographers from all over Central Europe an opportunity to meet and capture the natural, historical and cultural assets of this borderless and photographer-friendly Geopark, which proudly maintains its identity. There was a focus on controlling environmental impact, only small-group guided tours could enter the area, the tracks had prior nature conservation authority permits on both sides of the border. The tours started from Hungary and ended in Slovakia, the guides were professional experts of nature conservation organizations, like the Bükk National Park Directorate, providing expertise and surveillance. More than 100 volunteers helped manage the event, who during their work unwittingly become advocates of the Geopark. The photographers, participating in several specific and guided programmes, could compete with their best photos taken during the event in the categories of landscape, people and living nature. The programmes by themselves were exciting. For night photos, ruins of the fortresses standing on volcanic peaks were illuminated and experts delivered field lectures about astrophotography under the night sky. The dawn photos tried to catch the sunrise. Accompanying people could discover the rich folklore of the Palóc ethnic group inhabiting the Geopark. Sunset photography was paralleled by activities like catching and identifying insects and bats. The multifaceted Photo Marathon has proved to be a very successful grassroots marketing tool of our modern time. It brought people of different interests together, made them sensitive to nature and landscape protection and strengthened the identity of the Geopark for outsiders and inhabitants alike. Its large scale forced effective cooperation among staff members and stakeholders of the Geopark. As a side effect, the output has been viewed so far by hundreds of thousands of people using different social media platforms. Through their experiences, the participants became advocates of the Geopark, shared their photos on their own websites and blogs. The exhibitions of the best photos are circulated in schools and public cultural institutions on both sides of the Geopark. The Photo Marathon is the favourite common practice of the Slovak-Hungarian cross-border Novohrad-Nógrád UNESCO Global Geopark.

DESIGNING A NEW GUIDED TOUR WITH DIVERSITY

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Keywords: *guided tour, a role of local guide, comprehensive understanding of Geopark, diversity, monetization*

Session: Geoparks, sustainable tourism and local sustainable development

This presentation will discuss the important role of a local guide group to convey messages of a Geopark through the “geo-story.” Muroto City Tourist Guide Association (MTGA, hereafter) has conducted several new guided tours since 2015. The main area of guided tour of MTGA, so far, has been at the very tip of Cape Muroto since its establishment in 2008. Cape Muroto has been the most popular and well-known place among tourists and is the place where there is the signature geological formation of Muroto UGGp. However, MTGA has been faced with dealing with the diverse needs of tourists and also to monetize its guided tours for sustainable tourism from the viewpoint of guide’s income. It is not possible for Geoparks to sustain tourism without local guides. If they cannot earn their living from a guide activity, no guide will keep working for the Geopark. MTGA, therefore, has designed and conducted the following guided tours to deal with the situations cited above.

1. Feel Muroto Tour Main route of the tour is still at Cape Muroto but MTGA introduced a new concept which is an “interpretation.” The guide is there not to “teach” geological knowledge but to “find” something together that tour participants are interested in. In this tour, the guide can change the route flexibly following the interests of the participants. 2. Walking on Finishing Port Tour Murotsu Port Site is categorized into both cultural and geological site. Tour participants walk in a local town that has thrived on fishing. They can also shop and eat local dishes at a market in order to talk with locals. They can feel the atmosphere of the town. 3. Hiking Tour to Lighthouse at Cape Muroto Tour participants walk on a walking trail at Cape Muroto and go on a hike to Murotozaki Lighthouse on the mountain. More and more tourists have participated in this tour recently. It is popular among people who want to be refreshed on their day off and who already went on a regular guided tour at Cape Muroto. The Geopark is where you can learn a connection between locals’ lifestyle and nature/science. MTGA, therefore, wants to show Muroto Geopark comprehensively with those above diverse guided tours. Guides believe that guided tours should be a tool to tell people the “geo-story.” Moreover, because several guided tours are offered to respond to the various needs of tourists, MTGA will also be able to monetize its guided tours for sustainable operation for the association.

SOME STRATEGIES FOR THE PROTECTION OF GEOPARK & GEOHERITAGE IN THE DEVELOPMENT OF UNESCO GLOBAL GEOPARKS

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Keywords: *Geoheritage Protection, Geopark Protection, Geopark development, Construction experience, System Discussion*

Session: Conservation, science, research

In recent years, the UNESCO Global Geoparks have been booming. Most of the geoparks focus on science education and community economic cooperation. However, the fundamental condition for the survival of geoparks is the existence of geoheritage. The protection of geoheritage should be equally valued and even placed in a more important position. The author will discuss some effective measures to protect the geoparks and geoheritages based on experience in the development of Chinese Geoparks. The thesis will not only focus on regular technical protection, but will make in-depth discussion on more aspects, such as management systems of the geopark. The author will also put forward his own thinking regarding the hot issues of geopark boundary and the selling of geological materials. It is hopeful that my thesis will be provide some inspiration to leaders and managers of other geoparks that which are still under construction.

GEOLOGY OF THE ADAMELLO MASSIF: FROM WOLFGANG SALOMON TO GIOVANBATTISTA DAL PIAZ

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Keywords: *petrography, historical geological maps, Adamello, tonalite, Eastern Alps*

Session: Conservation, science and research

The Adamello, which is mostly comprised within the Adamello Brenta Geopark (Trentino, Italy), is the largest body (670 km²) among the Cenozoic intrusions of the Alps. The complex and fascinating history of the geological interpretation of Adamello is described, also using historical geological maps and materials. Salomon considered the Adamello as a cogenetic suite of plutons belonging to the “Periadriatic Igneous Province”. Vom Rath (1864) coined the name “tonalite” for the rocks cropping out south of the Tonale pass. Stache (1874) realized the first Adamello map (Hammer & Trener, 1908), but the first coherent geological map was published by Salomon at scale 1:75.000 in “Die Adamello gruppe” (1908-1910) memoir. Trener (1912) mapped the Re di Castello and Adamello tonalites, identifying the Adamello as the younger and the Corno Alto as the older plutons. Bianchi and Gb. Dal Piaz mapped at 1:12.500 scale the Re di Castello tonalite and gabbro bodies (1937) and at scale 1:250.000 the whole Adamello (1948). In the new 1:100.000 Monte Adamello sheet G. Dal Piaz et al. (1953) reported the existence of four magmatic superunits: Re di Castello, Adamello, Presanella and Corno Alto, each of them consisting of various intrusions. Callegari and Gb. Dal Piaz (1973) illustrated the pluton field relationships showing that the Adamello superunit was preceded by the intrusion of Re di Castello and followed by Presanella. Many gabbroic rocks are intruded the basement and cover rocks around the Adamello tonalites, i.e. at Mt. Mattoni, Mt. Marsler (Zanettin, 1956), lago Baitone (Cereghetti, 1988) and Mt. Ospedale (Locardi, 1958). The earliest studies of Bianchi and Gb. Dal Piaz (1937), Colbertaldo (1940), Hieke (1945), Malaroda (1954) and Callegari (1963) were improved by Brack (1985), John and Blundy (1993), Morgante (1972, 1981), Sonderegger (1980), Ulmer (1982) and Ulmer et al. (1985). Ulmer also distinguished the Val Fredda gabbro from the Blumone one on the basis of different crystallization sequences. The Adamello batholith is cross-cut by numerous dykes of basaltic to granitic composition (Salomon 1908-1910), partly described by Riva (1896, 1897) who observed that lamprophyres were younger than aplite dykes. These studies on dykes were improved by Colbertaldo (1942, 1950), Dieni and Viterbo (1960, 1961), Callegari (1963) and Brack (1980, 1984; Mt. Frerone), most from Padua University. The meeting “Il Magmatismo Tardo-alpino nelle Alpi” in Padua (1983), the publication of a special volume of the Italian Geological Society (1985) and the “Geological map of the Tertiary Adamello batholith at scale 1:50.000” (Callegari E., Gb. Dal Piaz and Gatto G.O.) published on 1998 were the conclusion of this period of field and petrographic works regarding Adamello, promoted by the Istituto di Geologia of Padua University. In the Padua meeting, a model involving multiple intrusions of mafic magma modified by increasing degrees of crustal assimilation to generate tonalitic magma was proposed for Adamello on the base of the Sr, Nd isotopic compositions (Del Moro et al. 1985) and the chronological sequence of intrusions from Re di Castello (about 42 Ma) to Presanella (about 29 Ma) was finally defined.

THE INVESTIGATION AND PROTECTION OF GEOHERITAGE IN CHINA

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Keywords: *Geoheritage Investigation, Geoheritage Protection, Science Population, Geopark, Development*

Session: Conservation, science, research

Under the guidance of Ministry of Land and Resources and Ministry of Finance of China, as well as the arrangement of China Geological Survey, the work carried out by China Institute of Geo-Environment Monitoring, to survey the important geoheritage in China, is basically completed, which has found out the background of geoheritage resources of 31 provinces (include autonomous regions and municipalities directly under the central government) and has found out the characteristics, scope, value and protection status of 6228 geoheritage at the provincial level and above. The work lays a solid foundation for the protection and scientific utilization of geoheritage in China. Meanwhile, we have formulated the first one standard of geoheritage survey and established the data base for geoheritage collecting, analyzing and summarizing, compiled the distribution map of important geoheritage resources in China, come up suggestions on the protection and utilization of geoheritage. All of them have played a leading role for the global geoheritage investigation and protection. In the construction and operation of geoparks, making full use of the attribute property of geoheritage resources can not only improve the scientific research level, but also provide the knowledge base for teaching and science population, and more can contribute to the sustainable development of the geopark. This paper focuses on the achievements of geoheritage survey in China and the transformation as well as application in geoheritage protection and science population.

NEW CLOUDINA GEOSITES IN VILLUERCAS-IBORES-JARA UGG, SPAIN

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Keywords: *geosites, biomineralization, Cloudina, Ediacaran, geodynamic*

Session: Conservation, science, research

The fossil record of abundant and diverse biomineralized skeletons first appears during the Cambrian period (approximately 530 Ma), in what is known as the "Cambrian explosion". In the 1970s, the first mineralized fossils of the terminal Ediacaran were discovered in Namibia. They are included in the genus *Cloudina*, a fossil of small size and tubular aspect that constitutes the first mineralized fossil assigned to metazoans, marking a crucial milestone in biological evolution. Subsequent research has shown that *Cloudina* had a wide distribution in the Ediacaran world (Oman, China, western United States, western Canada, eastern Russia, Spain, Uruguay). At present, several *Cloudina* occurrences are known from the Central Iberian Zone (Central Spain) where *Cloudina hartmannae* and *Cloudina carinata* are associated with *Sinotubulites*, another early biomineralized fossil. *Cloudina carinata* was first described from an area close to the Villuercas-Ibores-Jara UNESCO Global Geopark, Spain. The fossiliferous levels with *Cloudina* are located in two different palaeoenvironments: (1) continental shelf carbonate platform of the Ibor Group and (2) slope and basal environments of the Rio Huso Group with allochthonous accumulations (olistostromes) that include blocks of limestone (olistoliths) with *Cloudina*, transported by the collapse of the carbonate platform. The Villuercas-Ibores-Jara UNESCO Global Geopark is the only geopark in the world that includes these exceptional fossiliferous levels with some of the earliest biomineralized metazoans. The "Arroyo de la Fuente" geosite include shelf deposits with *Cloudina*. However, despite its great scientific and didactic interest, it does not meet ideal conditions for a geosite, since it is located along a road cut and therefore with dangerous access. The same stratigraphic level has been located in the newly proposed "Cerro de la Mina" geosite with similar or greater scientific value, greater didactic and landscape value and optimal conditions of accessibility. The new "Arroyo Pedroso" geosite, located in La Jara area, includes allochthonous accumulations of carbonate blocks (olistoliths, some with *Cloudina*) deposited in slope and basal environments. Its excellent exposure provides a high scientific and educational value to which must be added its great landscape value and peculiarities of the flora. The two newly proposed geosites constitute an efficient tool with which to explain the late Ediacaran geological history in the Villuercas-Ibores-Jara UNESCO Global Geopark. This includes the early evolution of biomineralizing animals and the palaeogeographic context and geodynamic evolution of the area.

GEOPARK EDUCATION AND AWARENESS RAISING - A TOOL FOR INCLUSIVE AND PARTICIPATORY DEVELOPMENT

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Keywords: *Education, public awareness, indigenous knowledge, service providers, tool*

Session: Education, public awareness and communication

This presentation will examine the approach of Non nuoc Cao Bang geopark in carrying out its activities on public awareness raising and education to enhance the effective contribution of geopark model to sustainable socio-economic development. Non nuoc Cao Bang is currently an aspiring geopark. In order to meet the criteria of a global geopark title, Non nuoc Cao Bang has been paying attention to make people aware of the importance of the development of this sustainable socio-economic model. To do so, it is important to further public awareness, communication and education of geopark for inclusive and participatory socio-economic development. Communication and awareness rising for public officers is one of important aspects to boost the effectiveness of Geopark model. Public officers are those who are employed by local government of Cao Bang province being in charge of social and economic areas and they have profound impacts on the development of geopark. The development of geopark does not engage geological heritages but social and natural heritages as well. Thus, experience from Non nuoc Cao Bang geopark draws attention on the need to, firstly focus the communication and raising awareness among public officers for an enabling environment for geopark development. Due to limited resources for communication and public awareness rising, this would link the need of the mobilization of the current administrative system resources of local government in partnership with the geopark to raise public awareness. In addition, this presentation praises raising awareness on being a global geopark partner and training for local service providers. This rationale will be drawn from experience of Non nuoc Cao Bang geopark in helping service providers improve their service quality and increase their benefits. Particularly, the integration of indigenous knowledge in school learning and community education is necessary for inclusive and participatory development. This presentation also considers experience of Non nuoc Cao Bang geopark in developing the geopark education as a tool to teach young generations and communities the traditional cultures, history of their place, conservation of heritages, particularly make them feel proud of these identities as well as help them be aware of social and natural issues faced by their communities. The conclusion of this presentation focuses on the necessity to carry out public awareness raising, school and community education of geopark for inclusive and participatory geopark development.

POPULARIZING GEOLOGY IN ROKUA UNESCO GLOBAL GEOPARK

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Keywords: *geology, popularize, geopark, information, Rokua*
Session: Education, public awareness and communication

The Geological Survey of Finland (GTK) has worked for many years with the clear aim of spreading knowledge about geological heritage to the public, to the tourism sector, and to places of education. The key task has also been the increase of geological knowledge in basic school education. GTK also provides professional help to the authorities and the local projects in their work to create new Geoparks in Finland. GTK has been in strong cooperation with Rokua UNESCO Global Geopark from the beginning 2010. Concurrent with geological work, the GTK has mapped geologically valuable natural sites. As a result of the mapping work, a geological outdoor map series has been developed for people interested in nature. On the maps, geological sites in the areas are shown and an explanation is given of their development and their effect on the existing nature and landscape. The maps have been made from the larger national park areas of Finland and Rokua UNESCO Global Geopark. Today this map series contains twelve outdoor maps and geological guides. The Rokua Geological outdoor guide is based on detailed LIDAR elevation model where all the landforms in the Geopark area are very visible. It also contains routes and geological explanations for the geomorphology and formations in the area. The guide opens the doors to a visitor in the geological world of Rokua area. GTK has designed georoutes and geological exhibitions for audiences all over Finland. In the local history museum located in Säräisniemi, Rokua geological exhibition was built mainly for use of local schools and inhabitants. In the exhibition local geology, bedrock and surficial deposits with samples and posters are presented. Exhibition has been very popular among school groups and local visitors. Utajärvi Geological Time Trail represents the history of Finnish bedrock. The trail is 92 meters long and consist of 55 boulders representing different bedrock types and ages in Finland and Rokua. Boulders make a timeline from the formation of Earth to present day. The Trail has guidebooks in Finnish and English and it is often visited by school classes. Geo trails and information panels in the Geopark area are planned to give visitors good and clear view about the formation of geosites and whole geological story of the area. Panels and sites are planned to be suitable in educational purposes for schools, excursions and all visitors. The information center Suppa provides centralized information about all the services, possibilities to hike, study and see in the geopark. Suppa has an exhibition which gives information about geology, nature and settlement history of the area beginning from the retreat of the last ice age. Good cooperation between local schools and Geopark staff has been very fruitful way to popularize and spread the geological knowledge. Work has been done in both ways by visiting in the schools and having lessons and school classes visiting in field and having guided tours in nature. Also international school class cooperation and student exchange has been very active.

INTEGRATED APPROACHES FOR GEOHERITAGE VALORISATION WITHIN GEOPARKS: THE “LOANA GEOTRAILS PROJECT” (WESTERN ITALIAN ALPS)

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Keywords: *Physical landscape evolution, Multidisciplinary educational approaches, Geotrails, Loana Valley (Western Italian Alps), Sesia-Val Grande geopark*

Session: Education, public awareness and communication

The realization of new geotrails within Geoparks of recent institutions may benefit of the most innovative methodologies addressed to educational applications and management practises. Concerning the evolution of physical landscape, a topic particular significant in mountain environment, several approaches may be used. Among them, multidisciplinary methods for data analysis and dissemination are welcomed especially when educational activities are addressed to both primary and secondary school. In the framework of the Sesia Val Grande Geopark and along one of the main accesses to the Val Grande National Park, in the Western Italian Alps, a project for the realization of a geotrail network has been launched. In this area, along the upper portion of the Loana Valley, where the geological and geomorphological features are emphasized by the presence of the Insubric Line, multidisciplinary investigations on landforms worth to be identified as potential geomorphosites were performed: i) geomorphological mapping; ii) dendrogeomorphological reconstruction of processes affecting geomorphosites; iii) petrographic and microstructural characterization of rock samples along the Insubric Line. From the scientific analysis some hot-spots emerged, that are ideal for the valorisation through the proposal of two geotrails. These geotrails are thought to be linked to the other thematic trails present in the Geopark territory. The trails are addressed to different targets of students and people and are planned to be equipped with specific panels. The realization of dissemination facilities is planned to be realized in the near future.

A NEW EXHIBITION CONCEPT IN DONG VAN UGGP: "THE POCKET MUSEUM". AN INNOVATIVE INITIATIVE TO STRENGTHEN LINK WITH GEOPARK PARTNERS AND INCREASE LOCAL SUSTAINABLE DEVELOPMENT

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Keywords: *Fossil Conservation, Community involved, sustainable tourism and sustainable local development*

Session: Education, public awareness and communication

DVUGGp hold a fossil brachiopod site from Devonian, extremely fragile and located in a road curve. Its opening to the public as well as its conservation were extremely problematic and should require an important investment without satisfactory solution in term of conservation. 100 m below this site, in the same geological level, is located a village of the Giay ethnic group with a private homestay opened in a traditional Giay house build 200 Years ago.

The idea was to connect more closely the site with the homestay and install on a wall close to this traditional house a rebuild "brachiopod site" using sample and fossils already pull out by erosion. This "rebuild site" is used in substitution of the original site which will not be opened to the public.

In complement, Inside the home stay is installed a "Brachiopod pocket museum". This pocket museum was designed with a minimalist vision (2M2 surface on the home stay wall) and with a deliberately limited budget (500€). It present a wooden showcase with 17 pieces (fossils and actual brachiopods as well as Brachiopod jewellery) and 20 A4 documents explaining the brachiopod history, particularities and their actual representative ecosystems.

The homestay owner has received a specific training to take care and present the "pocket museum" to the visitors.

By this innovative experience, DVUGGp would like to demonstrate that high quality equipment could be realized on an integrated form without important investment and afford an integrated significative local sustainable development supporting local initiative.

LANDSCAPE AS A PEDAGOGICAL TOOL

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Keywords: *Geopark, Beaujolais, Landscape, Tool, Citizenship*

Session: Education, public awareness and communication

Since the beginning of the Geopark Beaujolais project, the development of educational actions is one of the major axes of the action plan. The UNESCO Global Geopark Beaujolais offers each year a personalized support for schools that request it. During the last year 2017-2018, the Geopark Beaujolais accompanied five primary schools in their projects, which were all based on the landscape analysis. Why be interested in the landscape? In France, the scholar program for primary pupils (7-10 years old) is based on the discovery of their environment, of their village. The landscape reading workshop is interesting, because it brings to children a new vision of where they live. This awareness is part of learning and awakening in children's educational curriculum; they can now have a better idea about the development of the village and, at a larger scale, the evolution of the Earth. This is the first step to become a citizen! In practice, all projects started in the same way, with a landscape reading over the village where the school is located and its close environment. This allows to introduce the different keys of reading of a landscape and the technical aspects (foreground, background,...). The landscape reading has to be simple. The main goal is for children to be able to make the difference between the village and its surroundings. Then, they can spot the main building in the village and describe its function, the main human activities, the naturel environments, etc. In some cases, it is possible to create a map of the village. From the children's knowledge of their village and after the landscape reading, the notion of changing landscapes can be introduced. It can be evolutions on the long time (geological time) or on the short time (human time). Pupils observed landscape is "alive", it evolves over time and these changes are visible all around them. In order to be aware of evolutions over the long time, the group realized wall readings in the village. Almost all the old village centers of Beaujolais are built from local stone, usually found in the area. So we can deduce by the analysis of the stones of the buildings the general geological context of the sector, which refers to radically different past environments radically compared to today. Landscapes evolutions are also visible over a short time (about 100 years). Pupils worked on actual and old (1920's and 1930's) photographs of their village; in order to compare these pictures and determine the main evolutions. Population censuses were also analyzed, as well as the cadastres. Children could understand the villages and landscapes evolutions with these documents, in link with the job of the inhabitants and the modification of the village situation. The various educational projects conducted this year on the theme of the landscape accompanied the children's awareness of the world around them, of its varied components and its evolutions in time which determine the environment in which they live.

EDUCATIONAL ACTIVITIES FOR REFUGEES IN LESVOS ISLAND UNESCO GLOBAL GEOPARK

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Keywords: *Education, refugees, Lesvos Island UNESCO Global Geopark, geoheritage, natural disasters*

Session: Education, public awareness and communication

The world refugee crisis has led civil society to mobilise, and initiatives calling for greater support to refugees have multiplied across countries. Lesvos Island UNESCO Global Geopark, committed to the principle of respect for human dignity, has undertaken a series of initiatives aiming to alleviate the refugees who have left their countries and after a long and difficult trip have arrived on the island of Lesvos. They are organized by the Natural History Museum of the Lesvos Petrified Forest in collaboration with international and Greek non-profit, non-governmental organizations implementing programs of humanitarian action in Lesvos. The information activities and educational programs address refugees who are unaccompanied minors, families and adults living in refugees' hosting structures in Lesvos. These initiatives concern the organization and implementation of educational activities and non-formal educational programs with the aim of acquainting and raising awareness on the protection of the geological, natural and cultural heritage, geo-conservation and awareness raising on the protection against seismic hazard. One of the main objectives of the activities are acquaint refugees with the Petrified Forest of Lesvos, a unique 20 million-year-old petrified ecosystem and with the nature and culture of Lesvos, to stimulate their interest in our planet, the evolution of life, the importance of geosites and to discover the common links of the geological heritage. The activities also include awareness raising on geological hazards and give information on the causes of geological hazards and measures that have to be taken to reduce their impact. Under the motto "Our common global geoheritage", the activities are carried out in the Natural History Museum of the Lesvos Petrified Forest and the Sigri Petrified Forest Park and are implemented by the scientific staff of the Museum, the managing body of the Lesvos Island UNESCO Global Geopark. Participants use specialized scientific equipment for research and conservation of fossils, interactive multimedia applications and they are experiencing the simulation of major earthquakes on the Museum's seismic simulator and are trained in prevention and protection measures during an earthquake. The actions are being implemented within the framework of RURITAGE (Rural Regeneration through Systemic Heritage-led Strategies), a four-year EU funded project launched in 2018 where migration is one of the six Systemic Innovation Areas. Implemented in two UNESCO Global Geoparks (Lesvos Island, Greece, and Bergstrasse-Odenwald, Germany) it promotes awareness for migrants and refugees about the natural and cultural environment and the opportunities these generate for their own lives.

VIRTUAL REALITY DOWNUNDER - OUTBACK GEOTOURISM MAKES IT REAL!

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Keywords: *Virtual, Reality, Geotourism, Outback, Australia*

Session: Education, public awareness and communication

Interpretation and marketing tools to promote and attract visitors to the wild and wonderful Witchelina Nature Reserve in the Willouran Ranges of the far northern outback of South Australia have been developed by Nature Foundation of South Australia (NFSA) in conjunction with the University of South Australia. These include comprehensive track notes, detailed signage and maps for 4WD nature and geotourism drives; guides for walking trails; geotour brochures with photographs, Google Earth “fly-through” tours and satellite images; and substantial on-the-ground infrastructure. Both guidance and enjoyment, but also survival need to be considered for this isolated, remote and harsh desert outback landscape. Initially paper-based material was developed, followed by digital media acquisition and processing, with a view to incorporating this within the NFSA website, and allowing access through internet and mobile technologies. The aim is to integrate these digital technologies to produce complete and fully stand-alone Virtual Reality (VR) Geotours for each track and trail. Witchelina is a highly exposed inverted sedimentary basin in an ancient mountain belt, which has been and deformed by complex folds and thrusts. It is most spectacularly revealed from above, so satellite (Google Earth), airphoto and drone footage has been acquired and interpreted for the whole 440 Km² area of the Witchelina Nature Reserve and for individual geological domains, for each separate nature drive, and for the many individual geosites (about 40) so far described. Vertical and oblique aerial images and video have also been used. Likewise photographs and GoPro videos have been collected from moving (4WD) vehicles and from geotour routes, individual outcropping geosites, which have also been supplemented with 360 degree panoramas (panatours) together with sound and video recordings including narrated geological descriptions of each geosite. Visitors may therefore access fully integrated VR geotours for each nature drive, which may be downloaded (from the Cloud) and used remotely by mobile and remote handsets (Iphone, laptop and Ipad) either prior to the tour, during the tour or for memories and reflection afterwards. The VR geotours thus also provide tourists who may be unable to undertake full tours with an opportunity to sample some or all of the tours remotely. This leads to the question as to whether the development of a complete Virtual Tour of these nature drives is likely to enhance or replace the need to undertake the tour in person? Will the release of these VR Geotours enhance or supplant the need to undertake a 90km 6 hour drive across these rugged outback ranges? And will potential tourists be tempted and excited by this new multimedia facility or will they be discouraged from travelling often very long distances from overseas or even within Australia, to see, taste, smell and touch the reality of Outback Geotourism?

EDUCATION FOR SUSTAINABLE DEVELOPMENT IN GERMAN UNESCO GLOBAL GEOPARKS: THE WAY FORWARD

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Keywords: sustainable development, ESD, learning process, model region, Agenda 2030

UNESCO Global Geoparks (UGG) are model regions for sustainable development and play a crucial role in identifying, promoting and living sustainable lifestyles. The path to sustainability are continuous transformative learning processes at the individual as well as the societal level. Therefore, education - understood in a broader sense going way beyond the schooling of pupils and students - is one of the core tasks of UGGs.

Education for Sustainable Development (ESD) has been promoted by UNESCO since 2004 as a firmly established concept and practice. It is especially suited to guide any learning and education activity of UGGs.

In Germany, ESD has been broadly accepted as the key framework for learning in UGGs. In November 2017, representatives of all six German UGGs discussed with ESD experts and practitioners, at a workshop organized by the German Commission for UNESCO, the benefits of integrating ESD into their work. The result was a common understanding of ESD, a shared vision and also a jointly defined set of specific needs and possible next steps to achieve that vision. Ideas were exchanged on how the UGGs can further develop their educational activities within the wider context of the Sustainable Development Goals (SDGs) of the Agenda 2030 and the UNESCO Global Action Programme on Education for Sustainable Development.

Based on the results of that workshop, which can be understood as entry point into a longer-term process, all UGGs in Germany will develop their own educational concepts and management plans based on ESD principles, strengthening their role as agents for change towards sustainable development within the geopark region and beyond.

THE ECORS PYRENEES PROJECT: SCIENTIFIC KNOWLEDGE FOR EDUCATION AND LOCAL SUSTAINABLE DEVELOPMENT

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Keywords: *ECORS-Pyrenees, research, geosites, educational resources, sustainability*

Session: Education, public awareness and communication

The most representative and known cross-section of any part of the Pyrenean mountain range is the ECORS cross-section (acronym in Spanish for Continental and Oceanic Study by the Seismic Reflection and Refraction) which, from Toulouse (France) to Balaguer (Spain), runs parallel to the Noguera Pallaresa valley, in a North-South direction. The very well preserved of thrust structures and related synorogenic materials in the Geopark project of Conca de Tremp-Montsec was one of the main reasons for the acquisition of structural data along this profile. From the scientific point of view, the ECORS-Pyrenees profile (1985-1986) represented a very important milestone for modern geology world-wide, because being the first deep seismic survey that could obtain a complete image of a whole orogen on a crustal. The project was a good example of cooperative effort, through a multidisciplinary teamwork, of Spanish and French private companies and public institutions. New knowledge, concepts and ideas rose as a result of this survey creating an exceptional geological heritage based on an integrated interpretation of both surface and sub-surface geodata. This background has contributed to make the territory, in which the Conca de Tremp-Montsec is located, a world famous natural laboratory to study orogenic processes, formation mechanisms of the sedimentary basins, evolution of paleoenvironments and life, among others. The study of such data has been also incorporated in many textbooks and abstracts, both in Spain and outside, and has been used by multiple private companies and public institutions for the technical formation of their geoscientists and other earth related disciplines. One of the purposes of the Geopark is the identification, study and development of educational resources of different geosites, associated to the ECORS-Pyrenees profile, and to broad their intrinsic value and use in subjects that have an increasing societal impact, such as Geo-hazards, Hydrogeology and Earth Resources, among others. This follows the values and strategy of the Conca de Tremp – Montsec Geopark, aimed to strengthen the scientific knowledge to the service of society. In conclusion, the ECORS-Pyrenees profile is an example of a scientific research project, framed now into Geoparks values, which can raise awareness for local sustainable development, provide educational resources and the achievement of the interdependence between science and social development.

"SEEING IS BELIEVING" IN THE COMMUNITY EDUCATION PROGRAM

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Keywords: *Community education, Study tour, Quang Ngai, conservation, tourism development*

Session: Education, public awareness and communication

Non-formal community education is crucial to raising awareness, building partnerships and influencing actions to engage local populations in working for conservation and the development of sustainable tourism. Quang Ngai is blessed with a rich natural, cultural and geological heritage but these resources are adversely affected by the pressure of economic development, the overexploitation of resources and inappropriate planning. The engagement of local communities throughout the development process plays a vital role to ensure the effective conservation and sustainable development of a geopark's heritage. The Community Education Program which raises awareness in the local communities about these issues leading to gradual changes in their behavior is the foundation for their active and meaningful participation in conservation and the development of sustainable tourism. Seeing is believing. The Program is flexible and not limited itself to boring in-house training. Interesting study tours are organized to experience successful conservation models where participants can observe the management, learn from experienced conservation experts, share experiences with decision-makers, chat with tourists, learn from fishermen and tourism service providers, discuss with fellow farmers, and experience themselves as eco-tourists. Under the Community Education program, more than 200 local community members and local government officials from the aspiring geopark areas in Quang Ngai Province have been invited to take parts in seven 4-day study tours since 2017. In various activities during the tours, the participants are able to observe and compare the similarities in terms of the approach to natural resources, heritage and human impact. Based on their experiences they discover what they can copy or even improve on in their home area concerning conservation and the promotion of sustainable tourism development. The program is initiated and supported by Doan Anh Duong Company, a private enterprise in the province.

THE NEED FOR COLLABORATION AND NETWORKING FOR ESTABLISHING A NEW GEOPARK : SATUN ASPIRING UNESCO GLOBAL GEOPARK, THAILAND

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Keywords: satun geopark, Thailand geopark, collaboration and networking, new geopark
Session: Regional and International UNESCO collaborations

Satun Aspiring UNESCO Global Geopark, located in Southern Thailand has a total area of 2,597.21 km². It was promoted as a provincial geopark since 2014. It is the first Thai National Geopark and was nominated for membership of the UNESCO Global Geopark Network by the Thai government in 2016. Satun Geopark was established to fulfil the requirements of communities, and aimed at protecting and promoting their heritage sustainably. It is designed to operate from the bottom up. It took at least 3 years to reach the UNESCO Global Geopark criteria through the strong support and collaboration of many stakeholders and partnerships including : local communities, local enterprises, restaurants, hotels, tourist agencies, local schools, universities, community college, Satun governor office, Satun office of Natural Resources and Environment, Provincial Administrative Organization, 14 subdistrict Administrative Organizations, 2 subdistrict municipalities, 2 national parks, wildlife sanctuary, Department of Mineral Resources, Thai National Commission for UNESCO and etc. Satun UNESCO Global Geopark is involved in strong networking among members of the existing UNESCO Global Geopark Network, national geoparks in other countries including international experts from the UNESCO Global Geopark Network, Asia-Pacific Geopark Network (APGN), European Geopark Network (EGN), Chinese Geopark Network and Japanese Geopark Network.

The long journey involved in establishing Satun Aspiring UNESCO Global Geopark as the Thailand's first geopark and the geopark of the people was so difficult and complicated. Dealing with the local inhabitants and all stakeholders is a necessary and sophisticated process. At least three main groups of people need to be involved in the project including people/agencies within geopark, national agencies and international collaborators. The best tools and mechanisms are collaboration together with formal and informal networking. People are the "golden key" for successfully establishing an new UNESCO Global Geopark Geopark.

THE ROLE OF LIONS NATURE EDUCATION FOUNDATION AS A SUPPORTING PARTNER OF HKUGGP

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Keywords: *Networking, Collaboration, Communication, Innovation, Challenges*

Session: Regional and International UNESCO collaborations

The LIONS Nature Education Foundation was formed in 1990 with the specific mission and goals of supporting the promotion of, and work related to, nature conservation. Following the establishment of Hong Kong Geopark in 2008, the LNEF offered its services in building a more sustainable path to the future through the publication of geopark books, and the production of souvenirs and displays related to the geopark. After many discussions about developing a preemptive strategy and an ongoing capacity building program, supported by lectures and visits to Global Geoparks, the LNEF started to participate in the early stages of conceptual development and strategy formulation for many innovative geopark projects. LNEF members provided valuable expertise, vision and enthusiasm for the projects in the early stages, when the outcomes were usually not very clear. The LNEF has become a highly valued strategic partner of Hong Kong UNESCO Global Geopark throughout the full life of the various programs and initiatives it is involved with. With first-hand experience accumulated through direct exchange with UNESCO Global Geoparks and support for the work of GGN and its members, the LNEF has gradually developed a unique role in supporting the Global Geopark movement both locally and internationally over the past decade. This presentation will share their experience and views on

- (1) contributing to Global Geopark networking;
- (2) collaboration and support for infrastructure and innovative projects;
- (3) communication and networking; and
- (4) the challenges in developing sustainable projects.

***BERGSTRASSE-ODENWALD UNESCO GLOBAL GEOPARK (GERMANY): THE
“GLOBAL NOMADIC ART-PROJECT (GNAP)” - IN SUSTAINABLE DIALOGUE
WITH GEOLOGY, NATURE, LANDSCAPES AND MANKIND***

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Keywords: *Global Nomadic Art, in dialogue with landscape, photo exhibition, UNESCO WHS Messel Pit, artists and refugees*

Session: Regional and International UNESCO collaborations

When nature artists develop a relationship with their surroundings, the resulting artwork may be sophisticated and ephemeral, catching the passing moment. Each work of nature art is a unique blend of rocks, animals, plants, objects, landscapes and people, which are given a new meaning through the individual vision of the artist. This is exactly what a group of 20 international nature artists achieved in two weeks within the framework of the “Global Nomadic Art Project“ (GNAP), which took place in Bergstrasse-Odenwald UNESCO Global Geopark, initiated by the International Forest Art Association. The artists were provided with background information about the geology, nature, history and landscape at a number of exceptional locations in the Geopark including UNESCO World Heritage Site Messel Pit. The series involving 16 art workshops lasted several hours, resulting e.g. in “Adam and “Eve“, a tiny Roman settlement, a meeting of clams, a stone meal, Namibian rock mountains and the sophisticated association between vines, flowers and fruits. One of the most important considerations was the recognition, that Mankind is an integral part of nature. Thus the holistic approach used in nature art taps into a new emotional and philosophical level promoting the dialogue between humans, earth, nature and landscape – a vitally important aspect in view of the current global changes and a perfect bridge for supporting the communication and implementation of the SDG’s 2030 in the UNESCO Global Geopark by hands-on projects. The nature artists documented their works of art photographically and as audio and video recordings, which is an essential aspect, since the works of art are altered by natural processes, but photos are permanent. Finally, the photos were integrated into a large exhibition, shown at the International Centre of Forest Art Darmstadt. This summer, the exhibition has also been presented in the UNESCO WHS Messel Pit Visitor Centre and in the Environmental Education Centre Kühkopf (both Geopark Entrances) in combination with a movie of the arts project. Next year, the GNAP will be continued and extended by inviting nature artists from cooperating UNESCO Global Geoparks worldwide and by integrating an intercultural programme for refugees into the workshops as well as into the making of the art pieces. The big, all-embracing show of the complete Global Nomadic Art Project from all continents will take place in 2020 in Gyeongju (South Korea). The GNAP Germany is part of the globally active international YATOO-Project (South Korea) which addresses large-scale global changes such as the destruction of nature or climate change and sees the works of art as an inspiration to think about our own relationship with nature – a perfect link to the UNESCO Global Geoparks philosophy.

PRESENTING DANUBE GEOTOUR PARTNERS IN THE EMERGING VISITOR CENTER OF IDRIJA UNESCO GLOBAL GEOPARK

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Keywords: *visitor centre, interpretation, sustainable tourism, tectonics, partnership*
Session: Regional and International UNESCO collaborations

The Danube GeoTour project ending in June 2019 connects eight EU countries with six UNESCO Global Geoparks, one aspiring geopark and one national geopark. It will result in a joint Danube GeoTour involving a variety of itineraries, and comprise a set of innovative geoproducts and geointerpretation sites, based on the unique natural and cultural heritage of the Danube region. With the activities, the involved partners want to establish a smart balance between preservation and geo-tourism growth, to develop the Danube Geotour as a unique sustainable tourism product, to strengthen partnership, and to enhance visibility of the Danube Geotour as well as the participating geoparks. In one of the working packages of the project, the partnership is dealing with the interpretation of the geological heritage. Since geology is an extremely difficult topic to explain and interpret to the public, the first activity within the working package was to screen best practices and new trends in geointerpretation, and implement geointerpretation training. All participants gained new skills to interpret selected geological topics: tectonics, water, geo-time, metamorphic rocks, geohazards, dialogue between Earth & Man, and geomorphology. Each partner is working on one of the selected themes and piloting one activity, which is part of the Geopark's Visitor Centre or other Geopark's infrastructure. Our focus was also that pilot interpretation will add value or be part of the innovative geoproduct developed in another working package of the project. In the Idrija UNESCO Global Geopark the selected challenge for interpretation was tectonics with its major role in shaping the morphology of the area, as well as mineralisation of the mercury ore deposit. One of the main tectonic features of the area is the Idrija fault with its strong seismic activity in the past. The already mentioned and other tectonic features (thrusts, faults, tectonic windows, etc.) importantly influence nature, the surrounding landscape and morphology, and, last but not least, history, lifestyle and character of the people. This is the general story and the underlying theme of the new Visitor Centre, which will be constructed as a pilot action in the Idrija UNESCO Global Geopark. Furthermore, in addition to the Idrija story, the new Visitor Centre will involve and present partner geoparks in terms of exhibited replicas of rock specimens and augmented real life presentations in different parts of the exhibition. Finally, our goal is also to encourage the visitors to the Idrija UNESCO Global Geopark to pay a visit to other geoparks in the project as well, and even wider. To help achieve this goal the promotion tools, developed in the final work package of the project (digital map, image brochure, short image video and Danube GeoTour info stands) will also be on display in the Visitor Centre. The latter will open its doors to visitors in spring 2019. The Danube GeoTour project is co-financed by the European Union funds (ERDF, IPA).

RURITAGE: RURAL REGENERATION THROUGH SYSTEMIC HERITAGE-LED STRATEGIES

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Keywords: *rural development, cultural heritage, systemic innovation areas, rural regeneration, UNESCO global geoparks*

Session: Regional and International UNESCO collaborations

European rural areas embody outstanding examples of Cultural and Natural Heritage (CNH) that need not only to be preserved but also to be promoted as a catalyst of economic competitiveness and sustainable and inclusive growth. According to EUROSTAT, 27.8% of the EU population lives in rural areas and 32% in so-called "intermediate" areas such as suburbs or small towns and around 46.5% of European 'gross added value' is created in intermediate and predominantly rural areas. Despite this, most rural areas are facing chronic economic, social and environmental problems, resulting in unemployment, disengagement, depopulation, marginalisation or loss of cultural, biological and landscape diversity. In most cases, tangible and intangible Cultural Heritage is threatened. Demonstrating the heritage potential for sustainable growth can overturn this condition. Around Europe and at international level, numerous examples of good practices show how Cultural and Natural Heritage is emerging as a driver of development and competitiveness through the introduction of sustainable and environmentally innovative solutions and the application of novel business models. Based on past research and experiences, the RURITAGE project, recently funded by the H2020 programme of the European Union and officially starting in June 2018, identified 6 Systemic Innovation Areas (SIAs) that can contribute to the sustainable development of rural areas through cultural heritage. The identified areas are: Pilgrimage, Sustainable local food production, Migration, Art and festivals, Resilience, and Integrated landscape management. In this context the project selected 13 Role Models (RMs) which already demonstrated the potential of CNH in one identified SIA and 6 Replicators (Rs) that guided by the RMs and other project partners will develop and implement in a participatory process their own heritage-led development strategies. The six replicators will mainly work on implementing actions in one of the identified SIAs, but at the same time, they will benefit from the expertise of RMs from other SIAs, in a knowledge environment that will be able to nurture the entire Rs' ecosystem. Additionally to the SIAs described above RURITAGE will analyze the RMs considering 11 cross-cutting themes which are transversal to all SIAs: Business models and investment strategies, Governance and regulatory framework, legal aspects and land tenure, technological innovation, social innovation, environment and climate change, cultural Ecosystem Services, mental wellbeing, Tourism and marketing strategies, Cultural and Natural Heritage safeguarding, appreciation and interpretation, Mobility and accessibility of the areas. RURITAGE methodology is based on the integration of such cross-cutting themes into the rural regeneration strategies, in order to develop actions able to reach multiple benefits for territories and people. The 13 RMs and the 6 Rs come from twelve different countries in Europe and two Latin American countries, among them seven of them are territories labelled with the UNESCO Global Geopark designation. Not limiting itself to the project partner, RURITAGE will also look into other best practices around Europe and beyond. The 8th International Conference on UNESCO Global Geoparks is consequently the perfect occasion to launch a call for additional RMs and include other interested parties within the RURITAGE network.

THE CHANGING LANDSCAPE FOR UNESCO GLOBAL GEOPARKS IN CANADA AND THE CONTINENT OF NORTH AMERICA

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Keywords: *Canada, North America, Geopark development, National Committee, Collaboration*

Session: Regional and International UNESCO collaborations

The Canadian National Committee for Geoparks (CNCG) was established in 2009 and has operated for nine years under the Canadian Federation of Earth Sciences, a non-governmental organization that represents earth science societies and institutions in Canada. The committee, assisted financially by Natural Resources Canada, has been effective in the development of UNESCO Global Geoparks in Canada. Three UNESCO Global Geoparks have been established and a diverse suite of aspiring geoparks is currently under development. When UNESCO adopted Global Geoparks in 2015, the Canadian Commission for UNESCO (CCUNESCO) included CNCG as one of its committees and all applications are sent through CCUNESCO, as required. As the number of designated and aspiring geoparks continues to grow in Canada, the CNCG has decided to establish a separate not-for-profit entity to manage geoparks in the future. The nature and composition of the new not-for-profit entity has been discussed at length and steps are now being taken to make sure that it is established by the end of 2018. The decision made by the United States to withdraw from UNESCO means that UNESCO Global Geoparks will not be established in that country in the foreseeable future. From the beginning, the CNCG has worked closely with U.S. interests on the development of guidelines for geoparks and their management. There was always a stated intent to establish a North American Geopark Network but, for the moment, this cannot include the United States. Canada is exploring options with Mexico to establish a North American Geopark Network. A workshop was held in Ottawa in June 2018 for aspiring geoparks in Canada, the United States and the Caribbean region. An on-line toolkit has been developed for aspiring and designated geoparks to increase accessibility to key information, enable the sharing of best practices in an online environment and to help build overall capacity. Currently there are eight regions in Canada at varying stages of aspiring geopark readiness. It is anticipated there will be minimally one application from Canada put forward for evaluation in 2018 with two in 2019 and 2020. There is a healthy stream of future geoparks in the pipeline and the future appears bright. Reconciliation with indigenous people is a federal priority in Canada. Therefore, there is a strong emphasis on the inclusion of indigenous people in geoparks and one of the long-term goals is to have a geopark on indigenous land, run by indigenous people. Canada is a large country with a wide range of geoheritage. The tremendous scope of this geodiversity suggests that a long term goal for at least thirty geoparks is reasonable in order to reflect the nation's geoheritage.

STAKEHOLDER PARTICIPATION IN RESOURCE INVESTIGATION AND CONSERVATION OF NATURAL AND CULTURAL LANDSCAPES: A CASE STUDY OF TAIWAN

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Keywords: *natural landscape, cultural landscape, community-based geotourism, collaborative planning, multi-stakeholder partnership platform*

Session: Geoparks, sustainable tourism and local sustainable development

In 2005, both cultural and natural landscapes have been introduced into the newly amended Cultural Heritage Preservation Law as new legal items of heritage conservation in Taiwan. Unlike traditional protected areas, protected landscape is a new concept to Taiwan which emphasizes the interaction of local people and the land. Local communities are not outsiders but insiders of landscape conservation. They are the key authors of the living landscapes. Many valuable natural and cultural landscapes locate in rural areas. Ideally, rural communities should play an important role in landscape conservation. However, like many countries of the world, more and more rural communities in Taiwan become isolated and in decline on limited economic bases. As a result, many communities have lost their vitality as people leave to find jobs elsewhere. Empowerment of rural communities becomes an important task of landscape conservation. In order to help stakeholders of governmental authorities and local communities to apply the new legal items of natural and cultural landscapes, this study employs community-based participatory approaches to exploring ways of enhancing partnership and capacity-building among them. A study area of the Fun-nan village in Hualien County of eastern rural Taiwan was selected to figure out proper ways of implementing natural and cultural landscape investigation, conservation as well as geotourism development. A participatory action research has been employed in the case study area from 2006 to 2013 to enhance partnership for landscape conservation among the local authorities, local community, local school and the university as well as other stakeholders. The processes of the study can be divided into four stages as follows: During the first stage of 2006-2008, the task was to conduct several participatory investigations of local landscape resources. During the second stage of 2008-2010, the mission was to work with local people, draw up geotourism plans and put them into practices collectively. During the third stage of 2011-2012, the goal was to enhance local communications about legal designation of cultural landscape of the area and to achieve local people's acceptance. During the fourth stage of 2012-2013, the task was to draw up the management plan for the designated cultural landscape. The findings show that the 'partnership platforms' for multi-stakeholder participation are like new bridges connecting the Fun-nan Village, local primary school, local authorities, local NGOs and the research team (university). Through the discussion and working on the platforms through four different stages, stakeholders of the platform figured out a common ground of their interests and draw up proper community projects for investigating natural and cultural landscapes collectively. The platforms prove to be a genuine assistance to work together with local people to carry out local landscape resources investigation, geotourism planning and implementation, as well as cultural landscape conservation.

THE GEOCONSERVATION STRATEGY IN ESTRELA GEOPARK

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Keywords: Geoconservation, Strategy, Estrela Geopark, Geoparks, Geosites

Session: Aspiring Geoparks

The Estrela Geopark, with a territory of 2216km² and administratively divided into 9 municipalities, presents enormous challenges to its management. The fact that almost 50% of its territory is classified as a protected area is an opportunity, but also poses issues related to the occupation of the area and its conservation, which are distinct from the rest of the territory. With the objective of promoting the sustainable development of the Estrela territory through the valorisation of its heritage, conservation, essential part of any Geopark, assumes a high relevance. In this context, a survey and inventory of all existing heritage (geological and non-geological) part of this UNESCO Global Geopark application was carried out. All heritage capable of being classified and valorised was included. However, a simple classification and inventory of geosites does not mean that conservation is assured. Implementing a holistic approach that brings together geodiversity (124 geosites), biodiversity (various protected areas) and landscape management, recognizing its benefits to society and protecting natural ecosystems, is one of the major challenges for the coming decades. Thus, Estrela Geopark defined an innovative geoconservation strategy that will allow the monitoring, valuing and integration of the different geosites, evaluating their degree of vulnerability to natural (weathering) or anthropic (trampling) processes. This strategy will be achieved through the implementation of Integrated Management Areas, which are well defined geological and landscape units, with characteristics that allow the development of integrated management plans that combine geosites and other endogenous resources of the territory. This methodology for monitoring and management, developed by the Associação Geopark Estrela, as the mission of "stimulate and support the development and evolution of each area, so that they can generate value for the communities that live in them". The main objective of these management units lies in the creation of networks with similar characteristics that allow an effective management of the heritage, but above all, give the communities of each area the possibility to actively promote a permanent valorisation of their resources. In order to achieve this methodology, each IMA will have a Management Plan that will include, among others, detailed maps, characterization of geosites, existing routes, elements of cultural interest, tourism infrastructures, monitoring of susceptible areas, and strategic plans capable of quantifying development processes, mitigating the weaknesses of each area caused by its use, namely by tourism activities. This approach will facilitate the review of future interventions, assigning protection responsibilities to local agents, be they companies, local authorities or civil society. Through this strategy, the main problems and challenges will be identified in each area. In this way, innovative geoconservation practices can be created and developed, increasing the load capacity and simultaneously the environmental, ecological and social quality of each individual area, with the Estrela Geopark working as a broader territory with an identity that functions as an agglutinating element of the IMA's.

GEOPARK PROJECT IN THE ZAT VALLEY: FOSTERING A SUSTAINABLE DEVELOPMENT TAILORED TO THE TERRITORY (HIGH ATLAS, MOROCCO)

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Keywords: Morocco, Zat Valley, aspiring geopark, geoheritage, ecosystem services.

Session: Aspiring Geoparks

For more than a decade, the Moroccan Government has been promoting sustainable development in the Zat River basin. The results reveal that the population stays in the territory and efficiently manages the natural resources of this rural area located 65 km southwest of the city of Marrakech.

The backbone of the landscape is the Zat Valley, a SE – NW deep incision in the northern slope of the High Atlas mountain belt, which reveals geological outcrops of scientific, educational and tourist interest. Together, this geodiversity allows explaining the main events of the long geological history, from Precambrian to Cenozoic, of the High Atlas to the general public, in a complementary way with the Geopark that already exists in Morocco (M³Goun UNESCO Global Geopark).

To support the sustainability of this rural development, the Muséum National d'Histoire Naturelle (France), the Universitat Autònoma de Barcelona (Spain), the Université Cadi Ayyad (Morocco) and Cerdán Ingenieros S.L. (Spain), have been studying the viability of a geopark for almost four years. The study has been supported by Conca de Tremp-Montsec UNESCO Global Geopark (Spain) and it has been funded by the European Union, within the framework of the Project “GEOPARK” (H2020-MSCA-RISE-2014).

The multidisciplinary team (geology, environmental geology, botany, ecology, social sciences, tourism and geoparks) carries out SWOT analysis (Strengths, Weaknesses Opportunities, Threats) about the geological, biological and cultural heritage, with the involvement of local communities, especially through civil associations, for example, *L'Association des Amis du Zat* (The Association of Friends of the Zat Valley).

First results reveal a high potential to develop a geopark. There are several reasons. One of them is that, as the inhabitants discover -with enthusiasm- new values of the geoheritage, they incorporate it naturally in the management of the ecosystem services of the river basin, for example, as a geotourism resource. Through geological interpretation, locals and tourists can discover how different the landscapes of the past were (Carboniferous sea, Triassic Desert, etc.). As an example of “geology-biology-culture” integration, it is worth mentioning the Triassic aeolian sandstone (ancient desert), which is the support of the rock engravings of the Yagour plateau and the relict stand of *Juniperus thurifera* (iconic tree species).

A NEW GEOPARK ON THE COLLISION ZONE: NEMRUT-SUPHAN GEOPARK, SE TURKEY

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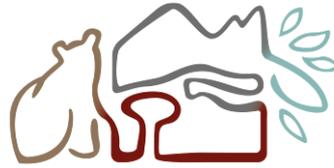
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Keywords: *Bitlis, Nemrut, Süphan, Geopark, Turkey*

Session: Aspiring Geoparks

10 000 km² area in which Nemrut and Süphan Stratovolcanos are located in its center and which is in East Anatolia and Eastern part of Lake Van is planned as "Nemrut-Süphan Geopark". In this area, there is a wide geo-diversity from Precambrian (Cadomian: 550 MY) to Quaternary. Bitlis Massive and Bitlis-Zağros Suture Zone is in the southern part of the geopark; Lake Van is in the east; East Anatolia Volcanism, reaching to Mount Ağrı in N-NE region and NAFZ and EAFZ which are the causes of so many pull-apart basins is in west. Nemrut and Süphan Stratovolcanos, located in the middle of this treasury present unique formations both in scientific and visual ways. At the beginning of geopark studies, a non-governmental organization was established to coordinate studies. An inn, estimated as about 500 years old, was restored and arranged as a Geopark visitor center. "Geopark Awareness Training", including geopark and geotourism concepts, was given to different age and profession groups. Geopark guidance training programs are prepared for geography and geology students. As a result of the conducted field studies, a lot of geosites are determined and mapped with their cultural heritage elements and their maps and routes are published. Outdoor sports potential of the area is determined and the routes, brochures and books of the all-natural sports, played in the geopark, are published. Biological diversity studies are conducted in geopark area and endemic species are determined and their maps and books are prepared. Alongside with the regional ethnographic element, a study was conducted on 13 naturally grown and edible plants and how they may contribute to the project as natural and organic product. Studies were performed to improve hand-made wood processing which is active in Ahlat and Adilcevaz districts. Four geopark workshops were held in one year. After these all Works, we plan and hope to declare the "Nemrut-Süphan Geopark" as a national geopark at the end of the 2018.



ADAMEZZO BRENTA GEOPARK
Madonna di Campiglio - Italy

8th INTERNATIONAL CONFERENCE
ON **UNESCO** GLOBAL GEOPARKS
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8-14 SEPTEMBER 2018

CHALLENGES FOR UGGPS INDUCED BY CLIMATE CHANGE AND NATURAL HAZARDS: THE GGN GEOHAZARDS WG

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Keywords: *Climate change, Natural Hazards, adaptation, mitigation networking*
Workshop: GEOHAZARDS

Regardless political or scientific objections climate change is a fact; the influence of humans is still a debate. The last years sailing across the North Pole is a possibility, mean monthly and annual temperatures in the oceans are steadily increasing year by year, and every month of the last couple of years in Europe makes a record in mean temperatures, while extreme heat waves and polar frosts are affecting all parts of Europe. In addition, our societies become more vulnerable in any kind of natural hazard, from wild fires to floods or earthquakes due to urbanization. International organizations and governments have agreed under Hyogo and Sendai Frameworks for Action to reduce and prevent the impact of climate change and natural induced disasters in global scale. In smaller scale though, regions and territories have a greater and probably more important role in this fight. Being and acting local, their contribution in prevention is minor. However, local communities have to adapt themselves in the changes to happen and undertake actions to mitigate the impact of future disasters, to prevent human losses and economic burden. This year Psiloritis UGGp, being one of the southernmost Geoparks in EGN and vulnerable in earthquakes, tsunamis and other natural hazards is facing one of the driest years ever happened. As an island in the middle of Mediterranean, Crete is depending on precipitation for water supply. Thanks to geological environment (limestone and marble), the mountains all over the island, like in Psiloritis UGGp, form huge water tanks to serve our needs. However, annual precipitation was the lower ever recorded and was accompanied by continuous high monthly temperatures. As a result, we expect to face huge problems in irrigation, potable water and any other relative activity this summer. Similarly this year, many other territories and geoparks all over the world faced severe damages due to heat waves, floods and wild fires related to extreme weather conditions. Considering the great variety of natural and climate induced hazards (floods, heat waves, frosts, earthquakes etc.) in many UGGps, it is apparent that Geoparks have to undertake and implement various actions to support their societies to adapt themselves in the changes, mitigate impacts of future disasters and become more resilient. Existing tools in all Geoparks, like the awareness raising and training activities, the monitoring and conservation of natural resources, the collaborations and networking with other UGGps or scientific institutions, and even, modifications of management and actions plans have to be used under this need. The role of Geohazards working groups in GGN, APGN and EGN, of the national Geoparks forums and of the scientists working in Geoparks is crucial. GGN Geohazards working group has conducted a four years Action Plan to organize and coordinate activities together with all Global Geoparks and UNESCO. Last year the GGN Geohazards WG had successfully coordinated the activities for the celebration, on 13th of October, of the International Day for Disaster Reduction and many similar activities are planned for the next years.

OVERVIEW OF ACTIVITIES ON DISASTER RISK REDUCTION AT UNESCO GLOBAL GEOPARKS

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Workshop: GEOHAZARDS

Keywords: *natural hazards, disaster risk reduction, survey to site managers, working group, international cooperation*

UNESCO Global Geoparks are located in various geographical settings and their territories may be partly or entirely exposed to various natural hazards and extreme weather events. In recent years, natural hazards, both geological (such as earthquakes, volcanic eruptions, landslides and tsunamis) and hydro-meteorological (such as floods, droughts and avalanches), have already caused extensive damage to UNESCO Global Geoparks. In addition, climate change seem to affect both occurrence and intensity of various hydro-meteorological hazards, increasing thus risks all over the globe. To have a better understanding of the exposure of UNESCO Global Geoparks to natural hazards, the different types of risk management, awareness raising activities and the existing good practices undertaken through the Global Geoparks Network, the Earth Sciences and Geo-Hazards Risk Reduction team at UNESCO performed a thematic survey in coordination with the secretariat of the Global Geoparks Network (GGN). The questionnaire was launched in April 2015 and an impressive 81 of the 111 Global Geoparks responded. The total response rate of 73% from the Global Geoparks Network. In 84 % of the European and 94 % of the Asian questionnaire responses, site managers indicated that natural hazards are an important issue in their UNESCO Global Geopark. According to site managers, mass movements – such as landslides and rock falls – and earthquakes are the main geophysical hazards, present in respectively 70 % and 40 % of UNESCO Global Geoparks. Around 12 % of the UNESCO Global Geoparks are exposed to volcanic eruptions and tsunamis. The most frequently observed hydro-meteorological hazards are floods (65 %) and wildfires (46 %), along with snow and ice related hazards (36 %). In light of the above, and in line with their commitments to the SDGs and the Sendai Framework, Global Geopark Network (GGN) and UNESCO are joining forces to protect UNESCO Global Geoparks and their communities and to contribute to safeguarding the global environment and human societies from the threats posed by natural hazards. In line with Shimabara and English Riviera Declarations, the GGN has established in 2017 an official Working Group titled «Geohazards Working Group», aiming to find ways on how mitigate risks at UNESCO Global Geoparks in the face of geological and hydrometeorological hazards strengthen the potential of UNESCO Global Geoparks in awareness raising.

WHAT WE SHOULD DO IN GEOPARKS TO REDUCE RISKS FROM GEOHAZARDS

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Workshop: GEOHAZARDS

Keywords: *past disasters, boom of disaster, outdoor class, preparedness, acceptable risk*

Characteristic of natural hazards is what we can learn of their past documented and geological records together with people's past experiences of them, though the coming hazards are not always the same as the past ones. Through the geological method, we can learn about past events and forecast the coming event, based on the past experience and records. Therefore, preparedness for coming geohazards is first understanding risks from the past geohazard not only in given regions but globally. We can also imagine the worst, but possible scenarios by considering the geological and economical background of the disaster-prone areas. This links to the basic concept of the Sendai Framework (UN Disaster Risk Reduction strategy) of 2015; that is, in every level we have to understand natural hazards and to share the awareness among all stakeholders. Recently, Japan may have met “a boom of disaster” since the Tohoku Earthquake in 2011. Although this boom may not be a bad current, “boom” is a short-lasting fashion after all. For instance, businesses in the boom may bring dangerous and shortsighted results. The Japanese national and prefectural governments are promoting a silly project of constructing very tall (7m high) dikes against the future tsunami throughout the coast of Tohoku, where the 2011 tsunami rose over 4 m-high dikes. Such high dikes completely mask people from the coming tsunami, unable to recognize its approach. This gives groundless safety to the people. Shortsighted ideas often ignore nature awareness. Facing sincerely with hazards is essential for people rather than turning their backs on the risks or believing groundless safety information. Sometimes risks from hazards may be acceptable to the people. Preparing for geohazards (or natural disasters) is not a matter of protecting people by constructing new infrastructure, based on invalid reasons, but letting them understand risks from a range of hazards for their own preparation. Geoparks are an excellent outdoor class where people can learn about geohazards and the lessons from disasters and can feel their intimate connection with geohazards. The Global Geopark Networks help the members to share our knowledge and experiences on geohazards and their preparedness. Communication through the GGN Working Groups on Geohazards and on Volcanic Areas gives a good opportunity to discuss how geoparks can solve several issues arising from geohazards and can raise people's resilience in members' territories and visitors' own regions.

GEOHAZARD AWARENESS IN KATLA UNESCO GLOBAL GEOPARK

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Workshop: GEOHAZARDS

Keywords: *Geohazards, Eruptions, Glacial outbursts, Jökulhlaup, Climate change*

Iceland is a country with various geohazards including earthquakes, ashfall, glacial floods (jökulhlaup) and major flood basalt eruptions. The southern part of the country is the most active volcanic area with Katla UNESCO Global Geopark the center of activities and with the unusual combination of several active volcanoes underneath ice caps making the eruptions powerful producers of ash and massive glacial outburst flooding (jökulhlaup). A very recent geohazard has been identified earlier this year as a result of rapid recession of outlet glaciers leaving the new bare mountain slopes very unstable creating risks of huge landslides or rockfalls. In this paper three new developments in geohazard education in Katla UNESCO Global Geopark will be presented:

1. An organised system of geohazard awareness weeks in all 15 municipalities of South Iceland during the winter of 2017-2018, including the three municipalities of Katla UNESCO Global Geopark.
2. A book being prepared for publication this year involving previously unpublished accounts of Katla eruptions between 1600 and 1900 recorded by people experiencing the eruptions.
3. Preparation of a conference in Katla UNESCO Global Geopark on October 12 celebrating the 100 years anniversary of the start of the last Katla eruption in 1918. The event will be used to raise awareness of contingency/response plans for future eruptions that are believed to be imminent. Furthermore, an account will be made of the system of Civil Protection and Emergency Management in Iceland with special reference to Katla UNESCO Global Geopark.

STRENGTHENING DISASTER MITIGATION AND RESILIENCE THROUGH DISASTER RESILIENT SCHOOL IN RINJANI-LOMBOK GEOPARK

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Workshop: GEOHAZARDS

Keywords: *Disaster mitigation, Rinjani-Lombok Geopark, disaster resilient school, collaboration program, Disaster resilience*

Some of the main reasons why Rinjani and its surroundings chose the concept of geopark is because Rinjani is the water resources of Lombok Island, Rinjani has some geological heritage in volcanology, Zoogeographically located in transition area of flora-fauna type of Asia-Australia and located in areas with high vulnerability to disaster and climate change. It said vulnerable to disaster because geologically, Rinjani-Lombok Geopark is located in Indonesia, a country bounded by meetings of 3 large tectonic plates so naturally save a lot of potential disasters that must be understood by the population. Disaster data from 2009 - 2018 mentions there are 129 disaster events in Lombok Island. The largest disaster kind in Lombok Island is natural disaster ranging from floods, landslides, tidal waves, tornadoes, drought, forest and land fires, earthquakes, tsunamis, and volcanic eruptions. Some disasters even claimed enough casualties. So that disaster is of particular concern to Rinjani-Lombok Geopark. In 2017, the Management Board of geopark tried to communicate the concept of mitigation strengthening with several parties and in 2018 a program of Disaster Resilient School created. This program collaborate with the Regional Disaster Management Agency, Mataram University, Red Cross, Regional General Hospital and other partners. The model schools chosen are high school scattered within the geopark's area. This level is chosen because the students is the teenagers who have many ideas and the closest generation to become the successor of regional development. Furthermore, these students are expected to transmit knowledge gained to the family environment and their relatives. This disaster resilient school program is a package of series activities that provide students in a school with understanding and practicing about disaster, basic geology, geoparks, first aid, public kitchen, evacuation techniques and SAR. This year, there are 10 schools that are modeled on 'Disaster Resilient School' and will increase next year because the response of each school that run the program is very positive and many other schools are interested in this program. Even in the future it is expected that the series of activities in this program can be patented and can be implemented by all schools in Rinjani-Lombok Geopark

GLOBAL GEOPARKS NETWORK, WORLD HERITAGE: PRODUCTS, COMMON PROMOTION & MARKETING FOR THE TOURISM MARKET
- WE ARE READY FOR IT !?

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Who will be presenting: Dr. Marie-Luise Frey

Keywords: *Geotourism, Global Geoparks, World Heritage, Products, Marketing*
Workshop: GEOTOURISM

In 2000 the European Geoparks Network was founded by four founding members Lesvos Island (Greece), Haute Provence (France), Vulkaneifel (Germany) and Maestrazgo (Spain) at International Tourism Bourse (ITB) in Berlin, Germany. In 2012 for the first time the Global Geoparks Network has given a common presentation with about 20 members participating in ITB. In 2016 the UNESCO Global Geoparks label was presented at ITB and raised a lot of interest on the first press conference after the launch of the International Geoscience and Geoparks Program in November 2015 in Paris, France. In June 2018 for the first time, Asia-Pacific Global Geoparks have promoted the Global Geoparks Network on the International Travel Expo in Hong Kong by support of LIONS Club and Hong Kong UGGP and Special Area Government.

It is interesting to find out that all members of the Global Geoparks Network talk about sustainable development across tourism and geotourism especially. Only few members are active in the common promotion and marketing. Products for tourism is thought to be e.g. guided tours by many members. However little is thought about the service and content chains that need to be ready for a successful promotion and marketing on the tourism market. The 2018 offers for a common quiz of the UGGPs being present in ITB, Berlin, have shown that there has still to be done work.

The GGN Executive Board therefore has formed a working group that has prepared an open call to develop a common marketing strategy for the GGN to go ahead for the members. Independently is that also the members are thinking of promoting their partners of the Global Geoparks network e.g. across a “Geoparks Corner” were the members of the Network are promoted in each of the territories and the nations, worldwide. Other contributions which can be thought of are collaboration projects with WHS and UGGPs from other continents and nations. By this all get to know their potential visitors much better and can prepare products to satisfy their needs and wishes. Exchange on different levels is necessary to go ahead for a successful future for all members. We shall not let the weakest? or the laziest? or ...?. determine the speed of development. Luckily it is a point of understanding needs of visitors and willing to do service for visitors as friends or guests visiting that is the basis of geotourism. No question the content to experience different territories of quality is additionally necessary. But as long as we do not exchange, we shall not be surprised if nobody looks at UNESCO Global Geoparks or UNESCO World Heritage Sites. Our strategy is common presence and activities on rural areas of international significance that have also extreme cultural and natural diversity and treasures. Everybody can contribute and when we organize the contributions like a rotating wheel everybody can show up to be recognized by a potential visitor. Without our active work and contribution we cannot expect that. Let us together develop new promotion tools that all members and territories can proudly present.

AN EMERGENT GEOTOURISM MONITORING SYSTEM (GMS) FOR THE UNESCO GLOBAL GEOPARKS IN THE ATLANTIC AREA

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Workshop: GEOTOURISM

Keywords: *nature trails assessment, health and wellbeing services, monitoring, geotourism, UNESCO Global Geoparks*

Partners of the project “Atlantic Geoparks (Transnational Promotion and Cooperation of the Atlantic Geoparks for sustainable development) - EAPA_250/2016” are developing a system for monitoring the effectiveness of their management systems involving a wide set of stakeholders -the Geotourism Monitoring System (GMS). This is a useful multi-rater assessment tool will allow UNESCO Global Geoparks to improve their performance based on the internal and external perception of the different publics and to provide information and to compare the results beyond the project lifetime. The GMS will be developed digitally to regularly monitor key stakeholders’ views on the management and development of the Geoparks and other natural areas. Because nature trails (NTs) have become very popular for a wide variety of users and purposes (professionals, recreational, health or educational purposes) and they are a crucial infrastructure to achieve the goals of the UNESCO Global Geoparks, the GMS will have a special focus on the NTs-based services spectrum network. The GMS has two different and interrelated levels of approach. A general one considering or dealing with overall characteristics of the NTs-based services, where three types of NTs (family, science and adventure) are considered with information focus for the general public. A specific one having a special application for the technical and scientific UNESCO Global Geoparks staff members focus on the components of the NTs-based health and wellbeing services: NTs-based Potential Indicator (NTPI), NTs-based Opportunity (NTO) and NTs-based Demand (NTD). Acknowledgments: This work was supported by The European Investment Funds by FEDER/COMPETE/POCI– Operational Competitiveness and Internationalization Programme, under Project POCI-01-0145-FEDER-006958 and National Funds by FCT - Portuguese Foundation for Science and Technology, under the project UID/AGR/04033/2013; by the European project "Atlantic Geoparks", EAPA_250 / 2016, INTERREG - Atlantic area; and by the UNESCO Chair on “Geoparks, Regional Sustainable Development And Healthy Lifestyles”.

DESTIMED AND MEET (THE MEDITERRANEAN EXPERIENCE OF ECOTOURISM): A REGIONAL APPROACH TO DEVELOPING, MANAGING, AND PROMOTING ECOTOURISM IN PROTECTED AREAS

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Workshop: GEOTOURISM

Keywords: *ecotourism, protected areas, sustainable tourism, product development, ecological footprint*

With the right governance, capacity, and cooperation frameworks in place, ecotourism can be transformed into a genuine solution for protected areas while directly supporting conservation of the Mediterranean region's incredible biodiversity. With this vision in mind, MEET (The Mediterranean Experience of Ecotourism) is providing protected areas and their private sector partners with the tools they need to develop, manage, and promote high quality ecotourism packages, both at local scale and together in a regional network. These products generate positive outcomes for conservation and communities, by strengthening the local economy while minimizing impacts on natural and cultural resources. Participating protected areas in a dozen countries across the Mediterranean, including several UNESCO Geoparks and Biosphere Reserves, have gathered together local actors from private and public sector into a Local Ecotourism Cluster to collaboratively design new ecotourism packages, which they have tested according to quality and sustainability standards and managed through an online monitoring platform created through two EU-funded projects, MEET and DestiMED. These methods include an innovative approach to measuring and reducing the environmental impact of tourism on the natural resources that sustain protected area communities. This new tool is based on the established Ecological Footprint framework, and is being developed in collaboration with globally-recognized research organization Global Footprint Network. MEET has now been established as a regional network of protected area, which provides both a governance mechanism and promotion platform for ecotourism in the Mediterranean. The tools tested and refined through MEET will provide the region with a recognized and trusted ecotourism brand that encourages collaborative marketing strategies, while allowing stakeholders to share knowledge and advocate for common needs and resources across the region and beyond. MEET's goals are to

- Develop, manage, and promote an ecotourism model which can be used as a leading example of protected area tourism in the Mediterranean
- Support members in building, transferring and exchanging knowledge, expertise, and lessons learned, through the development of methodologies and tools that reinforce capacity and cooperation within Mediterranean territories and beyond
- Act as a sales and marketing platform for ecotourism products, primarily by promoting the MEET brand internationally, growing a portfolio of high-quality ecotourism packages, and assuring its commercialization through smart market-driven strategies.

GEOFOOD: INVOLVING LOCAL COMMUNITIES WITHIN LOCAL FOOD AND SUSTAINABLE TOURISM

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Workshop: GEOTOURISM

Keywords: *Local food, Geological heritage, Sustainable development, Local communities, UNESCO Global Geoparks*

GEOfood is a brand for local food in UNESCO Global Geoparks. GEOfood criteria has been developed within several projects by Magma Geopark with partners and approved by the European Geoparks Network as official brand for local food into UNESCO branded Geoparks. GEOfood aims to support local producers and enterprises within quality criteria and international brand, to valorize local traditional recipes and productions which are respectful for the environment. GEOfood products and members want to underline the connection between the unique geological heritage of UNESCO Global Geoparks and the local food productions. The connection needs to be evident for the buyers in order to underline the products added value. The GEOfood experience can be combined with tourist packages that explore territories and cultures. Tourist packages can be enriched with experience linked with food, wine and olive oil taste! Magma Geopark successfully developed packages linked with outdoor experience and local recipes: tourists can book guided tour which includes traditional Norwegian soup from our famous chief. In June Magma Geopark will participate to the kick off meeting of the RURITAGE project, lead by Bologna University. Through RURITAGE Magma aims to develop further the GEOfood brand, strengthening it and set up tailored marketing strategy in order to involve more UGGp's and expand the GEOfood brand Worldwide. Every UNESCO Global Geopark which aims to follow the criteria can become GEOfood member. Members and information are available at: www.geofood.no

GEOPRODUCTS, WHAT AND WHY? GUIDELINES AND CASE STUDIES

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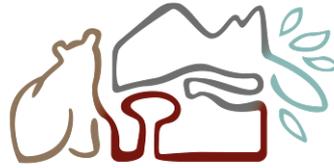
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Workshop: GEOTOURISM

Keywords: *Geopark, Geoproducts, Geotourism, Interreg, Danube GeoTour*

The concept of geoproduct is a key element in the geopark's system, often associated with the Geopark's mission of socioeconomic development. The literature shows many examples and approaches of geoproducts, sometimes defined only as geological objectives. The need for setting a guideline for defining a geoproduct is required in order to identify the key actors involved and the main steps to be taken so far in the development and implementation process. If we discuss the main attributes of any product, then we have to consider three aspects which the geoproduct must comprise in order to be a product: (i) It has to respond to a need; (ii) It has to be created, constructed through a production process; (iii) It has to be marketable and sold. These characteristics bring the term geoproduct closely to a practical and economical approach, it defines it more clearly and focuses on its necessity as a tool for socioeconomic development through geoparks. This perspective underlines the role of geoparks in achieving social, economic and cultural sustainability and in coping with pressure from the sociocultural impact of tourism. On the other hand, a geoproduct is not simply another product sold in a geopark. A geoproduct comes with a deep connection to Earth on a local level and with a strong sense of identity. Each geoproduct is unique in its construction with a story about people and the place they inhabit. As a result, we find that the philosophy of a geoproduct takes into account three axes: Identity, Production and Marketing. In the frame of the Interreg Danube GeoTour co-financed from ERDF and IPA funds we developed practical guidelines with the purpose of defining the geoproduct concept, explaining its philosophy, showing how a geoproduct can be constructed and exemplifying with some best practice from the project partners and from other EGN members. In order to develop or assess a geoproduct we developed a Logical matrix. This logical matrix has a key role in identifying basic elements of the relationship between Earth materials, local communities, geopark strategy, local producers, target groups and geoproduct development and marketing. The paper is presenting case studies developed by Hateg UNESCO GG using the new proposed definition for geoproducts. In the framework of a common geotourism product developed in the Danube Basin, we will also focus on geoproducts' potential impact on strengthening the geopark role in local communities and promotion.



ADAMEZZO BRENTA GEOPARK
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MOVING FORWARD TOWARDS THE TRANSBOUNDARY GEOPARK ON CLASSICAL KARST AREA

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Keywords: *Classic Karst, transboundary geopark, karstic geoheritage, cross-border cooperation, Karst*

Session: Aspiring Geopark

The Classical Karst (in Italian Carso Classico, in Slovene Matični Kras) is the universal symbol of the karst phenomena. It's characterized by all type of surface and underground karst forms, with such particular density, wideness and typology to recall the first researches of what will then be called "karstology", from the name of this area: Karst, Kras, Carso. Considering the high value of the huge geological heritage in this area, it was decided to undertake the development of a cross-border geopark on the Karst plateau between Slovenia and Italy. Although there are many and different scientific publications and a lot of dissemination and touristic outputs, it is necessary to provide a coordination and settlement, from a geological point of view. This is why the Geological Department of the Friuli Venezia Giulia Autonomous Region, representing the municipalities of the Italian side, and the Municipality of Sežana, representing the municipalities of the Slovenian side, are working together for this goal. The first step was to bring geology among the people with the purpose to improve the awareness of the geodiversity through the organization of geo-interpretation for adults and children and also through the creation of geological paths and geo-cycling routes. At the same time it was decided to involve the governance of the territory: first of all, the local public authority through the intra-municipal agreement on both sides and then the cross-border institutions by means of the transboundary agreement. In the last years, many activities have been made on both sides; for example a pre-feasibility study for the cross-border geopark, the geosites cadaster, and, on the Italian side, a regional law nr. 15/2016 for the protection and enhancement of the geodiversity, the geological and speleological heritage and karst areas, with specific articles about the creation and management of regional geoparks. Since, the Karst plateau territory is so wide and complex, characterized by a strong natural and cultural heritage, sites with public interpretation and touristic development, this is just the beginning of a process that requires a coordinated Geomarketing strategy and a management plan that can connect all the existing geo-sustainable facilities.

THE COTENTIN ASPIRING GEOPARK, A GEOSTRATEGIC TERRITORY FOR PROMOTING SUSTAINABLE TOURISM ALONG THE CHANNEL COASTLINE

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Keywords: *Geoheritage, Cotentin, Normandy, aspiring geopark, Geotourism*

Session: Aspiring Geoparks

The Cotentin aspiring geopark is located in Normandy, on the south coastline of Channel, nearly English Riviera geopark. This is a geostrategic territory between two UNESCO World Heritage sites: the Mont-Saint-Michel and the aspiring D-Day landing beaches. With 1 400 km², this area reveals a remarkable geodiversity telling the continuous Earth's story for two billions years. The territory comprises two parts: the ancient basement rock (Proterozoic, Paleozoic) showing the succession of three mountain-ranges and the Mesozoic sedimentary cover of Paris basin corresponding to Tethys and Atlantic stories. All of them are covered by Cenozoic formations with internationally recognized Quaternary sections from the last glaciation Würm. This diversity of rocks emphasized the beautiful landscapes and local architecture. The coastline shows various morphologies: rocky coasts, dunes, estuaries, sand and pebble beaches, contrasting with moorlands, peaceful valleys, small woods, streams hedgerows and stone walls in the countryside. The national geoheritage inventory has highlighted 61 remarkable geosites. Some of them present information panels and local associations provide visits for all audiences. Numerous sites also expose archaeological and biological heritages. Relationship between local population and geology is reflected through historical mining and quarrying as well as local architecture. Considering the attraction of this area depending on its exceptional geology and authentic natural and cultural heritage, an emergent territory project will contribute to sustainable tourism in Cotentin Peninsula. Thus, dispersed actions developed by local actors will be brought together in a global project with public and private partnerships, permitting to create a geopark on this territory.

TIMOR-LESTE EFFORT IN ESTABLISHING THE FIRST ASPIRING UNESCO GLOBAL GEOPARK FOR FOSTERING THE COMMUNITY-BASED ECOTOURISM, CONSERVATION OF GEOTOURISM AREA, EDUCATION AND SUSTAINABLE DEVELOPMENT

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Keywords: *Geopark, Community-based ecotourism (CBET), geotourism, education, sustainable development*

Session: Aspiring Geopark

Timor-leste or East Timor is a new nation in jubilee year that located in Southeast Asia and occupying half the island of Timor. Timor-Leste is ringed by coral reefs teeming with marine life and also blessed with geological natural and cultural resources such as hydro carbonates, minerals, fossils and lithographic art.

The country is still under development in all sectors including sustainable tourism sector. Timor-Leste has many pristine natural types of scenery. Several important touristic areas of interest are: Marobo Hot Spring and Lospalos – Iikere – kere with its' traditional drawings and the National Park of Nino Conis Santana with endemic biodiversity and some historical heritages. These places and the national park have been considered to be designated as protected areas and are been developed as touristic areas under the Minister of Tourism (MT) and the local communities. The MTAC also has been conducting the “Community-Based Ecotourism” programme to promote ecotourism and to develop local economy through sustainable tourism. The Ministry of Mineral and Natural Resources (MMNR) is also conducting scientific researches on Timorese geological sites. Hence Timor-Leste presents a high potential for establishing a UNESCO Global Geopark.

Even though efforts are made at the national level to promote ecotourism, there is a need to raise awareness, knowledge and capacity to plan and develop sustainable tourism at community and local authority levels and strengthen coordination between local government and responsible ministries. Indeed, the touristic and research potentials of sites are not-known or under exploitation.

By attending the UNESCO “Regional Training Course for UNESCO Global Geopark – perspectives for National Commission for UNESCO in Asia and the Pacific region-“ supported by the Japanese Funds in Trust in Oki Islands, Japan in May 2018, our team from Timor-Leste has been fully introduced through to UNESCO Global Geopark context. Because of local potential, UNESCO Global Geopark as a model for local sustainable development appears then as an appropriate concept for Timorese context. This paper will explain what are the potentials and identified sites, the local challenges as well as the first steps to be taken by the Timor-Leste National Commission for UNESCO (TLNCU) and the National University of Timor-Leste (UNTL) for Timor-Leste to establish his first UNESCO Global Geopark.

BUILDING ASPIRING GEOPARKS IN CAMBODIA: A NEW WINDOW TO, GEOSCIENCES, LOCAL COMMUNITY DEVELOPMENT, TOURISM AND EDUCATION

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Keywords: *Cambodia, Aspiring Geoparks, geosciences*

Session: Aspiring Geoparks

Cambodia is worldwide famous for its cultural heritage, but yet there are no Geoparks in this country. This southernmost country in Southeast Asia mainland has seven national parks namely Kiriom, Bokor, Kep, Ream, Botom Sakor, Phnom Koulén And Virakchey. These seven national parks cover about 870,000 ha of the land where ecosystem of diverse evergreen tropical nature, ancient culture, and geological relics are preserved. Cambodia as well as Indochina is believed to drift from Gondwanaland during Permian and join with South China micro-continent during Triassic. Thus there is a variety of geological record since Paleozoic to Quaternary changing from marine environment to craton environment. Building Geoparks from the seven national parks will definitely bridge across geosciences, local community development and education. In this millennium, there is a trend of labor movement to cities. This makes the economic gap between urban and country side. Geoparks will play an important role to narrow this gap and preserve significant geo-relics for the next generation. Starting with national parks might be the best choice for Geoparks concept in Cambodia since there is already existing legal framework supporting the conservation nature and promote science in the national parks. The geological department of Cambodia has the mission to create geological museum in Cambodia but there are some barriers ahead. Therefore, Geoparks will also work as the geological museum. To make this happen, central government will be the ice breaker and seek for the champions among the communities surrounding the seven national parks. This mission will need a good coordination from the national government involving three ministries such as the Ministry of mines and energy for geosciences, the Ministry of Environment for the ecosystem and conservation, the Ministry of Tourism for the tourist promotion.

THE “PARCO MINIERE LAGORAI” ASPIRING GEOPARK IN TRENTO, ITALY

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Keywords: *geodiversity, mines, porphyry, archaeometallurgy, decorative stones*

Session: Aspiring Geoparks

Mining and its peculiar geological background distinctively characterize the region of the “Parco Miniere Lagorai” aspiring geopark (NE Trentino, Italy). Located next to the Dolomiti UNESCO World Heritage, the Lagorai-Cima d’Asta district is dominantly composed of Permian effusive (Athesian Volcanic Group) and granitic rocks (Cima d’Asta pluton); a pre-Permian metamorphic basement outcrops along the perimeter belt. The abundant mineral deposits of the area, which are related to the huge volcanic events connected with the structurally complex mega caldera of the Athesian Volcanic Group, have been worked since ancient times. The Prehistoric copper smelting archaeometallurgical sites and the Medieval silver mines, also worked for fluorite, barite and quartz during the Industrial age, all testify a major long lived human activity. Beyond mining sites, stones are also an important local resource. The whitish, greyish and reddish limestones of the Rosso Ammonitico were used during the sixteenth century to decorate the city of Trento under the guidance of the Prince-bishop Bernardo Clesio. In more recent times, porphyry quarries played a crucial role in the Trentino economic development. For this reason, porphyry stones are locally called “red gold”. A rich mineralogical heritage and several thermal establishments are the main legacy of the local mining industry, definitely ended about sixty years ago. This long mining history has given a deep-seated awareness in the local community, which today gives value with institutionally-supported focused activities. The Argentario ecomuseum, the Calceranica mining park, the Pietra Viva museum, the Vignola mining museum and the Palù del Fersina mining museum and mine are the most important active institutions. Moreover, the Museo delle Scienze-MUSE of Trento made exhibitions and researches and the Soprintendenza per i Beni culturali of the Autonomous Province of Trento acted to create the archaeometallurgical areas of the Acqua Fredda at Redebus and Montesei at Serso. Since 2016 the Alta Valsugana and Bernstol valley community (territorial body of the Autonomous Province of Trento) has been coordinating the local community in order to establish the Parco Miniere Lagorai and verify its potential as future mining geopark. A promoting committee between municipalities and cultural associations has been created to represent a reference point and motivate collaborations within the local community. The Parco Miniere Lagorai Guide map is the first geo-product available for tourists. Further involvement of local administrations and other official bodies with specific expertise is also expected.

POTENTIAL FOR GEORGIA TO JOIN THE GLOBAL GEOPARKS NETWORK

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Key words: *Georgia, Geoparks, Potential.*

Session: Aspiring Geoparks

Georgia is located in the central part of the Caucasus along the Eastern coast of the Black Sea. The Caucasus represents a panerozoic collisional orogen that extends over 1200 km from Caspian to Black Sea. Currently it represents the Tethyan segment connecting the Mediterranean and Iran-Himalayan orogenic belts, between the Gondwana-derived Arabian plate and East European platform (Gamkrelidze, 1997).

Georgia with its unique geological heritage and favorable climate is an excellent destination for the development of Geoparks and the Geotourism industry. Its territory covers all major structural units of the Caucasian Orogeny: the Greater and the Lesser Caucasus mobile belts and Intermountain depressions lying between them (Trans-Caucasus microplate). This area represents a real "Natural geological laboratory", exposing magmatic, sedimentary and metamorphic rocks, ranging wide on the geologic time scale (from the Neoproterozoic to the Quaternary inclusive). These rocks keep records of 700 million years of the history of geological processes that have built numerous geological sites of international importance observed in the present-day Georgia.

The unique geological structure of Georgia's territory allows for the potential establishment of several geoparks and the preparation of several geotouristic routes (Gamkrelidze et al., 2011). As potential geoparks we could consider: 1. Kazbegi - Quaternary volcanics and Pre-Mesozoic crystalline basement (Daryali massif); 2. Vardzia - Mid Miocene Megacalder explosion products (thickness more than 800 m) and an ignimbrite flow (35 km length) in the river Mtkvari valley; 3. Dmanisi - Dmanisi ancient hominids site and the Quaternary continental basaltic flow of Mashavera valley; 4. Sataplia - Dinosaur Footprint, together Sataplia cave and Prometheus cave. Geotourism routes: 1- Along the Georgian military road: Tbilisi - Dariali massif (130 km); 2.- Tbilisi-Dzirula Masiff -Mestia-Ushguli (450 km). It should be noted that all these areas for geoparks and geotraverse contain important cultural heritage well.

At the end, according to the modern multidisciplinary research, the Argonauts expedition to the Kingdom of Colchis (ancient Georgia) in the quest of "Golden Fleece" could have been a real event (Okrostsvaridze et al., 2014). If so, Georgia should be considered as the oldest country which was visited by "geotourists".

THE “GEONAVE” (GEOSHIP) OF THE BIANCANE MUSEUM IN TUSCAN MINING UNESCO GLOBAL GEOPARK

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Keywords: *Geothermal Energy, Tuscany, Biancane, Education, geothermal*

Session: Education, public awareness and communication

The surface geothermal manifestations, consisting of steam jets, geysers, lagoons, sulfur crystals, have always induced in the human imagination the belief of the presence in these places of infernal creatures, so much so that many of these places have been attributed evocative names (valley of the devil and hell - Valle del Diavolo, Inferno, infernaccio etc.). Likewise, eighteenth-century naturalists describe these places in a sometimes bizarre way, inducing surprise and disbelief in the reader but also the desire to visit these scary places full of mystery. The Geosite “Biancane of Monterotondo Marittimo” is not just one of these places, but it is an excellent site of the Tuscan Mining Geopark. Hundreds of geothermal manifestations are concentrated in a small area: small thermal springs, lagoons, steam showers, sulfur smell, sulfur crystals and other minerals. The temperature at the soil surface is close to 100 ° C. It really looks like a place near Hell! The explanation of this phenomenon is in the presence in this area of numerous faults that allow geothermal vapors to reach the surface and manifest themselves. The geothermal area of Monterotondo, contiguous to that perhaps most famous of Larderello also has a long history of use of the resource by man, here too the boron salts of the geothermal manifestations have been exploited and here the first true geothermal power station of the entire Tuscan geothermal area was built. These peculiar aspects made it necessary to create a museum that would tell the story of the Biancane, of geothermics, but above all of the geological phenomenon that generated it and continues to generate it. This is how the multimedia / sensorial project of the “Geonave” (Geoship) was born, a large technologically futuristic capsule that would take visitors from the clouds to the depths of the earth's crust and back to the clouds passing through the fissures of the rocks and through the technological systems for the exploitation of geothermal vapors. The visitor, "Terranauta" (“Earthnaut”), will make a fascinating and engaging journey, immersed in a surreal atmosphere and surrounded by spaceship equipment, images, lights, noises, smells, warmth, movement and the voice of a "Virgil" that will accompany him as Dante. In this journey, through a complex of sensorial stimuli that will push him to identify and transform himself first into water vapor, then into a drop of rain, then into geothermal steam and then into an electron, ending his run as energy to produce light from a lamp.

SCIENCE POPULARISATION MODEL OF DALI MOUNT CANGSHAN GEOPARK

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Keywords: *science popularization, science popularisation volunteers, community engagement, geoheritage, geoconservation*

Session: Education, public awareness and communication

To enhance science popularisation in the past few years, Dali Mount Cangshan UNESCO Global Geopark has been promoting public awareness, improving public engagement, and boosting sustainable development of the geopark. These persistent efforts include publishing serial science popularization books such as ‘Wangfuyun’ for children and ‘Dali Mount Cangshan UNESCO Global Geopark’ for high school students. The books are prepared and written in an attractive and easy-to-understand format enabling effective conveying of science knowledge and arousing interest of the young generation. The geopark also builds a platform for science popularisation volunteers. Volunteers are recruited locally to help organizing activities, conducting lectures and running workshops on introduction to the geopark and geoconservation concepts for the general public and schools. Detailed surveys were conducted in twenty primary and high schools within the geopark to identify the best ways of popularising science to students. Community programmes such as meetings and talks are regularly arranged with the objectives of improving communication with local people and at the same time delivering geoheritage and cultural heritage protection messages. Summer and winter camps, training workshops on geopark, geoconservation, appreciation, mountaineering and guiding skills are organised by the geopark authority for various groups of people. The innovative ways of having new and interesting programmes to popularise geosciences will continue to be a major task in the development of Dali Mount Cangshan UNESCO Global Geopark in the years to come.

UNESCO GLOBAL GEOPARK BEAUJOLAIS, 2018 GEO-EVENTS PROGRAM

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Keywords: *Geopark, Beaujolais, Event, Initiative, Development*

Session: Education, public awareness and communication

The new UNESCO Global Geopark Beaujolais has always had a bottom-up approach, working with local and regional stakeholders in order to create opportunities to develop economical activities, to reveal geology and to promote the territory. In 2016, the Geopark Beaujolais created the concept of “the geo-initiative contest” to valorize those who act on the ground. A geo-initiative could be events, visits or tours, equipments or facilities, goods or artisanal products, tourist services, economical activities etc. At the end of the year 2017, the Geopark Beaujolais opened the second “geo-initiative contest”, focused on geo-events. The mains goals were:

- Maintaining the mobilization of local stakeholders
- Developing local and sustainable economy
- Improving visibility and knowledge about the Geopark Beaujolais to the great public

This second edition was a real success: about 40 applications were submitted within 2 months. After a selection committee, about 30 geo-initiatives were awarded during a ceremony and published in the geo-events program 2018 of the UNESCO Global Geopark Beaujolais. Among the geo-events we find guided walks and hikes, exhibitions, workshops, but also landscape tasting, sports events, gardening conferences and many more. The first geo-event after being an official “UNESCO Global Geopark” was the inauguration of the white limestone quarry of Lucenay, in the golden stones region. Before the sunset, the Geopark was presented to the hundreds people and at nightfall there was a big geo-lightning show on the cutting face of the quarry. Many geo-events occurred in 2018 like “Strata II, the return of the stones” (“Strates II, le retour des pierres” in French). This geo-event is organized by an association of local artists in partnership with the Geopark Beaujolais. During 3 days in May 2018 there have been:

- Artists exhibition to show geology through sculptures, drawing, handmade jewelry;
- Preview presentation of the comic “Stones stories, Geological chronicles in Beaujolais” produced by a local artist and by the Geopark team;
- School outdoor activities with the Geopark team addressed to pupils from local schools;
- “Pebbles fishing” guided walk with our geologist;
- 1-day hike named “The walk of stones” focusing on naturalistic and geological topics;
- Workshop “Rocks and landscapes of the UNESCO Global Geopark Beaujolais”;
- And also jam sessions, local products and food during all the week-end.

Like these 2 examples, the geo-initiative contest was a great way to make people proud of the Geopark and a mirror of local communities’ involvement. The program helped to punctuate the year with geo-events. It was a real success, so much that we had reprinted it twice more. This contest gave sense to many actions or projects, positioning the Geopark as a pillar of Beaujolais’ local development. Obviously, we have no choice but to renew the geo-initiatives contest and the geo-events program next year.

GEO-EDUCATION PROGRAM IN ARAS ASPIRING GEOPARK

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Keywords: *Geo-education, Geotourism, Geopark, Aras Aspiring Geopark, conservation*

Session: Education, public awareness and communication

As the geopark and geotourism concepts are unfamiliar for students in general, especially at elementary schools, geo-education programs are a good way to increase their information. In order to gain this goal, performing different programs beside their routine curriculum shall draw the students' attention and make them more curious to know more about geotourism and geoparks. In Aras Aspiring geopark, for getting the student more familiar to the geopark concepts, the Geoheritage of the Middle East Institute (GEOHIM) team held some programs in three phases: The first phase was for elementary schools, in eight schools of the geopark territory, the second phase was held for eight high schools and the last phase was for the teachers. The schools were chosen among both villages and cities. The program was held by two educational and practical aspects. In educational phase two persons (one geologist and one tour guide or geo-tour guide) teach different aspects to the students. Geologist talks about geology and geotourism and tour guide talks about tourism concepts. In the practical phase the student become more familiar with stones, fossils, they are trained to make some geoprodukt and they will go to the field trip.

The concepts were introduced in educational steps and some concepts like conservation were learned by playing game. For example we design three baskets with Geoheritage, bio-heritage and cultural heritage names; and ask children to put some cards with some pictures on the right basket.

The feedback from students was checked by painting, writing some phrases and making some handicrafts. By reviewing evaluation forms, although they had good basic information about geology, about ninety percent of students became more aware about the geopark project and its benefits. They also found that they should have different behavior with tourists. And they understood that they can have new jobs in their future as geo-guide and geo- guards in geosites. Local communities' situation and its benefits (such as more income from local houses, making and selling products by geopark logo and so on) became more obvious for them.

THE DEVELOPMENT OF GEO-EDUCATION PROGRAM OF NATIONAL GEOPARK SECRETARIAT OF KOREA

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Keywords: *Geo-education, excursion, student, education, awareness*

Session: Education, public awareness and communication

The National Geopark Secretariat of Korea has managed ‘Geopark excursion program’ for middle and high school students since 2016. According to increasing of activity-experience learning demands nowadays, we are providing good opportunities to study about Geoparks and geology for many students. Mainly we select geoparks and geosites having outstanding geo-educational worth carefully, and invite middle and high school students of the whole country and Geo-science teachers and then go on Geopark excursion program together. The students can learn about formation stories of diverse geosites by seeing and touching directly, and can understand the characteristics of geography and geology in particular geological era. For 2 years, from 2016 to 2017, we managed 20 times of the geopark excursion program and totally 1,200 of students attended to the program. In 2018, We have a plan to manage 10 times of the geo-education program between April and November and estimate about 700 of students would attend to the program. As the students attend these geo-education program, they are more interested in Geoparks and geology. Also, through the promote this educational program, we can create another geo-education programs newly and develop variety of contents related to the geopark. And we can expect activation of geoparks and improvement awareness about national geoparks.

ASPIRING SAIMAA GEOPARK IMPLEMENTS GEOLOGY AND ANCESTRY BY MINIATURE

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Keywords: *Saimaa Geopark project, visitor center, rock paintings, miniature, ancestry*
Session: Education, public awareness and communication

The aspiring Saimaa Geopark area has two visitor centers. The main visitor center is situated in Imatra city, but a smaller, side visitor center is in the north part of the Saimaa Geopark projects area in the geoparks member city Mikkeli. Mikkeli's visitor center is in Urpolas nature center and it is owned by municipality's environmental services. The nature centre hosts exhibitions with varying themes, provides environmental education activities for schools and other groups. and takes care of a tiny nature trail which is following the Urpolanjoki river. Urpola nature center is part of the aspiring Saimaa Geopark network.

There are many rock painting areas in the Mikkeli region and the most popular is in Astuvansalmi, with nearly 100 different pictures. Astuvansalmi is one of the Saimaa Geopark projects geosites number 37.

At the site one can observe a large rock in the shape of a man's head facing east and the Stone Age paintings of the big rock, are today, best seen from the lakeside, either during wintertime when the lake is frozen or from a boat. Since this unique place is a bit hard to get to, it was decided to create a scale model of the Astuvansalmi rockpaintings. The model provides a good experience of the paintings without having to take the boat trip or driving plus hiking the path. In size, the scale model is 1:50 and its dimensions are 80x45x70cm.

Urpolas geopark visitor centers miniature model of Astuvansalmi shows it as it was in The Stone Age, in a scale that fits in to nature centre. For the miniature it was necessary to explore the rock's measures and shape, as well as the life near this spiritual place in the Stone Age. In miniature water line is risen up like it was back then. Finally, the artists themselves were put to the miniature, heading to the place with dugouts during an imagined sunny summer day 5000 years ago.

Seeing the miniature will hopefully help people to have a hint of the Stone Age origins and providing the opportunity to view the site in miniature also forms part of the aspiring Saimaa Geoparks geosites protection.

EXPERIENTIAL GEOPARK WATERFALLS IN YUNGAY (CHILE)

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Keywords: *Experiential Geopark, Comunitary Turismo, Biosphere Reserve, Centenary Forest, Endemic Fauna*

Session: Geoparks, sustainable tourism and local sustainable development

Experiential Geopark Waterfalls in Yungay, are an extensive natural territory of 823 km² located in Ñuble Region in southern Chile (37°07' S, 72°01' W). Geopark Waterfalls are characterized by showing impressive waterfalls through territory, composed by: Perquenco, Perquenco little, Itata little, Itata, Dañicalqui little, Dañicalqui, Cholguán little, Cholguán, Chilcos, Paruco, Blanquillo, Placilla, Laja and the white water estuary that originates four more waterfalls; all of them are a natural network of touristic resources. Itata waterfall, is the central milestone of Geopark Waterfalls by being more consolidated as a tourist destination not only for its scenic beauty, but also for its cultural heritage and contribution to geotourism and geosciences. Itata waterfalls show an impressive waterfall of 80 m height, towards a deep canyon and undermined by water current; originated by deposits characteristic of a sequence of volcanic avalanches associated with partial collapses of the volcanic buildings of the adjacent Andes Mountains (geological survey of the area under analysis developed by Sernageomin Institute). This implies that downstream of the Itata waterfall, is confined by vertical walls formed by a sequence of volcanic deposits, lahars or lavas in full stabilization stage, showing sediment strata fluvial and glaciovolcanics. Also, there is a high degree of retrograde erosion, that reduces the frontal apex hillside of the waterfall up to 1.00 m per year, originating caves. Mountain zone there are a rich ecosystem developed from rivers that cross the Geopark Waterfalls, with centenary native forests, plants and animals endemic, characteristic of UNESCO Biosphere Reserve "Nevados de Chillán-Laguna Laja Biological Corridor" (declared year 2011). This ecosystem which must be protected and exploited sustainably to their population's. Municipality vision on territorial development in this area, will concentrate in enhancing geological and cultural heritage, along with ecosystem protection; due to actions requested by local communities to develop tourism and environment education. For this reason, Geopark distinction can be assigned, to give the theoretical support of correspondence, and to formalize methodologies of serious institutional, scientific and economic development; that allow the sustainable development of the territory, promotion of diffusion, geo-conservation and community tourism development, thanks to its declaration as Geopark.

FUTURE DEVELOPMENT AND PERSPECTIVES OF THE DANXIA LANDFORM

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Keywords: *Danxia landform, Future perspectives, Tourism geoscience, Geopark, Geomorphology*

Session: Geoparks, sustainable tourism and local sustainable development

There are several famous geoparks in China, such as Danxia, Taining and Longhushan, where the landscape is dominated by Danxia landform. In some other geoparks, the Danxia landform also plays an important role in the overall landscape. Thus, it is important to carry out studies on the Danxia landform, in order to further develop geoparks, do relevant scientific research, and popularize knowledge of Danxia landform. Danxia landform was first named in China about 80 years ago and now is well known all over the world. Though much progress has been made in Danxia landform research and discipline construction during the last 30 years, the theoretical construction of the Danxia landform is far behind other disciplines of rock geomorphology. Normative regional investigation has not been carried out on the Danxia landform resources. Moreover, basic geological research and environmental geological issues have been paid less attention. Based on previous investigation on the basic theory of the Danxia landform and tourism development for many years, several future studies of the Danxia landform are proposed as follows.

- (1) The normative investigation and database construction of the regional distribution of Danxia landform resources.
- (2) The basic geological studies including formative conditions, dynamic mechanism, evolution processes and classification system, especially the relationship between different landscape formation mechanisms, sedimentary facies and the development of the Danxia landform.
- (3) The survey, detection and prevention measurements of the rockfall landscape.
- (4) Biodiversity and human landscape studies using the Danxia landform and construction of scientific tourism and research base.
- (5) The perfection of the subject and theoretical system of the Danxia landform.

PROMOTING GEOHERITAGE, GEOTOURISM, AND GEOEDUCATION THROUGH TOURIST ATTRACTIONS & COMMUNITY EMPOWERMENT

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Keywords: *promotion, tourist attraction, community empowerment, geotourism, annual event*

Session: Geoparks, sustainable tourism and local sustainable development

Geopark Management Agency Ciletuh-Palabuhanratu implements several strategies for encouraging travellers to stay longer in the geopark, providing many interesting tourist attractions to be explored inside geopark. Seven geotrails have been provided to meet the needs or interests of visitors, with one path connecting several geosites where there is geological, cultural and biological diversity, so that visitors can easily understand the diversity and heritage of geoparks. The location has been completed with information boards, tourism facilities and accommodation, and professional guides are provided. Annual traditional ceremonies are regularly held, such as Seren Taun in Kampung Kasepuhan Ciptagelar, Sinaresmi and Ciptamulya; Hajat Laut di Pantai Palabuhanratu, Palangpang Beach, and Ujunggenteng Beach. In addition, the community also has a Ciletuh-Palabuhanratu Geopark Festival which has become an annual occasion, as well as the emergence of new events that are implemented and promoted independently by the community, and supported by the Government. The spirit of advancing geotourism began in 2015 when West Java Provinces provided opportunities for both men and women to be actively involved in increasing local commodities on a regular basis every year. Activities developed were event management, art packaging, business capacity building, geo-product packaging, geoculinary packaging, homestay management, guide certification, beach guard training, publicity packaging, and tourism awareness raising. Currently, visitors can enjoy the creativity of local people who have been actively involved in developing tourist attractions, providing souvenirs in the form of local handicrafts and typical foods, as well as providing best service and hospitality for visitors. This creativity is expected to help revitalise the local economy and increase sustainable economic revenues for local communities. Tourist attractions that can be enjoyed include Geology, Biological and Cultural Tourism Tours, Geotourism Journeys, Turtle Conservation, Rare or Endemic Tree Adoption, Geotourism Events, Surf School, Batik Pakidulan, Surade Batik, Jampang Coffee, Jampang Tobacco, Black Rice, Red Rice, Hanjeli, Turtle Roti, and other culinary produce. Geopark Management Agency Ciletuh-Palabuhanratu currently has a Geopark Information Center, where complete information on the potential and activities of the complete Geopark Ciletuh-Palabuhanratu can be obtained here, along with information boards, brochures, booklets, etc.

INNOVATIVE GEOPRODUCTS DEVELOPMENT IN IDRIJA UNESCO GLOBAL GEOPARK

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Keywords: *geoproduct, sustainable tourism, socioeconomic development, interpretation, networking*

Session: Geoparks, sustainable tourism and local sustainable development

Geoproducts connect geoheritage, cultural heritage, identity, socioeconomic development and interpretation. By creating geoproducts, geoparks contribute to green economy development and help build local identity and its visibility in transnational context, which strengthens the social and economic dimensions. The main purpose of development of geoproducts in the Idrija UNESCO Global Geopark is to increase the visibility of geoproducts, to connect local providers of different services into a common chain, to create added value to products, to increase the quality of products and services among costumers., . Eight geoparks within the Danube GeoTour project are dealing with both methodology and development of pilot innovative geoproducts. The participating geoparks are rich in geo-heritage and represent unique areas in the Danube region. Their sustainable tourism development, however, lags behind the quality standards of top EU Geoparks. This project faces a challenge recognized by all partners: the sustainable use of the exceptional wealth of Geopark's natural resources and heritage through sustainable tourism development that avoids negative environmental impacts. One of the main aims of project activities is to increase the capacities of participating Geoparks in creating unique sustainable tourism products and services based on a geopark's specific heritage, the involvement of local small and medium enterprises (SMEs), new gamification tools and visitor engagement with a focus that is in line with the strategy on managing tourism pressures and the carrying capacity of each individual territory. Understanding and communicating geoproducts is a key element and also a challenge for all involved geoparks. Within Danube Geotour project activities, "Guideline for development of innovative GeoProduct" was established to provide a baseline framework with definition of geoproducts. The creation of a geoproduct has to follow three basic requirements: geology connection, economic viability and geopark partnership. During the production stage and use, it must also respect the natural and cultural environment as well as social inclusion and vulnerable groups. The development of a range of different geoproducts facilitates cooperation with local population, advancement of local supply chains and valorisation of human resources within the local area. It also benefits from one of the most important and innovative geopark assets – networking and partnerships. According to the "Guideline for development of innovative GeoProduct" three main steps for pilot actions have been prepared by the Idrija UNESCO Global Geopark. The main emphasis is on the establishment of a system for development of geoproducts, which involves the development of an assessment system, a quality assurance system and a marketing system, cooperation with local providers and common development of geoproducts, and final pilot testing of the developed geoproducts. In the cooperation with local providers and the Idrija UNESCO Global Geopark, two pilot geoproducts are now in the phase of development. First one is GeoArt&Craft Trail, which consists of GeoArt&Craft products, services and events, and the second geoproduct are GeoFood Trails, which consist of Geofood products, services and events. The Danube GeoTour project is co-financed by the European Union funds (ERDF, IPA).

GEOLOGICAL ATTRACTIONS AND HERITAGE IN THE HWASEONG NATIONAL GEOPARK (CANDIDATE SITE), KOREA

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Keywords: *Hwaseong Geopark, geotrail, geosite, geological heritage, dinosaur egg*

Session: Geoparks, sustainable tourism and local sustainable development

Since the introduction of the National Geopark System in 2011 to 2018, South Korea has designated 10 sites including Jeju Island, Ulleungdo-Dokdo, Busan, Cheongsong, Gangwon Peace Area, Mudeungsan area, Hantangang-Imjingang, Gangwon Paleozoic Geopark, Jeonbuk West Coast, and Gyeongbuk East Coast. As a result, the National Geopark System is in the maturing stage. Numerous local governments have been showing their interest in constructing geological parks within their regions. In addition to Dinosaur's Eggs Fossil Ground at Gojeongri, Hwaseong City, one local government has selected 12 geological attractions, including Uh-seom, Ddak-seom, Goryeom, Jebudo Island, Salgoji, Baekmiri Coast, Ippa-do Island, Gukhwa-do Island, Dori-do, for certification as a National Geopark. The objective of this study is to introduce the geological attractions and geological heritage within the candidate sites of Hwaseong National Geopark and examine their value. The Hwaseong National Geopark site is part of the Gyeonggi massif tectonic structure on the Korean peninsula, with a geological diversity that includes Precambrian metamorphic and sedimentary units, Paleozoic metamorphic and sedimentary units, Mesozoic igneous and sedimentary units, and Cenozoic sedimentary units. The geological attraction 'Dinosaur's Eggs Fossil Ground at Gojeongri' was designated as a Natural Monument No. 414, which includes rich geological heritage, such as dinosaur's eggs fossils, burrow structures, tafoni, faults, drag folds, and cross bedding, and excellent tourism infrastructure, such as eco-trails and visitors centers. The geological attraction 'Wooeum-do' is rich in geological diversity that includes fold structures, faults, joints, mafic dykes, and pegmatites and various types of gneisses, which have high educational and academic value. The geological attraction 'Uh-seom' includes orbicular structures that are valued highly in academic circles because of their uniqueness among metamorphic rocks. The geological attractions 'Ddak-seom,' and 'Goryeom-seom' vividly show various sedimentary layers and structures distributed in the Cretaceous Tando Basin. The geological attractions of 'Jebudo Island,' 'Salgoji,' and 'Baekmiri Coast,' located on the West Coast have coastal geomorphology features, such as foreshore, seastack, sand beach, and coastal sand dunes, and geological structures that include various metamorphic rocks, clastic dykes, and quartz deposits, providing various experiential programs. The coastal island areas of 'Ippa-do Island,' 'Gukhwa-do,' and 'Dori-do,' other geological attractions, show landscapes with grand fold structures, various metamorphic rocks, and unique coastal erosion geomorphology. In summary, the candidate sites of Hwaseong National Geopark are composed of high-quality geological sites with geological diversity and academic value. The sites provide geo-trails with a combination of geological, geomorphological, landscape, and ecological elements, tourism infrastructure for visitors, and various educational and experience programs. Therefore, the Hwaseong National Geopark candidate sites have great potential as a unique National Geopark that represents the Western Gyeonggi region.

GEORAFTHING - AN ADVENTUROUS WAY TO TEACH GEOLOGY

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Keywords: *GeoRafting, Rafting, Education, Danube GeoTour, Interreg*

Session: Geoparks, sustainable tourism and local sustainable development

The Nature and Geopark Styrian Eisenwurzen has an outstanding landscape as well as Geology and one of the last unspoilt white-water rivers in Middle Europe. White-water rafting is a very common and popular sport in the area. Many tourists are coming especially for this occasion – not only from Austria also from neighbouring countries. Even some rafting World and European championships are taking place each year. During the ongoing Interreg Danube GeoTour Project the Geopark has the possibility to develop a new GeoProduct and to combine an adventure sport with education. The Geopark can now teach visitors about the Geopark, landscape, culture, nature and Geodiversity during a raft tour. This Interreg Danube GeoTour project (funded within the Interreg Danube Programme) faces a challenge recognized by all partners: the sustainable use of the exceptional wealth of Geopark natural resources and heritage through sustainable tourism development that avoids the negative environmental impacts. The main project result will be joint Danube GeoTour designed to strengthen cooperation between the regions' Geoparks and act as an innovative tourism product to accelerate visibility and tourist visits in the geoparks. Common strategy for sustainable management of tourism pressures will form the basis for creating innovative geoproducts. Sharing experiences, testing pilot geotourism products and new interpretative approaches should increase local inhabitants' engagement, Geopark management capacities and lower the quality gap between Danube and other European Geoparks. The so called GeoRafting can be seen as one part of the Danube GeoTour. This innovative GeoProduct is going to be tested and evaluated until June 2019. Workshops and training materials for Raft guides are going to be created. Marketing tools are going to be established as well – flyers or an image video for example. The Nature and Geopark Styrian Eisenwurzen is going to show the ongoing progress on the development of this innovative GeoProduct and is happy to share its experiences during the GGN conference throughout a presentation.

RESEARCH ON SUSTAINABLE DEVELOPMENT PATHWAYS OF HUBEI HUANGGANG DABIESHAN UGGP, CHINA

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Keywords: *Geopark, Sustainable Development, Pathways, community economy, Huanggang Dabieshan of China*

Session: Geoparks, sustainable tourism and local sustainable development

As a case of Huanggang Dabieshan UGGp, this paper is mainly focuses on pathways for sustainable development of the Geopark. The paper proposes a classified protection model for the geological relics based on geosites protection of the Geopark and also discusses the development strategy of geotourism in the Geopark. It is suggested that Huanggang Dabieshan Geopark should focus on developing two major geological tourism routes, integrating the geotourism into the tourism industry of Huanggang region, and designing tourism products suitable for the development of the Geopark. The paper builds a multi-level comprehensive management model for geoparks involving three major systems, namely, management agencies, management systems, and management personnel. The relationship between tourism development and poverty alleviation in the region is discussed from operating systems, protection systems, and support systems, emphasizing their important role in the promotion of community economic development and poverty alleviation. To sum up, this paper establishes the sustainable development pathways for Huanggang Dabieshan UGGp, which is referred to as the “Five-in-One Pathways” composed of geoconservation, geotourism, geoscience, geopark management, community economy and poverty alleviation.

FIGHTING MARINE LITTER AT CABO DE GATA-NÍJAR UNESCO GLOBAL GEOPARK

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Keywords: *Marine litter, Plastic, Mediterranean Sea, ACT4LITTER, Conservation*

Session: Conservation, science, research

It is a reality that marine litter has become little by little one of the main problems of pollution that affect our seas and oceans, and facing the future, in one of the greatest challenges that is presented globally for all humanity. The Mediterranean Sea is one of the most affected basins by marine litter, worldwide. Marine litter represents a pervasive and persistent problem that knows no boundaries. It has a negative impact on vital economic sectors such as fisheries, aquaculture, navigation, energy and tourism, while it may endanger human health and safety. Marine litter threatens species and habitats, with impacts varying from entanglement and ingestion, to bio-accumulation and bio-magnification of toxics released from litter items, facilitation of introduction of invasive species, damages to benthic habitats, etc. It has been acknowledged as a major threat in many Mediterranean Marine Protected Areas (MPAs) hampering the achievement of their conservation goals and MPA Managers lack the tools and knowledge to effectively address the issue at their level and prevent the problem from getting worse. Cabo de Gata Níjar UNESCO Global Geopark has started its own fight against plastic marine litter participating in ACT4LITTER, an Interreg Med Funded Project with results that clarifies their main litter causants, with unexpected results that shows a different reality in every side of the Cape of Gata itself. With a monitoring programme every three months, the nature of the litter shows that the situation, even when the whole area is one of the most well preserved areas in the Mediterranean, is getting worse. The monitoring program, through which the same beaches have been sampled 4 times per year to recognize the influence of tourism, storms, and many more factors, has also served as a tool to identify the specific sources of pollution and thanks to this identification, to elaborate a plan of action on them and to plan corrective measures to minimize the affection to the marine environment and create awareness of sustainable practices in the long term. Citizen participation and collaboration with associations, town councils, companies and others has been essential and a participatory process was launched for decision making. In this meeting the results and the measures carried out or planned for the fight for marine litter in the Cabo de Gata UNESCO Global Geopark will be shown.

GEOLOGICAL BACKGROUND OF LOCAL INDUSTRIES IN SAN'IN KAIGAN UNESCO GLOBAL GEOPARK

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Keywords: *Japan Sea, San'in Kaigan, granite, back-arc basin, industry*

Session: Conservation, science, research

San'in Kaigan UNESCO Global Geopark is located along the Japan Sea in Southwest Japan. Geological history of the geopark area is divided into following three stages. Stage 1 (Late Cretaceous to Paleogene) : Japan was a continental arc located eastern margin of the Asian Continent. Stage 2 (Early to Middle Miocene) : Japanese Islands were separated from the continent and Japan Sea was formed by the rifting and expansion of back-arc basin. Stage 3 (Late Pliocene to the Present) : Volcanic activities on the Island Arc and present landscape was formed. Some industries are often developed with relation to geology of the San'in Kaigan Geopark. We introduce geological outline and industries of the San'in Kaigan Geopark and discuss significance of geo-story between them. Stage 1 is characterized by intrusion of large batholithic granites at the continental margin. Granite area is well-drained and supplies clear ground water. Ground water through granitic rock is suitable for brewing of sake, because it contains proper quantity of minerals (Ca, P, Mg and others) which activate yeast, and poor in iron ion which damage flavor of sake. Most of sake breweries are located on the granites in the San'in Kaigan Geopark. Geology of stage 2 is composed of marine or non-marine subaqueous volcanic and sedimentary rocks formed by rifting and expansion of back-arc basin. The rifting and expanding of Japan Sea formed deep ocean basins near the coast of San'in Kaigan Geopark. Such deep sea became good fishing ground of snow crabs which lives in deeper layer (about 300m to 600m) than other crabs (about 30m to 300m) popularly eaten in Japan. As a result, rifting of back-arc basin provided fresh crab which is one of the representative local products in San'in Kaigan Geopark. Stage 3 is characterized large scale andesitic to rhyolitic volcanic rocks in Pliocene to early Pleistocene and small monogenetic volcanoes with scoria cone and basaltic lava flows in Pleistocene. These volcanic fields became mountain areas and formed deep valleys and gentle highlands. Deep valleys have complicated association with next villages and kept good pedigree of cattle as a result. Furthermore, gentle highland enabled to pasture the cattle. Stockbreeding of Japanese beef cattle ("Tajima Ushi") is popular in this area. They are calf before fattened in various regions in Japan and gene of them has been inherited to 99.9% of bland cattle in Japan. Mentioned above, major industries have geological background in San'in Kaigan Geopark. Such stories between industries and geology are called geo-story. Appropriate geo-stories promote people's understanding to earth science and will lead to branding of the Geopark.

THE THERMAL WATERS OF CERCHIARA IN THE POLLINO UNESCO GLOBAL GEOPARK (SOUTHERN ITALY)

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Keywords: *Pollino National Park, Thermal water, Water geochemistry.*

Session: Conservation, Science, Research

The Pollino UNESCO Global Geopark represents one of the largest national park of Italy, covering 1,925.65 km². The geopark includes the Pollino and Orsomarso massifs, which are part of the southern Apennine Terrains. The park offers a whole series of attractions comprising: (i) towns with interesting sights such Morano Calabro (convent of Colloredo), Laino Castello, Mormanno, Papasidero, Civita, Cerchiara (church of Madonna delle Armi) and (ii) a great variety of fauna (golden eagle, Italian wolf, roe deer, black woodpecker, griffon, peregrine falcon, red kite, lanner falcon etc.) and flora (first among all the park's symbol represented by Bosnian/Pollino pine tree). Furthermore, in the Mercure Valley have been discovered remains of pre-historic species such as *Elephas antiquus* and *Hippopotamus major*.

Among the many resources of the Pollino National Park/UNESCO Global Geopark there are the thermal waters of Cerchiara. Waters discharging at the Cerchiara springs come from a deep circuit, which is chiefly hosted in the Mesozoic limestones, dolomitic limestones with evaporites of the Pollino Unit. These thermal systems could represent one of the major economic resources of the Park and therefore necessity of detailed studies. At the moment the study show that meteoric waters, infiltrating in the Pollino massif at elevations close to 1800 m asl, recharge the deep aquifer deepening along one or more fault systems, as suggested by the structural setting. They acquire heat from reservoir rocks through conductive transfer during their prolonged circulation into the deep aquifer at temperatures close to 40°C and P_{CO2} of 2.5 bar. The thermal deep aquifer acts as a sort of well-mixed reservoir, whose fluids are completely mixed with the fluids entering it. The water leaving the deep reservoir discharges at the surface at 30 °C after a relatively fast upflow and limited cooling. The upward part of the hydrogeological circuit is controlled by local low and high-angle fault systems as well as by the tectonic window of Cerchiara di Calabria, where the Cerchiara Formation crops out. At the moment further studies are under way to better characterize the superficial and deep aquifers.

*REMOTE SENSING GEOLOGICAL INTERPRETATION OF THE RED BEDS
SEDIMENTARY FACIES AND DANXIA LANDFORM IN THE XINJIANG BASIN,
JIANGXI PROVINCE, CHINA*

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Keywords: *Xinjiang Basin, Red Bed, Danxia Landform, Sedimentary Facies, Remote Sensing Interpretation*

Session: Conservation, science, research

The Longhushan World Geopark, located at the southwestern part of the Xinjiang Basin in Jiangxi Province, is famous for the Danxia landform landscape. Based on remote sensing analysis, we interpret the Red Beds sedimentary facies and Danxia landform, which is beneficial for the study of the relationship between the red beds and the Danxia landform development. Results of the spectrum of the rock derived from SVC HR-768 portable spectrometer and statistical analysis of the OIF of ETM+ images indicate that the ETM+ RGB (7,4,3) of Xinjiang basin is the best bands combination for enhancing the features. Among the Principal Component Analysis, Multiplicative Transform, Brovey Transform, High-Pass Filter, Wavelet Transform and Intensity Hue Saturation methods, the Wavelet Transform method proves to be the best combination method. Combined with the color images of other band combinations and high spatial resolution images in Google earth, we use the Wavelet Transform to meter the images of ETM+RGB (5,4,3) of panchromatic band as the base image, to interpret the lithostratigraphy, structure and Danxia landform landscape of the Xinjiang basin, and establish the remote sensing interpretation signs. Four lithological belts have been identified, including coarse-grained conglomerate belt, conglomerate belt, sandstones belt, siltstone and mudstone belt. These four belts form an East-West extended concentric ring from the marginal basin to the central basin. Furthermore, 15 landscape Danxia landform areas, 11 Danxia landform areas and 12 Danxia hill areas have also been interpreted, which is consistent with the field observation.

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*RESEARCH ON LONGEVITY FACTORS OF “THE HOMETOWN OF
LONGEVITY” LEYE COUNTY, A REGION OF LEYE-FENGSHAN GLOBAL
GEOPARK*

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Keywords: *the Hometown of Longevity, longevity factors, longevity secret, geological and ecological environment, research methods*

Session: Conservation, science, research

Leye County in Leye-Fengshan Global Geopark has a unique geological environment, a pleasant climate, pure air, water rich in minerals and trace elements, good geomagnetic field and good longevity and health resources like green food. In March 2016, Leye County was awarded the title of "the Hometown of Longevity" promulgated by the organizing committee of the summit on sustainable development for ageing of United Nations. According to the statistics of relevant departments, the number of centenarians in Leye County showed an increasing trend. At the end of 2016, there were 33 centenarians in Leye County. 2245 people were in the age of 80 to 89, 301 people were in the age of 90 to 99. . To understand the relationship between the longevity of local residents and the ecological environment in Leye County, explore the sustainable development of tourism and economic in Leye County, this project has used methods like geographic information system, field survey and sampling method, chemical analysis, document research, questionnaire survey and interview method to comprehensively study the unique geological environment, climate, negative oxygen ions, geomagnetism, water, food and life style in Leye County. To a certain extent, this research reveals why there are so many long-lived people in Leye County.

SURFACE DATING OF RED SANDSTONE FROM THE DANXIASHAN UNESCO GLOBAL GEOPARK BY LUMINESCENCE AND ITS IMPLICATIONS FOR THE AGES OF DANXIA LANDFORM

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Keywords: *Danxia landform, Geopark, Surface dating, Luminescence, red sandstone*

Session: Conservation, science, research

There are several famous geoparks in China, where the landscape is dominated by Danxia landform, such as Danxia Mountain and Longhu Mountain. Usually the Danxia landform is composed by Cretaceous to Paleogene red sandstone, which then underwent differential weathering during later time. Differential weathering lead to the formation of various beautiful Danxia landform. At present, the exact formation ages of various Danxia landform at the Danxiashan UNESCO Global Geopark are poorly explored. By now, surface dating of rocks by luminescence has been developed, which might serve as an effective tool to date the formation ages of Danxia landform at the Danxiashan UNESCO Global Geopark. The theory is as following: when the outside of red sandstone was erode to form various landscape, the surface of sandstone become to expose to sunlight and the daylight radiation resets luminescence 'clock' to zero from rock surfaces to deeper depth (0-25 mm). This reduction of luminescence is then as a function of depth and time. The longer time of exposure to sunlight, the luminescence signal at different depth is reduced more. The luminescence as function of time is as following: $L=L_0\exp(\sigma\phi_0 t\exp(-\mu x))$, where L_0 is the maximum luminescence signal intensity at saturation. L is the luminescence remaining at depth x (mm) after an exposure time t (s), $\sigma\phi_0$ (s⁻¹) is thus the effective decay rate of the luminescence at the rock surface when it is exposed to a particular daylight spectrum) and μ (mm⁻¹) is the attenuation coefficient as the light penetrates the rock. At the Danxiashan UNESCO Global Geopark, the surface rock samples from 0-20 mm depth were collected from different landform and they were dated by surface dating by luminescence. The ages dated provided clues on the formation ages of different landscape. This work was funded by the National Science Foundation of China (NO. 41772197).

GEOTOURISM IN PATAGONIA VERDE: NEW OPPORTUNITIES FOR LOCAL DEVELOPMENT IN SOUTHERN CHILE

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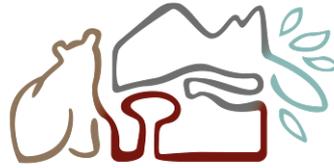
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Keywords: *Geotourism, Geoconservation, Patagonia Verde, Local Development, Chile*

Session: Conservation, science, research

The Regional Government of the Lakes District, southern Chile, has proposed a delimitation of the territory that defines five tourist destinations based on their attributes and level of development. Patagonia Verde (Green Patagonia) is one of these zones, which has a surface around 20.000 km² located where the intermediate depression has been covered by the sea that separates the continent into the Chiloe Island (Costal Cordillera) and the Northern Patagonian Andes. In this segment of the Andes, the tectonic activity related to the Liquiñe-Ofquí Fault Zone control the morphology and setting of glaciers, rivers, hot springs, geysers and active volcanoes such as Yates, Hornopirén, Huequi, Michinmahuida, Chaitén and Corcovado. Moreover, frequent landslide events affects inhabited plains between the mountain range and the sea, which together with volcanism, represent a challenge for the land management. Also relevant, are the National Parks Hornopirén and Corcovado, the National Reserves Futaleufú and Lago Palena and the Pumalín private park recently donated to the Government by the Tompkins Conservation, protecting more than 25% of the territory where biodiversity is the main axis of conservation. The nature of Patagonia Verde is characterized by pristine landscapes of scenic beauty recognized worldwide and by scarce human intervention compared to other areas of the country. Regional and national authorities have considered this condition as a comparative disadvantage for the inhabitants of Patagonia Verde, particularly in relation to basic health, education and transport services. Consequently, a "Special Plan for Extreme Zones: Patagonia Verde" has been implemented by the National Government to diminish these asymmetries. One of the programs of this plan is called "Sustainable Development: Patagonia Verde Tourist Destination" that aims to valorize the nature, culture and gastronomy of the territory to establish tourism as a tool for economic development. An ongoing project known as "Geotourism in Patagonia Verde" aligns with the needs of the territory and support the development of geotourist products as a strategy to promote the conservation of its natural heritage and its use for sustainable economic development. More than 50 sites have been analyzed according to their potential for scientific, touristic and educational use, together with their risk of degradation. This project has generated and transferred scientific knowledge related to the geological history of the region to local tourism operators. Likewise, the compiled knowledge has been shared to the local school community, with the ultimate goal of integrating these geoscientific contents into the school's curriculum through formal and informal educational activities. Finally, the work with public institutions will seek to integrate geodiversity in the conservation policies as a new way of seeing and interpreting these unique landscapes.



ADAMEZZO BRENTA GEOPARK
Madonna di Campiglio - Italy

8th INTERNATIONAL CONFERENCE
ON UNESCO GLOBAL GEOPARKS
8-14 SEPTEMBER 2018

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Keynote

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MULTI-DESIGNATED UNESCO SITES BETWEEN GEOLOGICAL HERITAGE AND INTEGRATED MANAGEMENT: THE EXAMPLE OF THE DOLOMITES.

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Keywords: the Dolomites, UNESCO, geoheritage

Among the many UNESCO scientific programs dedicated to intangible, material, natural and cultural Heritage of the Planet, there are three that give rise to designations reserved for the natural environment: the World Heritage Convention (WH), the World Network of Biosphere Reserves under the Man and the Biosphere Programme (MaB) and the UNESCO Global Geoparks under the International Geoscience and Geoparks Programme (IGGP). These three programmes present some common elements and similar objectives, in particular with regard to the protection of areas, combining conservation with sustainable development, the enhancement of Geological Heritage, the integrated approach to the management of complex territories and the networking of the property inscribed.

However, UNESCO itself attributes a different value to the three designations on a global scale as the three programmes express three different perspectives on the relationship between Humankind and Natural Heritage.

This different designation reflects a different hierarchy within what is commonly known as Outstanding Universal Value (OUV) but does not necessarily imply a different importance; rather it defines different specificities and a different mission. Anyway, a multiple designation often, complements and enhances the value of the natural environment.

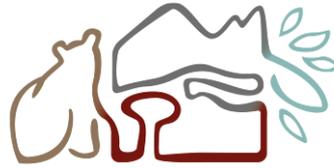
There are many multi-designated sites in the world: 88 are simultaneously registered in the WH List and in the MaB Programme, 8 are inscribed both in the WH List and in the GG Network, 9 are in the GG Network and in the MaB Programme. However, only 4 sites have all the three UNESCO designation for a natural heritage: *Cilento and Vallo di Diano National Park with the Archeological Sites of Paestum and Velia and the Certosa di Padula* (Italy; but WH property is a cultural landscape); *The Dolomites* (Italy); *Jeju Volcanic Island and Lava Tubes* (Republic of Korea); *Pyrénées - Mont Perdu* (Spain, France ; but WH property is a mixed site).

Currently, only two sites in all the world have the triple designation UNESCO from the point of view of geological heritage: *The Jeju Volcanic Island* and *The Dolomites* where are present, all at once in the property: the UNESCO Global Geoparks Network with the "Adamello Brenta Geopark", registered since 2008; the UNESCO World Heritage with "The Dolomites", inscribed into the List in 2009 under the vii and viii criteria, and - last but not least - the World Network of Biosphere Reserves with the "Alpi Ledrensi & Judicaria" registered in 2015 into the Man and the Biosphere Programme.

The Dolomites WH site, as serial property, are itself a composite territory, characterized by an outstanding landscape deriving from an extraordinary geological history and a long-standing human frequentation. In this area, the interactions and the links among geological values, landscape and territory are very close and is difficult to separate. The overlapping of management, the different layers of protection (several national and regional parks, a network of protected areas and natural monuments) is very high but it has been resolved by the recent decision of the Administrations to share an Overall Management Strategy that as its objective implement the actions regarding landscape heritage and protected areas, geological heritage, tourism and mobility, promotion, education and research. This strategy is applied through functional networks that interact with the territory and the various stakeholders and put them in contact and relationship with each other. This stratification of different actors, stakeholders and administrations makes the challenge of sustainable development that is taking place in this territory interesting. The inscription of the Dolomites in

the UNESCO World Heritage List as a serial site and the presence of Geopark or MAB areas indicate that the territory deserves and deeply desires sustainable development.

The multi- designations UNESCO involves many territories that have decided to promote towards sustainable development, in particular it increases the awareness that the Geological Heritage is the basis of the exceptionality of the dolomitic region. This awareness is clearly developed through actions that increase the knowledge of the geology by the populations that live or frequent the Dolomites. The development of geo-tourism, for example, and all policies that pass through the dissemination of geological heritage are part of the common strategy that the different UNESCO designations have as their mission.



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HERITAGE SEEDS IN NATURTEJO UNESCO GLOBAL GEOPARK (PORTUGAL)

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Keywords: *Organic agriculture, local seeds, genetic heritage, Naturtejo Geopark, Paeonia broteri*

Session: Geoparks, sustainable tourism and local sustainable development

Many of the plants on planet Earth no longer exist; they have gone extinct because their seeds have disappeared. Wild and domesticated species are endangered by the disappearing of plant genetic diversity, due to weak nature conservation policies and conventional agriculture. The remarkable biodiversity of Naturtejo UNESCO Global Geopark is a result of the diverse geological background, with more than 600 million years of history, and both must be sustainably managed. This is a rural territory where agriculture activities have a very important role on the population and Naturtejo Geopark aims to raise awareness for the importance of better practices in organic agriculture and other agrosystems. Sementes Vivas Living Seeds S.A. , a Naturtejo Geopark partner, is an organic and biodynamic seed company that produces, processes and contributes to high quality open-pollinated seeds of vegetables, fruits, flowers and herbs. The varieties are adapted to local soil conditions and the Mediterranean climate. The “Heritage Seeds” is a new collection of seeds of local vegetable varieties, for example: tomatoes, peppers, watermelons and turnips; as well as local herbs and flower species such as lupins, peonies and rosmaninho (*Lavandula stoechas*). Crops and varieties with a large cultural influence on the local communities are selected, at least one per municipality. Through this new project the understanding and awareness of the local seed heritage, the cultural traditions related to the crops, and their role in climate change mitigation are enhanced. The seeds are produced from beginning until end (selection, improvement and multiplication) in close cooperation with local communities and farmers of the Naturtejo Geopark. The communities’ and farmers’ great accumulated knowledge, years of traditional practices, are crucial to help to connect science with natural, cultural and intangible heritage in their territory. To communicate this wealth of knowledge, and at the same time conserve genetic diversity inside and outside of the Geopark is the goal of this project • “Heritage Seeds” started with the genetic preservation and reforestation project of the Rosa Albardeira (*Paeonia broteri*) under the scope of “Toulões – The Peony Village”, where the local development is connected with the promotion of Rosa-Albardeira as an icon associated with its conservation (result of a partnership with Lorsch Peony City, in the Bergstrasse-Odenwald UNESCO Global Geopark (Germany), and Lushan Mont, in the Lushan UNESCO Global Geopark (China), both also World Heritage).

GEOPARK PARTNERS COMMITTED WITH THE SUSTAINABLE DEVELOPMENT

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Keywords: *Sustainable development, Partners, Geotourism, Stakeholder, UN SDGs*

Session: Geoparks, sustainable tourism and local sustainable development

In recent years, there has been a clear tendency for the preference for sustainable tourism. Tourists value positively those destinations that work actively for their sustainable development. Proof of this is that the United Nations declared 2017 as the International Year for Sustainable Tourism for Development. It is imperative that Geoparks work together with the stakeholders to incorporate these criteria of environmental, economic and social sustainability to the management and the activities that are carried out, especially in the context of geotourism. In the case of the Geopark of Central Catalunya, the "Commitment to Sustainability" program has been used, which is being promoted and coordinated by the Diputació de Barcelona jointly with the Barcelona Chamber of Commerce. This program is linked to the Biosphere Certification and is based on the standards proposed by the 17 SDGs of the UN integrated into the 2030 agenda, following the guidelines and recommendations emanating from the World Charter for Sustainable Tourism +20. In the territory of Geopark, this program serves as a protocol for formal membership in Geopark, as an official partner. The implementation of this program began last year 2017. It consisted of a day of information and awareness, two days of training and a workshop. A consulting company and the Geopark was supporting during the implementation process to the companies and equipments involved. An initial visit was made to each company and one of verification at the end, to make sure that they fulfill all the criteria. The program requires that each one have to propose 3 improvement actions for the following year. In the case of Central Catalunya, at least one of them must be the creation of a Geopark product. The definitive acceptance implies the recognition of the companies and equipments as official partners and a distinction and support material is granted to them. Accreditation implies acceptance of the requirements of the Geopark. 23 companies and facilities were involved in this program, including: Travel agency (1), restaurants (1), hotels (5), shops (1), rural accommodations (3), museums (4), cellars (2), hostel (1), tourist offices (3), active tourism companies (1) and others (1). With these first participants an initiative has begun to attract the main territorial actors towards the improvement of their activity in terms of sustainability. In 2018 7 new stakeholders have joined the program. And this will have an impact on the quality of life of the inhabitants of the territory, as well as a better experience for our visitors.

THE TUMBLER RIDGE GLOBAL GEOPARK BRAND – A JOINT EFFORT BETWEEN A TOWN AND THEIR GEOPARK

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Keywords: *tourism, marketing, sustainable, municipality, collaboration*

Session: Geoparks, sustainable tourism and local sustainable development

In 2014, the Tumbler Ridge UNESCO Global Geopark received its official geopark designation. As with all Geoparks, community support was a key part of the Geopark project. The Tumbler Ridge UGG is located in the remote Rocky Mountains of northern British Columbia, Canada. With a population of only 1,800 people in nearly 8,000 km², the Geopark has only one town and almost no rural population. Once dependent upon coal mining as a single industry for the town's survival, new palaeontological discoveries and exceptional wilderness recreation gave the town new hope to rebrand as a ecotourism destination. In pursuing a new marketing strategy and brand for the community, consultants met with community members and stakeholders, and established that the key iconic unique feature of the territory was indeed the UNESCO Global Geopark, and the result was the recommendation to the town of Tumbler Ridge to adopt the Tumbler Ridge Global Geopark as their tourism marketing brand. The goal of our community was to create a national park feel, with a cohesive look which gave visitors and locals alike the sense of being in a world class designated wilderness area. The joint brand has been a successful partnership between the Tumbler Ridge Global Geopark Society, which manages the UGG, and the District of Tumbler Ridge. After developing branding guidelines and an updated economic diversification strategy, new materials were developed to reflect the joint brand. The community visitor guide is branded after the Global Geopark, and all of the wayfinding signage throughout the town displays the Global Geopark logo. Banners have been updated for downtown streetlights which fly the Geopark flag, and the community visitor centre sign was designed after the Global Geopark logo. Our most popular geosites and trails have new interpretive panels at the trailheads designed on brand, and the District of Tumbler Ridge have encouraged their staff to use the logo internally and locally with communication, resulting in the community recreation guide and posters including the Global Geopark logo alongside the District of Tumbler Ridge traditional logo. Since becoming a Global Geopark in 2014, attendance at the visitor centre in Tumbler Ridge has increased over 700%, from just over 2,000 in 2014 to nearly 18,000 visitors in 2017. The impact of the joint brand has been a significant contributor to the reinvention of Tumbler Ridge as a tourism destination.

SCIENTIFIC, SOCIAL AND ECONOMIC IMPACT OF THE EGNAZORES2017 CONFERENCE

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Keywords: EGN conference; Azores Geopark; visibility; local engagement
Session: Geoparks, sustainable tourism and local sustainable development

The EGNAZORES2017 Conference in numbers: i) a total of 370 delegates from 26 European countries (85%) and also from Australia, Brazil, Canada, China, Colombia, Ecuador, Iran, Japan, Mexico and USA ; ii) 125 s and 40 i-posters (e.g. TV screen posters); iii) 7 special s delivered under the umbrella of the two workshops “Geoparks & Geotourism in Volcanic Areas” and “Geohazards in Geoparks”; iv) 7 buses and boats for the mid-conference field trip, as three different options and itineraries (“Feel and taste the S. Miguel volcanoes”, “...deep blue and coloured greens”, “Geocultural landscapes”); v) 16 delegates at the post-conference fieldtrip “...from majestic volcanoes to great people” on the Faial, S. Jorge and Pico islands; vi) 26 delegates at the post-conference fieldtrip “...islands of fire and water” on the Flores and Corvo islands; vii) about 10 social and cultural events organized in collaboration with the stakeholders of the Azores UNESCO Global Geopark (UGG) and the local population, including a musical performance by the regional music school in Ponta Delgada, a “(GEO)FAIR” to promote European geotourism and draw attention to the importance of this tourism product worldwide, the launch of the special stamps edition “Geoparque Açores” by the Portuguese post company, CTT-Correios de Portugal S.A. and the welcoming of the conference delegates by a group of 20 children from a centre for child support and social inclusion.

Those are some achievements of the 14th European Geoparks Conference - EGNAZORES2017, that took place in the Azores UGG from 7th to 9th September 2017, followed by the post-conference fieldtrips (from 10th to 13th, September) and that also included the EGN Advisory Committee Meeting, on September 5th and the 40th Meeting of the EGN Coordination Committee, on September 6th.

In this work we emphasize the strategy implemented on the management of the EGNAZORES2017 Conference, supported in a clear definition of tasks and a strong engagement among the Azores UGG team, the involvement of the local stakeholders and regional institutions, the sponsorship by the Azores Government and, during the conference, the outstanding help of the 22 volunteers, from Portugal, Brazil, Croatia, Greece, Hungary, Italy, Switzerland and USA.

The outcome of the EGNAZORES2017 Conference confirms the scientific quality of the contributions, the growing international interest in geoparks, the high quality standards in geopark operation and activities and the recognition of geotourism in the sustainable development of geoparks territories worldwide. At a regional level, the Conference raised awareness among the population and the governance, improved the local engagement and contributed significantly to the Azores UNESCO Global Geopark visibility, recognition and development.

As final notes: i) a provisional study on the economic impact of the EGNAZORES2017 indicates that this conference contributed about 350,000 Euros to the local Azorean economy, and, ii) in general terms, 60% of delegates valued the conference as very good, and 30% as good, on most of the topics in our questionnaire.

ARARIPE UNESCO GLOBAL GEOPARK AND IU-Á HOTEL: A SUCCESSFUL MARRIAGE!

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Keywords: *development of geopark, local development, partnership, sustainable tourism, geoparks*

Session: Geoparks, sustainable tourism and local sustainable development

The iu-á hotel with one year of operation was elected, in 2015, by the TripAdvisor, the "18th best hotel in Brazil" on a list that brings together annually the "25 Best hotels in Brazil" based on user ratings. Since your opening, the iu-á will be hotel receives the "certificate of excellence" award. The iu-á will name is inspired by the native language of the Indians Cariri, early inhabitants of the region, and means Juazeiro (juá/iu-á/fruit of thorn) - a leafy tree and green in all seasons and that gave rise to the name of the city. A private venture with approximate cost of construction and assembly in the order of R\$ 25.000.000,00 (25 millions of reais). During your construction, two and a half years, involved the hiring of 140 employees, and today works with 68 employees, all trained in course of 40 hours about Araripe UNESCO Global Geopark and your Natural Heritage, including visiting the geosites. The idea is to incorporate the territory and your culture to the hotel management, in all its levels. The partnership was born during the construction of the hotel, together: Demétrio Jereissati (hotel owner), the Araripe Geopark and the Cariri Regional University from Brazil, was consolidated with the signing of a Covenant an agenda of sustainable actions and mutual cooperation to the Araripe Geopark's goals were incorporated into the new hotel, only in the territory of Brazil. The hotel stands out for offering an international standard structure, with appreciation of regional culture, able to receive both the business as leisure tourism. With the goal of being an ally of the sustainable development of the region, the partnership includes the dissemination of natural riches through fostering and preservation actions, establishing a chain of benefit to the whole region of Brazil. One of the latest actions of the hotel was the "Doblossauro", a vehicle Doblô (Fiat) adapted to receive a large Pterodactyl, a flying reptile of the order of Pterosaurs, at the top of the vehicle. More than 1/3 of Pterodactyls described in world are in the Araripe UNESCO Global Geopark territory. The "Doblossauro" is available in the hotel for guests and non-guests wishing to get acquainted with the geosites and the territory as a whole, as well as a mini Museum – small exhibition center where visitors and guests can learn a little about each part that composes the Araripe Geopark. The visitor is guided by one of the associated guides, which receive support from the hotel to devote to this function; the wealth of information they convey is of fundamental importance in order to meet the Cariri. A partnership that has served as an example for hotels of the region and puts the Araripe Geopark of the best attractions of Brazil.

JEJU UGGP GEOPARK BRANDING PROJECT

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Keywords: *Jeju Geopark, Korea Geopark, Geopark Branding Project, Geo Trail, Geo House*

Session: Geoparks, sustainable tourism and local sustainable development

Jeju Island has been promoting Geo Branding project to revitalize Geopark since 2013. The Geo Branding project aims to establish a representative brand that collectively refers to local products that combine various natural, ecological and human resources with the motive of the geological features of Jeju UGGp geosites. Geo Trail, Geo House, Geo Food, Geo School, and Geo Farm are among the representative brands currently activated by the Geo Branding Project. Geo Trail, four trail courses in place so far, is a trail course that runs through the towns of Geopark. These courses include a variety of historical, cultural and ecological resources, attracting a great number of visitors. Geo House, located in the geosites, is an old traditional house, remodeled by applying the geological concept. With good accessibility and affordable price, Geo House has become a unique type of accommodation and 12 Geo Houses are currently in operation. The geological features of the geosites have motivated Geo Food. Various food items such as pyroclastic-surge-deposit-shaped cookies, volcanic-bomb-shaped bread, and scoria-cone and tuff-cone-shaped puddings have been developed for sale. Geo School is a program that provides the geological and ecological education for the students in the geosites and monthly educational programs have been carried out since 2018. Geo Farm is a project that processes and sells agricultural and aquatic products cultivated in the Geopark village. These products are priced higher with the brand logo attached on them. Geo Branding project surely helps promote Geopark and boost the local economy.

GEOTOURIST MAP: COMMUNICATION BETWEEN GEOSTAFF AND TOURISTS

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Keywords: *Geotourist map, geosite assessment, cartographic visualization, Geopark maps, cartographic communication*

Session: Geoparks, sustainable tourism and local sustainable development

Since 2003 knowledge is accumulated concerning the making and using of geotourist maps in Hungary. It involved both large-scale and medium-scale maps. The latest contribution is published in 2018 about a small area of the Balaton Uplands as a large-scale 1:30k geological hiking map. The aspects of making, using and disseminating geotourist maps are demonstrated through the workflow of this map, but experience with previously published cartographic materials is also built in our study. The genre of geotourist map combines the characteristics of traditional tourist maps and geological/geomorphological maps. Its scale varies from large to middle and there exist several subdivisions. Categories can be created based on the scale and the thematic content. Furthermore, from the aspects of use and make, we can also define key characteristics. These distinctions are valid either using paper-based or digital maps on a portable device. Large scale maps (approximately between 5k and 50k) are ideal to represent natural and artificial phenomena on their true shape, extent and location. Thus, their main use is assisting map users on the field. Medium scale (50-500k) maps however, depict objects in a generalized way making them ideal for overviewing an area (e.g. planning a car trip). From the aspect of making these maps, there lie several differences in the compilation process, concerning mainly the source data for the thematic overlays and the topographic contents. For example, while medium scale maps can be compiled from existing materials, creating a large scale map should include firsthand field data about geosites and other landmarks. The selection of the proper geosites to be depicted on the map has a high priority, because they play important role in the dissemination of knowledge to the visitors of the concerned area. While on medium scale maps only the most well-known geosites are placed, the large scale maps should contain lesser-known sites as well, which have to be selected throughout a geosite assessment process. Selecting the best geosites for the map is a combination of geometrical and qualitative approaches (e.g. filtering out the small or not representative objects). The remaining landmarks have to be close to tourist facilities, but they also have to possess scenic and scientific importance. The compilation stages of a geotourist map are as follows: (1) source map research in paper-based and online archives and in scientific papers; (2) GIS processing of the collected information; (3) field survey/field verification; (4) geosite assessment modeling/site selection; (5) cartographic visualization. Our latest 30k map was created for hikers who are interested in geology, and carefully crafted to depict both thematic and topographic content in the most comprehensive way. The area is part of the Bakony-Balaton UNESCO Geopark, one of the best known Hungarian protected areas. The Park area includes the shores of Lake Balaton, the largest lake in Central Europe which is a frequented tourist destination. The staff of the Geopark organize tours to the well-known sites, and are keen to illustrate their presentations with maps.

A GEOPARK TO TASTE IT (NOT ONLY OF ROCKS MEN LIVE)

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Keywords: *Geofood, Local Foods, Partners, Local Companies, Network*

Session: Geoparks, sustainable tourism and local sustainable development

We are working with our local companies since the beginning of our geopark project. In our territory there are some regional certified products, with high quality and very professional, produced, for example Protected Designation of Origin of Honey, Protected Designation of Origin of Cheese, Protected Designation of Origin of Wine, Iberico (Iberian) Jam and also high quality products like, olive oil, chestnuts, mushrooms, etc. We are also working together with some regional “Touristic Products Clubs” with Extremadura Public Administration, to create new opportunities for our local foods and little companies. This kind of Clubs are very important in promotion and new touristic products; e.g. Cheese Routes Club, Routes of Ribera del Guadiana Wine Club, Iberian Jam Routes Club, etc.. We are developing some regulation and rules to create a GeoCompanies brand, to make a “Geopark Food Company”. In different working groups around the geopark, we teach the rules to the local companies; e.g. how, when and where to use our logos, in shops, labels, also in promotion, brochures, web pages, social networks, fairs ..., to promote them. The local companies must understand what is a UNESCO Global Geopark, and why we are one of this, working together, using local products, and very important, to be members of the Professional Tourism Enterprises Association of the geopark “GEOVILLUERCAS”. In this association there are restaurants and hotels and it’s very important to create alliances, strategies and synergies between them. Also we are working with the “GEOFOOD” project and there are some companies using the logo and working together. We need to improve this project with our companies because it’s a big chance of international promotion and a very good opportunity to make business around the world.

THE SPACE OF GONG CULTURES

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Keywords: *Intangible Heritage, Ethnic group development, Unesco label, Musical, Vietnam*

Session: Geoparks, sustainable tourism and local sustainable development

The Krong No – Dak Nong Volcano Geopark extends over 5 districts and 1 town in Dak Nong Province of Vietnam Central Highlands. It is home to three indigenous ethnic minorities: M'ngong, Ma and Ede who own many unique cultural heritages such as folk festivals, epics (Ot N'drông), especially Gongs Culture heritage which was recognized as the Masterpiece of the Oral and Intangible Heritage of Humanity by UNESCO in 2005. Gongs of indigenous minorities in The Krong No – Dak Nong Volcano Geopark are a musical form with special outstanding position as it contains various cultural values associated with natural environment and community-bonding activities. However, due to historical circumstance and contemporary socio-cultural change, Gongs are facing the risk of losing their value. Over the past 10 years, the National UNESCO Office in Hanoi City, the Ministry of Culture, Sports and Tourism and Dak Nong Province have coordinated to implement several projects to preserve this intangible cultural heritage according to the UNESCO 2003 Convention and the Cultural Heritage Law of Vietnam. Despite initial achievements, the preservation of the Space of Gong Culture – the World Cultural Heritage of Vietnam has some limitations due to various reasons. Dak Nong Province is preparing a dossier submitted to UNESCO for Krong No Volcano Geopark designation as a UNESCO Global Geopark. This is especially important not only for the Space of Gong Culture but also for all other heritages in the geopark area. Once landscape environment, biodiversity are protected and restored, it will create the best condition to revive the performance environment of Gongs. Throughout the UNESCO-oriented tourism activities, cultural values will be preserved and promoted effectively, which create favourable conditions for the Space of Gong Culture to remain and develop in a sustainable way in the Krong No – Dak Nong Volcano Geopark.

YOUNG GEOPARK AMBASSADORS COLLABORATION PROGRAM

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Keywords: *Collaboration, Ambassador, Education, Investigation, Dissemination*

Session: Education, public awareness and communication

Geopark Young Ambassadors Collaboration Program is an interchange educational experience between Molina Alto Tajo UGGp and El Hierro UGGp for students of 4^o degree of secondary school. The project is carry out by Molina Alto Tajo UGGp in collaboration with Secondary School Institute of Molina de Aragon and the Municipality of Molina de Aragon, and in the other hand, the Roques de Salmor y Garoé Secondary School Institute from El Hierro UGGp. The objectives of this educative experience are: - Improve the knowledge of students through the investigation of their surrounding land. - Increase the knowledge about geology and other subjets - Promote values of conservation and best practices - Reinforce the identity trough knowledge of local science, culture and traditions - Improve skills in team working - Dissemination of Geopark Values Students, in three people teams, will make an investigation report about some Geopark heritage topic, the two winners teams, will travel to other Geopark for present its work and visit main geo-attractions. Teachers teams, of both institutes, in collaboration with Geoparks experts selects a series of topics about Geoparks Heritage such as geology and environment, history, non-tangible heritage, etc. in order to understand the Geopark context and warranty the proper knowing of Geopark, investigations reports must start by a general synopsis of Geopark heritage and Features. A Committee evaluates the works by assessment of their quality and proclaim a winner team. Evaluation criteria are: - Gather the essence of Geopark in all heritage features. - Innovation. - Clearness in the messages. - Scientific consistency. - Artistic quality and performance. Winner team travel to other Geopark for present its work and visit heritage. The format of presentation is free, the jury will appreciate the implement of new performance ideas. Participation will be free of charge for student, Geoparks and educative institutions will provide the necessary economic founds for works and travels. Since Geopark concept and heritage is included in School Educative Project, the aim of this experience is to repit every year as a new sujet in order to the participation of as much as possible students.

SAME ROOTS, SAME ORIGINS: A CAPACITY BUILDING PROGRAM FOR LOCAL COMMUNITIES

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Keywords: *Capacity Building, Local Community, Sustainable development, Innovation, Model*

Session: Geoparks, sustainable tourism and local sustainable development

Hong Kong UNESCO Global Geopark of China (HKUGGp) is located in the northeast part of Hong Kong and includes 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 in and ownership of geopark initiatives through ongoing capacity building programmes and long-term local engagement and partnership projects, with a view to preserving the traditional culture and developing the local economy in a sustainable manner. Although there are many villages with a notable historical and cultural heritage in HKUGGp, 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 HKUGGp. A new project, entitled “Same Roots, Same Origins”, is intended to be an example for conserving the intangible heritage of the local communities. With strong local support and the concerted effort of numerous government departments and NGOs, a disused school has been converted into a visitor centre. The local community designed the visitor centre, with the support of HKUGGp and other professional bodies, and looks after the daily management of the centre. The Same Roots, Same Origins project is expected to be a positive, unique model of sustainable development.

THE ROLE OF GEOPRODUCTS IN FOSTERING LOCAL SUSTAINABLE DEVELOPMENT

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Keywords: *geopark, community, development, heritage, geotour*

Session: Geoparks, sustainable tourism and local sustainable development

One area of innovation developed thanks to geoparks transnational cooperation is the geoproduct concept and its socio-economic and managerial framework. A geoproduct is defined as a type of product which has a direct connection with the Geopark's territory, is produced by a Geopark's partner and encourage the local economy. In this context, Hateg Country Global Geopark develops a new type of geoproducts composed of a network of visiting and interpreting points called "Geopark's Houses" linked by thematic trails and fostering local community initiatives. The Water and Stones Path is the longest and most complex thematic trail of this geoproduct. The route crosses the territory of six villages. Includes a paleontological site of international importance, a medieval fortress, a vernacular patrimony site and the House of Stones interpretation point. Two of the path's objectives, the House of Stones and the Vernacular Heritage Site, are the result of Geopark's administration involvement in defining the concept, construction, interpretation, and management in different local contexts. The stones along the route are witnessing hundreds of millions of years of Earth evolution. The water, in different forms, played a role in building and de-destroying the rocks. Specific human activities, constructions, and stone made objects are directly connected to stone or water use, discovered and reinterpreted in a modern context. The House of Stones is developed in Ohaba-Sibisel village, on a private property, by the Wild Roots NGO together with the Geopark and based on Geopark's concept. It is an important interpretation point which reveals the strong connection between local bio- and geodiversity. It has a stone foundation (granite boulders), straw bale walls plastered with clay and a green roof, all the building symbolizing the layers of the soil, starting with the bedrock, parent material, subsoil, topsoil and the organic layer. The Vernacular Heritage Site is a traditional technique complex located in Pestera Village, one of the most isolated communities on the Geopark's territory. The site consists of two water mills, clothes washing installation water - operated and a limestone burning furnace, realized at the beginning of 20th century. Built only from local stones and wood, based on an ingenious technique, this unique ensemble on Geopark's territory reveals the strong connection between Man and Earth and the ways of using rocks and water power by local communities. The two objectives and other visiting points on the path represent genuine geoproducts developed to ensure the sustainable development of the Geopark and encouragement of local initiative. The Water and Stones Path is one of the geoproducts developed within the Interreg project Danube Geotour, a transnational project co-funded by European Union funds (ERDF, IPA) aiming to valorize the geoheritage for sustainable and innovative tourism development of Danube Geoparks. All geoproducts, including ours, will be finally integrated into an international innovative tourism product to stimulate visibility and increase tourist visits in Danube Geoparks. This paper presents the construction process, involvement of different local stakeholders, the socio-economic impact on local communities and the impact on local and regional geotourism development.

COASTAL GEOMORPHOSITES IN CILETUH-PALABUHANRATU GEOPARK AND ITS GEOTOURISM POTENTIAL

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Keywords: *Coastal, Geomorphosite, Geotourism*

Session: Geoparks, sustainable tourism and sustainable local development

Along the coast in Geopark Ciletuh-Palabuhanratu there are some very interesting and important geological sites. Overall, the beach area in the geopark is located in 7 sub districts in Cisolok, Cikakak, Palabuhanratu, Simpenan, Ciemas, Ciracap, and Surade. From north to south, the beaches are made up of different lithological types of from different rock formations. In the north, in Palabuhanratu Bay, the general characteristics of the beach involve a grayish sand, partly made up of gravels that are dominated by andesite, basalt, and altered rocks. Cibangban Beach has a rocky shore composed of an andesite intrusion. Outcrops of ignimbrite tuff and lava from the Citorek Formation can be found in several locations such as Karang Naya Beach and Tenjo Resmi. Some are characterized by a columnar structure. In the Palabuhanratu Subdistrict, the northern area is defined by Pliocene volcanic hills. The southern area is bounded by the Cimandiri Fault which also defines the northern boundary of Jampang Plateau. Between these areas, the Jampang Highland ridge is composed of Oligocene volcanoclastic deposits of the Jampang Formation, including sandstone, volcanic breccia, lava, tuffaceous sandstone and tuff with horizontal layers. The cliff beaches reveal evidence for continental uplift associated with ongoing subduction. From the Ciletuh Area to Cikepek Beach in the south, the beaches are composed of quartz sandstones, polymict breccias, conglomerates, and claystone with thin coal layers from the Middle Eocene Ciletuh Formation. The coastal sediments here are composed of diverse materials such as quartz, hornblend, red clay, and iron sand. The small islands, at some locations, such as Mandra Island and Kunti Island are identified as sea-stack landforms. Along the coast between Cikadal, Batununggul to Cikepuh there are a number of unique rock-shaped objects resembling various types of animals, such as frogs, rhinoceros, buffalo, crocodiles, dragon heads, lion heads, eagle heads and fences and batik motifs. These forms were created by processes associated with marine erosion. This morphology is also referred to as the wave cut-platform. At Cikepuh Beach and Citirem Beach headlands composed of basic and ultra-basic rocks controlled by faults with an east-west orientation. The Sodong Parat has a sea cave. The southern region, i.e. Ujung Genteng Beach to Karang Bolong, has a relatively flat coastal morphology with a more gentle topographic rise a characteristic of an emergent coastal landform or raised beach. Here the lithology consists of limestones, some tuffs and calcareous sandstone. The northern and eastern areas grade into the Bentang Formation, estimated to be of Late Miocene age. Along the coast there are also many grassland areas. The beaches have a different land use status. In the north, most beaches are well-developed tourist attractions. Beaches in the area of Mount Badak to Citirem are situated in the conservation forest area. Access to this location can be explored in a boat tour from Palangpang Beach. Visitors can also, with the permission from the conservation forest agency, engage in coastal treks.

THE HEAT OF THE EARTH, A GEO TOURISTIC SUSTAINABLE PACKAGE FOR THE IMPLEMENTATION OF THE GGN PRINCIPLES AND VALUES

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Keywords: *Ecotourism, Sustainable Tourism, European Charter for Sustainable Tourism, Green Economy, Circular Economy*

Session: Geoparks, sustainable tourism and local sustainable development

Over the last few years, Parks and Protected Areas have been increasingly challenged to integrate the social and economic realities of their territories in a tangible way. Parks should ideally be an incubator of ideas and visions, while supporting a model of development based on sustainability, renewability and circularity in the use of resources, while paying particular attention to support for local innovative companies. The Tuscan Mining Geopark (Parco Nazionale delle Colline Metallifere) with this intervention presents its own experience. Founded in 2003, the Tuscan Mining National Geopark, embarked on a path towards sustainable tourism starting in 2010. Thanks to reflections and projects developed within the European and Global Geoparks Networks, we activated in 2013 the participatory process leading to European Charter for Sustainable Development in Protected Areas (by Europarc Federation). Since 2017, the Tuscan Mining Geopark has been involved in an Interreg Med project, titled DestiMED, which aims to support the development and management of sustainable tourism products in protected areas of the Mediterranean Region, in order to promote them in international markets. The intervention will focus on the presentation of the characteristics and the participatory modalities with which the sustainable tourism package was built, named "the Heat of the Earth", which the Park has defined basing on two guiding pillars: 1. the focus on interpretation and enhancement of the geological aspects of the visit and 2. the maximum (measured) impact reduction in terms of CO2 emissions of the defined tourism product, also known as the Ecological Footprint (EF). The presentation will illustrate how, in a tangible way, a sustainable tourist proposal can be built (with a scientific measurement of emissions) by integrating proposals and excellences: geology, botany, fauna, culture, history and archaeology and building the offer based on agro-agricultural products cultivated and transformed locally with care to sustainability, and collaborating with family and locally owned service providers (guides, catering, accommodation, restaurants...). Of particular importance is the partnership that the Geopark has activated with a local tour operator which is specializing in sustainable inbound tourism, developing skills and competencies and creating new green and decent jobs. Finally, we will illustrate how all this has led to a remarkable advancement of awareness among the local population and local business about the issues of sustainability, all while building the awareness of the development potentialities that the Protected Area / Park offers, thanks to its role as director and catalyst of local government policies.

TIANZHUSHAN GLOBAL GEOPARK ANCIENT MANUAL POTTERY IS WEARING A NEW COLOR

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Keywords: *protection, pottery, heritage, sustainable, development*

Session: Geoparks, sustainable tourism and local sustainable development

Doumu ancient pottery, adopting manual crafts for thousands of years, is an important cultural landscape of Tianzhushan global geopark, which has been listed as a representative of provincial intangible cultural heritage by Anhui province people's government. The ancient pottery was made from the pure and fine yellow clay of Tianzhushan global geopark, gone through washing, throwing, basking, repairing, polishing, drawing, graving and other 14 processes, all by hand, lasting for 25 days. There are more than 40 kinds of pottery crafts, which have integrated usable, ornamental and craft value together, fully reflecting the creativity of folk pottery and crafts. It can be used as life utensil, sacrificial utensils and ornamental items, which can last for thousands of years. Doumu pottery craft and the Xue Jiagang relics site in Tianzhushan global geopark date from the same origin with a history of 6,000 years, which has been regarded as a living fossil in the history of pottery making, and has important historical value. In recent years, with the support of the governments at all levels and Tianzhushan global geopark administrative committee, ancient pottery has been integrated into geological landscape, beautiful countryside, and cultural tourism and effort has been made to build productive protection, live transmission and innovative development, tradition and innovation promotion, protection and inheritance combination, and the integrated system of inheritance and transfer base to make Doumu ancient handmade pottery wear a new color. Manual pottery art is the link between ancient and modern, and a window into ancient civilization. Generations of pottery artist have worked hard, carefully improved, constantly promoted pottery craft, developing tea set, flowers vase, furnishing articles, musical instruments and souvenirs, as many as 300 varieties. Each year, there are over 30,000 students from middle school, university and research institute, which enables students to combine research and travel experiences with practical activities, guides students to integrate books and life, go out class to outsider, close touch history, sense nature and cultivate their taste. Actively participate in exhibitions at home and abroad, and continuously disseminate the ancient pottery culture to the world. Actively encourage local residents to participate in the inheritance of crafts, and employ more than 35 local non-genetic recipients. Over 200 people will benefit from it. The average income per person will be about 30,000 yuan per year. The economic value and cultural value of intangible cultural heritage have been revealed.

HUMANS CANNOT MANAGE MUD VOLCANOES. BUT CAN INTERPRETERS MANAGE MUD VOLCANOES' HUMAN VISITORS?

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Keywords: *geopark, interpretation, management, mud volcanoes, sustainable development*

Session: Geoparks, sustainable tourism and local sustainable development

Buzau Land Aspiring Geopark in Romania has some inspiring sites. Salt deposits, strange anthropomorphic concretions, amber, mud volcanoes ...and wonderful scenery where many old traditions survive and butterflies fill herb-rich meadows. The cultural traditions include folk explanations for the geological oddities – are the burping, belching mud volcanoes respiring dragons or other mythical beasts deep underground, or maybe they are just belching after ingesting swallowed cows? Mud volcanoes – like their magmatic relatives – are rather unpredictable. And humans certainly cannot control them! Mud, water and hydrocarbons are being erupted at several sites in the geopark and currently there are various degrees of commercialisation of the areas. The sites are fragile and the behaviour of many visitors does not respect the site with footsteps everywhere, even in soft mud, and pieces of mud being torn up and thrown around. Current information boards at two sites – one explicitly asking visitors to respect the site – may, or may not, be read. But even if read the effect on behaviour seems minimal. This is NOT sustainable development. One small aspect of developing Buzau Land Aspiring Geopark with the local community will consist of working with local people to gather the stories around the mud volcanoes. But another strand is to understand the science of the volcanoes and also to study the effects on the local ecosystems which even to a casual observer can be seen to be rich in halophytes closest to the bare vents with biodiversity increasing with distance from the streams of mud. Interpretation should tell stories. Brain food, if you like. Interpreters use the mantra “provoke..relate..reveal” developed by Freeman Tilden in the US National Parks, and Tilden stressed connecting people to places. So interpretation should also make people value – in their hearts - what they see and then wish to preserve it for others. The current proposal for Buzau Land is to fully survey the most commercialised site (the owner is keen to work with us) and maybe develop a circular route to highlight the varying biodiversity as well as the eruptions, and then promote the site with provocative interpretation which relates to visitors’ existing experiences (maybe with cooking?) and then tells them why the site is fragile and needs respecting. Will this approach work? Will the unpredictability of the eruptions make it too difficult to lay out a trail? And will people keep to it? So far we have looked, taken lots of images from the ground and with a drone. And thought. Next comes an interpretive strategy and a plan. Then to evaluate the draft products. “Watch this space”, as they say!

EMPOWERMENT OF COASTAL COMMUNITIES BY DEVELOPING GEOPRODUCTS FROM MANGROVE FORESTS IN BELITONG ISLAND NATIONAL GEOPARK

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Session: Geoparks, sustainable tourism and local sustainable development

National Geopark of Belitung Island has large coastal areas where communities live and work. In Eastern region of the island only there are twenty thousand hectares (20,000 hectares) of mangrove forests which are very rich with many species of vegetation, fish, shrimp, crabs, etc. Coastal communities have not utilized raw materials from nature exists in such forests. Coastal people who are mostly fishermen heavily depend on fishing as their main source of income. During months of high waves and bad weather fishermen lost the opportunity to fish and that influence their daily income significantly. This large dependency to the sea make most coastal people poor. Therefore empowerment program for women is initiated to create values from the mangrove forest potentials to improve their income. This program is aimed to empower wives of fishermen to develop their skills, innovation and creative entrepreneurship with conservative based. They are also taught to conserve the mangrove forests to maintain mangrove product sustainability. The program is conducted in smaller groups where they are given intensive trainings and mentoring to create batik and food products where the raw materials are taken from the mangrove (propagule). The program has been successful in creating many geoproducts with premium quality such as mangrove hand painted fabrics (batik) and other processed food which in turn improving the creative economy and tourism within Belitung Island National Geopark. This pilot project will be replicated to other similar areas with some recommendations.

GEOTOURISM PACKAGES AS A WAY TO IMPROVE THE PROMOTION AND LINKAGE BETWEEN GEOLOGICAL, BIOLOGICAL & CULTURAL HERITAGE IN RINJANI LOMBOK GEOPARK.

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Keywords: *Sustainable tourism, Local Development, Geotourism, Rinjani, Lombok*

Session: Geoparks, sustainable tourism and local sustainable development

Lombok Island has the beauty of natural attractions such as mountains, beaches, waterfalls that have long been packaged into tour packages and managed to attract many tourists to visit. Though in addition to the geological heritage Lombok Island also shows wide biodiversity and cultural heritage which when combined will have greater appeal. In collaboration with a local working group, currently Geopark Rinjani Lombok board has developed six geotourism packages in Ampenan (Mataram City), Sesaot Pakuan (West Lombok), Aik Berik (Central Lombok), Tete Batu (East Lombok), Sembalun (East Lombok) and Desa Gumantar (Kabupaten Lombok Utara). The geotourism packages combine geological aspects, other natural aspects and distinctive cultural features of each region. Community groups are involved as much as possible, such as local arts groups, small community industry workshops and traditional transport modes. Attractions in each geotourism packages are unique and different from each other. The goal is that each geotourism package offers different sensations and variations. The geotourism packages will be fully managed by the community itself in a working group. The task of the working group is to identify the geological, biological and cultural resources that exist in their village. In addition, the working group also identifies community groups that can be included as part of the geotourism package such as traditional arts groups, small community centers that are interesting for tourists to visit. After that the working group will arrange the itinerary and calculate the selling price of the tour package. Within the price of a tour package there is a sharing for local community groups involved, such as transport providers, meals, accommodation, art groups, small industry groups, guide, porter and group of geotourism package managers. This community involvement has become the standard in developing geotourism throughout Rinjani Lombok Geopark area. Every village that wants to pioneer the development of ge-tourism packages in its area must follow the same pattern and standard. The aim is to involve the community in the conservation of their geological, natural and cultural heritage. Awareness to actively support conservation efforts will grow if people feel immediate economic benefits in a sustainable manner.

NON NUOC CAO BANG UNESCO GLOBAL GEOPARK - A KEY FACTOR TO BUILD A NEW MODEL OF SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT OF CAO BANG PROVINCE, VIETNAM

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Keywords: *Tourism goals, geopark partners and network strengthening, local product development, community tourism-based activity, nature conservation and environment protection*

Session: Geoparks, sustainable tourism and local sustainable development

Located at the Northern border between Vietnam and China, the Non Nuoc Cao Bang UNESCO Global Geopark occupies around 3,072 km² within 9 districts of Cao Bang province. The central part of the Geopark shows a mature karst system which fully demonstrates karst forests, isolated towers, fossil and active caves with underground and surface rivers, including the so-called “turlough” system of lakes of international significance. Added to the mature karst system, the Geopark features granitic plutonites rich in minerals e.g. tungsten, tin, iron and gold as well as 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. The Geopark’s territory has been well-known as home to several ethnic minority groups who have lived well adapted to the environment, displaying rich traditional cultures, which are demonstrated by hundreds of both tangible and intangible heritage values, creating a range of distinctive cultural landscapes with many historic and religious sites of national significance. Cao Bang Tourism Development Program period 2016-2020, being one of the 6 primary programs which play an important key role of the economic structure of Cao Bang, has mainly focused on goals in 4 main fields, including (1) Setting detail plans/programs for tourism and geopark heritage development; (2) Implementing projects on tourism infrastructures and related services; (3) Boosting up cooperation and promotion activities, e.g. organizing conferences/meetings/seminars on development/promotion and preparing marketing programs for Non Nuoc Cao Bang Geopark. A project on the establishment and development of Non Nuoc Cao Bang Geopark for the period 2016-2020 was approved by the People's Committee of Cao Bang to significantly achieve the tourism development program's goals as well as to be in line with UNESCO Global Geoparks criteria and requirements. This project has been prepared and implemented in which the Geopark is considered a key factor to build a new model of sustainable socio-economic development for the province, in connection with heritage values preservation and promotion, natural environment protection, geopark partner networking and local product development; empowering women in community tourism-based activities for sustainable tourism and local sustainable development.

VISITORS' SATISFACTION AND THEIR WILLINGNESS TO REVISIT XINGWEN UNESCO GLOBAL GEOPARK OF CHINA

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Keywords: *visitors' perceptions, IPA, geotourism, service, facilities*

Session: Geoparks, sustainable tourism and local sustainable development

Xingwen UNESCO Global Geopark, situated in Southwest China, became a Global Geopark Network member in 2005. It offers a wide variety of heritage of geological and cultural importance such as karst landscape, karst caves, lakes, waterfalls, wildlife, culture, etc. In the last few years, the number of visitors to Xingwen Geopark has increased dramatically from 183,000 in 2005 to 579,000 in 2017. This influx has spurred substantial increases in the demand for facilities and services. However, in terms of a geotourism destination, some visitors may not like the changes in the environment and the landscape of the Geopark due to its development. The purpose of this study is to measure the level of visitors' satisfaction with the quality of services and facilities at Xingwen Geopark and to determine the relationships between visitor characteristics, satisfaction and their willingness to revisit. Data were collected from on-site surveys in the Geopark. In addition, the study uses Importance-Performance Analysis (IPA) to identify the attributes in services and facilities that are a necessary priority for improvement. The results of the study shows the level of visitors' satisfaction with the Geopark to be medium. Of the 29 attributes, the study identifies 13 items as being of good quality, 5 as needing priority improvements and 11 as being of low priority. A high percentage of visitors intend to return and are willing to recommend the Geopark to others. The results also suggest that there are some opportunities for improving the services and facilities in the Geopark especially for management, planners and service providers.

USING GIS FOR GEOPARKS MANAGEMENT

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Keywords: *Geoparks Management, GIS, Remote sensing, Decision making, risk reduce*

Session: Conservation, science, research

Effective management of geoheritage, culture, and ecological resources, especially geoparks requires accurate and up-to-date information to help park managers in making appropriate decision. GIS have appeared as very powerful technologies because they allow manipulating and displaying geospatial information. More and more parks are increasingly using GIS data mapping software and digital map data to increase efficiency within park management. This study provides such information using GIS and remote sensing technologies to manage geoparks in asset management, service requests, reducing the risk, enquiries from the public, guiding policy development, and creating custom maps for events. Some lessons are drawn from experiences of some cases to understand how GIS and remote sensing technologies could assist with geopark management. It is intended that the study would provide some inspirations for geopark managers, decision makers and all those wishing further to investigate applications of remote sensing for planning better management of their geoparks.

THE IDEA OF COFFEE AS GEO PRODUCT FOR GEO TOURISM: INTEGRATING THE CONCEPT OF VALUE CO-CREATION AND EXPERIENTIAL MARKETING

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Keywords: *coffee as geo product, geo product, geo tourism, value co-creation, experiential marketing*

Session: Aspiring Geoparks

This article is aim to provide the idea of coffee as geo product for geo tourism to aspire other GeoPark which has the same potentials. GeoPark is an area where international geological heritage is managed with a holistic concept of protection, education and sustainable development. Therefore, significant efforts are needed in increasing the understanding of the main issues of the GeoPark concept, including increasing local economics initiative surround it. One that combines both is the idea of geo tourism. The basic concept of geo tourism itself is how the local potential can integrate with the tourism development. This article will highlight Lilangan Village in Belitung Timur, Indonesia. Belitung Island has been nominated as one of national GeoPark, and Lilangan Village is one of area that indicates supports the idea of geo product development. Lilangan Village has potential for Arabica coffee plantation and the habits of the community to drink coffee in “warung” (coffee shop). Therefore using case study of Lilangan village, this article attempts to formulate the concept of value co-creation and experiential marketing to create local economics initiative thru tourism potential of GeoPark landmark. At the end of this article, several suggestions and recommendations are provided to follow up the proposed notions. That includes how to implement the concept of value co-creation and experiential marketing in the form of tourism package. For example, “wisata kebun kopi Lilangan” (tour to Lilangan coffee plantation) and “wisata warung kopi Lilangan” (tour to Lilangan coffee shop). In addition, this article also offers conceptual framework for practitioners and academics that are looking for theoretical support pertaining to develop potential coffee as geo product for geo tourism.

INTEGRATION OF GEOLOGICAL AND CULTURAL LANDSCAPES OF JIUHUASHAN GEOPARK, ANHUI, CHINA

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Keywords: *Jiuhuashan Geopark, geosite, granite landform, culture*

Session: Geoparks, sustainable tourism and sustainable local development

Jiuhuashan Geopark is located in Chizhou City, southern Anhui province, with an area of 139.7 kilometers. Jiuhuashan is a natural and cultural heritage site of China and is also one of four sacred Buddhist mountains in China. There are 57 geosites in Jiuhuashan park, among which there are 3 world-class geosites, 15 national class geosites. And geosites in Jiuhuashan park are the typical representatives of the magmatic activities caused by collision between oceanic plate and continental plate in East Asia. The F-rich miarolite and bimodal magmatic activity in Jiuhuashan Geopark are favorable classrooms for the research and exploration on the crystallization differentiation of fluid-rich magma. Jiuhuashan Geopark is an example of large-scale granite fault-block landforms. The granite fault-block landform of mountain-hill-basin contributes to biodiversity and culture in Jiuhuashan. The rise of Jiuhuashan Buddhism culture which is based on the geology and landform in Jiuhuashan is historical testimony of Sino-Korean cultural exchanges. Ecological system of Jiuhuashan Geopark is representative in the world for its synergetic evolution of geosites, natural landscapes and cultural remains. With the concept of geosites conservation and global sharing, People in Jiuhuashan hope to join in UNESCO Global Geoparks Network.

THE LANDMARKS „BRUNSWICK LION” AND „IMPERIAL PALACE OF WERLA“ - GEOPARK AMBASSADORS FOR THE ECHY 2018

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Keywords: *geopark- landmarks, archeology, history, cultural heritage*

The Geopark Harz . Braunschweiger Land . Ostfalen in Germany is a very huge geopark about 9600 square kilometers in size. Therefore, a landmark project, that separates the Geopark in 34 parts, is used as a kind of ‘first step-programme’ to visit the Geopark and learn essentials about the history of the region.

Some landmarks like “Brunswick Lion”, that tells the history of the main city of the Geopark area, and “Imperial palace of Werla” represent areas with several very important historical places. So, the Geopark is traditionally cultivating a strong co-operation with archaeologists and historians. The project is a good example for this internal Geopark co-operation and is approved as an official project for the European Year of Cultural Heritage (ECHY) 2018.

The landmark "Imperial Palace of Werla" presents a place that in the Middle Ages was one of the most important for the history of Northern Germany - between 919 and 1013, all German kings visited Werla, twice was decided here on the succession king.

Long-time archaeological investigations as well as a careful analysis of the medieval texts allow detailed statements about the history of Werla, its architecture and its infrastructure. Of particular interest is the interaction between the natural conditions and the use of these resources by humans. These studies, which can be described as landscape archeology, relate, for example, to the origin of the building materials, the demand for timber or the supply of the 22-hectare plant from the surrounding area. Using Werla as an example, the "ecological footprint" of a medieval royal manor is discussed.

The presentation of the archaeological structures is carried out by means of environmental and landscape protection. Such a system has been implemented for the first time in northern Germany in Werla and since 2012 has become a model case for the archaeological preservation of monuments.

The lecture will present the latest research results, their visualization at the authentic location and the long-term concept for monitoring the site as a landmark of the GeoPark.

DEEP SEA TRACE FOSSILS IN THE BASQUE COAST UGG. CONSERVATION STRATEGY IN A EROSIIVE GEOLOGICAL CONTEXT. WHEN AND HOW SHOULD WE ACT?

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Keywords: *trace-fossils, erosion, conservation, replica, education*

Session: Conservation, science and research

Conservation of the paleontological heritage in an erosive geological context is always a challenge. Erosion is a natural geological process, but it is not related with the fossilization phenomenon that gave place to the threatened paleontological heritage. Therefore, taking into account the principles of the geoconservation, we should act to ensure the preservation of the paleontological heritage before it is washed by the sea. But, when and how should we act? Basque Coast UGG flysch coastal outcrop is worldwide known because of its chronostratigraphic and paleontological value. The outcrop is composed of more than 5.000 m thick pile of deep marine clays, marls, limestone and sandstones deposited in the Gulf of Biscay during upper Cretaceous, Paleocene and Eocene series. This huge serie crops out along 10 km of beautiful and accessible sea cliffs and it is suppose to be one the best outcrops of the world to analyze deep marine trace fossils. More than 40 different typologies have been described, including one holotype called *Rotundusichneum Zumayensis*. The natural erosion of the cliffs is very active and means a clear threat for the conservation of this huge paleontological heritage.

Basque Coast UGG has defined a clear geoconservation strategy based on:

1) We try to maintain trace fossils in the outcrop as long as possible.
2) Not all the trace fossils have the same relevance. We cannot afford to preserve thousands of specimens. Depending on their abundance and the scientific and educative importance two different groups have been defined:

- A. Those trace fossils that are especially relevant and need to be watched every three months and extracted from the cliffs before they detach and fall down. Replicas can be also carried out.
- B. Those trace fossils that are more abundant and less relevant are collected from the bottom of the cliffs once they have been naturally dropped in a gathering campaign that must be organized every year. There are certain specific cases when the surface of the trace fossil can be too big or fractured to be extracted in a safe way. In these cases replicas for the most important specimens have been done.

All the collected and extracted specimens, together with the big replicas are stored and shown in the visitor centre located in Zumaia. In addition to this, several media presentations have been organized every time a relevant specimen has been collected in order to recall for the scientific importance of the section and the commitment of the geopark for its conservation. The geoconservation strategy of the Basque Coast UGG is based on science; it is useful for the preservation of a reasonable and representative amount of specimens and creates good material for education and opportunities for the promotion of the geopark.

CHANGE IN ATTITUDE TOWARD CONSERVATION OF GEOHERITAGES IN IZU PENINSULA UNESCO GLOBAL GEOPARK: A LESSON FROM A FAILING CASE OF GEOCONSERVATION

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Keywords: *geoconservation, geoheritage, a case of failing, columnar lava, Izu Peninsula UNESCO Global Geopark*

Session: Conservation, science, research

We, Izu Peninsula UGGp, have changed in attitude toward conservation of geoheritages from a lesson of a failing case of geoconservation. The aim of this paper is to discuss that geopark management enhances the value of geoheritages and to contribute on geoconservation.

This is a case that the Banjo Waterfalls locate in the middle of the Izu Peninsula is one of a tourist site where we can observe columnar joints developed by a volcanic eruption 24,000 years ago. It used to access behind the waterfalls through a footpath, and its beautiful scenery attracted much tourists before. The waterfalls were not little known as a valuable geoheritage before we commenced geopark management in 2010. In the same time, the site rock was very close to possible collapse by developing cracks. The footpath was closed due to secure the safety of visitors. Hereafter the number of visitors was decreased gradually. Since locals requested for opening public again, the rock has been treated with the adoption of the DK bond technique of concrete patching cracks of the joints. This repairing destroyed the waterfalls scenery completely.

After the treatment, we commenced the geopark management. During the process of nomination of the geosites, the columnar lava of the Banjo Waterfalls was rejected since its management. We really realized the value of the Banjo Waterfalls as a geoheritage and a better conservation technique should be adopted. We regretted sincerely that we took a wrong way of the treatment. The case of this failure and the awareness through geopark management provided a lot of suggestions. Since that time, we take into consideration never to underestimate the value of geoheritages as well as maintain visitors' safety among geoconservation strategy. There would be some other cases facing in difficulties to strike a balance between conservation and safety of visitors when we apply geosites for tourism. I would like to share our experiences so that you will be able to avoid from failing conservation like our Banjo Waterfalls.

GEOLOGICAL NATURE CONSERVATION IN ACTION: LEGISLATIVE ENVIRONMENT, CASE STUDIES, RESULTS AND CHALLENGES IN BAKONY–BALATON UNESCO GLOBAL GEOPARK, HUNGARY

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Keywords: *geological nature conservation, legislative environment, geosite management, geotourism, geoeducation*

Session: Conservation, science, research

Bakony–Balaton Geopark was accepted into the Global Geoparks Networks in 2012. The 3,244 km² Geopark is located in western Hungary, on the boundary of four major geographic regions. It is characterized by a variety of geological, topographic, climatic and hydrological features as well as by its extensive biodiversity. The area comprises 172 different geological formations: Ordovician metamorphites, Permian sandstone, Alpine Triassic carbonate succession near Central Europe’s largest, shallow-water lake, Lake Balaton; Ammonite-rich Jurassic and new dinosaur genera-bearing Cretaceous above bauxitic tropical tower karst, Eocene large foraminifers and Miocene mollusc fauna with several hundred genera in the Bakony Hills. The diverse endemic mollusc fauna of the former Lake Pannon is unique in limnic facies in the Earth’s history. Silicified sandstone cemented into ‘Seas of Stones’ around Káli Basin; unique Mio-/Pliocene remnant hills of one of the “densest” volcanic fields in Europe that formed an emblematic landscape; almost 700 caves in gorges and on karst plateaus; hundreds of sinkholes; a 15-km-long thermal-water maze under a town and more than 1,600 clear-water springs — these are all under the nature conservation supervision of Balaton Uplands National Park Directorate, the management organisation of the Geopark. Numerous geosites are located within protected natural areas (National Park, Protected Landscape Areas, Nature Conservation Areas) and/or in many cases the geosites themselves are protected by virtue of the law (caves, sinkholes, springs). Caves are under the umbrella of a strong legal protection in Hungary: all of them belong to the State (independently from ownership of the surface property) and caves are non-tradable assets. Even a state-run National Park Directorate must get a permission from the Nature Conservation Authority for any work inside or opening one as a show-cave. Thanks to the impressive level of geodiversity, there are 113 registered geological key sections in the Geopark (the highest relative density in Hungary). This fact generates one of the important missions for the Geopark staff: the preparation work for the legal declaration of protection of key sections by a ministerial order (field surveys, management plans, consultations with the stakeholders, etc.). Dozens of different types of geosites are the intervention locations of our two big-scale projects: closing cave entrances in a ‘bat-friendly’ way and installing new stainless steel ladders inside, complex management of key sections and geological nature conservation areas, renewing the unique ‘Seas of Stones’ (fields of sandstone/conglomerate boulders) in the Káli Basin, etc. The 900,000 EUR grand total budget of these projects 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, fighting against ‘lamp-flora’). During the construction works, durable and premium quality materials were used. The projects provided the opportunity for raising awareness and geotourism: many information panels were placed, new nature trails were created (also as facilities for our popular guided geotours and geoeducational programmes), and booklets were published for the general public, also in English.

DOUBLEVR: INNOVATIVE CONTENT MANAGEMENT SYSTEM FOR VIRTUAL REALITY CONTENTS

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Keywords: *Virtual reality, Content Management system, education, geological and cultural heritage, accessibility*

Session: Education, public awareness and communication

The geoVR is a group of projects run by Magma Geopark before and during the development of the DoubleVR Content Management system by Doublethink private ICT Company. The geoVR projects, started in 2013 and has been funded by European Commission through Northern Periphery Programme, Rogaland County, Norwegian UNESCO Commission and Nordic Atlantic Cooperation Funds (NORA). There funded projects have had one purpose and that was to supported Magma Geopark in creating, testing, adapting and launch the most innovative Content Management System for virtual reality. DoubleVR was launched 28th of March 2018 and is an innovative platform which allows everyone to produce virtual reality experiences (virtual and/or augmented reality reconstructions on the background) and to add hotspots (text, pictures, videos, drawings, maps and animations) in the virtual landscape. The system has been planned in order to match several needs: the wish of simple virtual contents development affordable from everyone, the wish of make the geological and cultural highlights attractive for new generations and the idea to create a tool which allows disadvantages groups to access to the heritage making the experience as realistic as possible. In fact, the DoubleVR has endless possibility to reproduce the reality: it can make the users travel within times, it enables them to cross the ocean or walk to the unreachable mountain tops, everything just simply within laptop or smartphone. Thought the DoubleVR each Company, territory, association or single professional can create and tell its own story to the public and reach the widest possible audience. The DoubleVR innovation is stunning! It has never been so easy to create and combine visual and text contents. Everyone can do it! Now the DoubleVR licence is for sale and it gives access to: • Shooting manual for 360 degrees pictures. • Manual for how to developing hotspots. • 5 users Content Management System for upload hotspots. • Support • Make your own VR project or join other projects already in the platform, like geoVR for where you find UNESCO Global Geoparks, aspiring Geoparks and World Heritage Sites.

AIRBORNE LIDAR IMAGERY AS A TOOL IN INVENTORY OF GEOSITES

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Keywords: *Lidar, Laser Scanning, Digital Elevation Model, Geosites, Cultural history sites*

Session: Aspiring Geoparks

Airborne Lidar (Light detection and ranging) is a powerful tool that is essential for modern day land surveying. The method uses a downward facing laser scanner attached to an airplane and it produces a high resolution point cloud that is used in production of a digital elevation model (DEM). The Finnish National Land Survey is conducting a program to cover the whole Finland with airborne Lidar imagery and a high-resolution DEM by 2020. The results are open data and publicly available. Lidar imagery has been extensively used in inventory of geological, natural and cultural history sites in the Lauhanvuori-Hämeen kangas Aspiring Geopark in Western Finland. The whole 5000 km² area is covered by a 2 meter pixel size DEM. The geology of the area consists of Proterozoic granites covered locally by weathering deposits related to the Sub-Cambrian peneplane, the Cambrian sandstone remnant of Lauhanvuori, multiple phases of glaciogenic deposits and an extensive mire network, whose development has been fueled by a strong post-glacial uplift. Within the area lies two National Parks and numerous other protected areas which are the primary locations for geosites within the Aspiring Geopark. The use of Lidar imagery has helped to streamline the inventory process. The high resolution DEM provides precise information of geomorphological features, including surface patterns of mires, shoreline formations, glacial features such as flutings, drumlins and De Geer -moraines and also bedrock features such as shear zones. Lidar has helped to identify a post-glacial fault from the Lauhanvuori national park and it has provided precise images of a large meandering river valley now located in an area with very little present day water flow. In addition to geological and natural sites Lidar has been used extensively in mapping of cultural history features. Old travel routes, quarry sites, stone age settlements, tar pits, mire drainage systems and peat extraction sites are all features that can easily be targeted using lidar based DEM. This has helped to minimize slack in the field work as the points of interest can be precisely located already at desktop. Usage of high-resolution Lidar based DEM's also pose some problems. The wealth of information provided by them is huge and many features of significance are actually clearer in DEM images than in nature. Even clear features may be disguised by vegetation, which is why usage of DEM's must be supplemented by aerial images and require field presence. Lidar based DEM is a great tool for investigating geological, natural and cultural history sites and it can add a whole new level to understanding the world around us. In Lauhanvuori-Hämeen kangas Aspiring Geopark airborne Lidar imagery has been routinely used for identifying sites of interest which has helped to streamline the geosite inventory process.

AN INTRODUCTION TO GEOSITES IN THE SOUTH CENTRAL COAST, VIETNAM

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Keywords: *geosite, geoheritage, Southern Central Vietnam coast, geosite inventory, geodiversity*

Session: Conservation, science, research

The South-Central Coast of Vietnam extends over 8 provinces and contains abundant valuable geological and geomorphological features within its about 1,200 km length from Hai Van Pass (between Hue City and Da Nang City) to Ke Ga Headland (Binh Thuan Province). Some of the geosites within this geoheritage are attractive destinations for domestic and international visitors. However, most of these geosites are unknown to the public, despite the numerous geological and geomorphological descriptions contained in previous studies. An extensive on-going survey has been initiated to assess the potential of the area. A preliminary inventory has identified over 60 geosites within four categories: Geology (lithology and structure), Geomorphology, Complexity (geology and geomorphology) and Viewpoint. The prominent scientific and aesthetic aspects and the national importance of 5 geosites are described in detail in this paper. These include: Hai Van pass – Hue and Da Nang City; the eroding coast with proterozoic rock outcrops in Tam Hai – Quang Nam Province; Holocene Ly Son volcanic island – Quang Ngai Province; Pliocene basaltic columnar jointing on the coast in Ganh Da Dia – Phu Yen Province; and red sandy plateau Phan Thiet – Binh Thuan Province. The geodiversity of this coastal area has the potential for establishing National, and Asian UNESCO Global Geoparks. Detailed assessments of the value of geosites in the Southern Central Vietnam coast in particular and in the Vietnam coast in general are indispensable for establishing a conservation enhancement programme as well as developing geo-tourism to promote local economies.

QUANTITATIVE ASSESSMENT OF GEOSITES AS A TOOL FOR THE PROTECTION OF THE GEOLOGICAL AND GEOMORPHOLOGICAL SITES

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Keywords: *Quantitative assessment, Geoconservation, Evaluating geosites, geoparks, protecting geosites*

Session: Conservation, science, research

Geoconservation policy and measures have been adopted in many countries for specific geological monuments. Protected areas often include sites of particular geological - geomorphological value, but the protection and management of these sites is as priority of their management bodies. Aim of this paper is to present an integrated methodology and the criteria for the assessment of geosites that are the basic unit of the geological and geomorphological heritage, and the use of this methodology for the implementation of an integrated geo-conservation policy. The quantitative assessment of the geosites can be a useful tool for their management in Geoparks in Greece as well as internationally. A key component of the research was the development and implementation of the geosites' assessment methodology that assessed the sites and structures of geological and geomorphological interest in Lesvos Island UNESCO Global Geopark, Greece in order to define the priorities for protection, promotion and management and to select those sites that should be exploited in the context of the different activities of Lesvos Island UNESCO Global Geopark in the fields of awareness raising, education and tourism. Using the data collected, the definition of criteria necessary for the creation of a framework for the evaluation of geosites and the definition of parameters for a system of evaluation of the geosites was created. The conclusions from the implementation of the geoparks assessment methodology have contributed to the development and improvement of the assessment methodology of the geoparks and inspiring geoparks as well as to the operation and activities of the Geoparks.

THE ROLE OF SPELEOLOGICAL GROUPS IN THE MANAGEMENT OF SIERRAS SUBBÉTICAS UGG

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Keywords: *Cave management, Sierras Subbéticas, Geopark, Speleological Groups, Cabra Sinkhole*

Session: Conservation, science, research

The Sierras Subbéticas UNESCO Global Geopark (South Spain) extends along the central part of the Betic Cordillera. The constitution of the mountain range during alpine collision and its posterior uplift resulted in sets of fractures affecting Mesozoic and Cenozoic materials of the South Iberian Margin. Numerous joints and faults in limestone and dolostone have given rise to caves. The first speleologist associations appeared in the 60s, but their activity dates back to a century earlier. In 1841, the first eminently scientific incursion to the Sinkhole of Cabra took place, years before than Édouard-Alfred Martel initiated, with the same spirit, the speleological activity that led him to be considered the father of modern speleology. However, the bottom of vertical sinkhole of Cabra (116m free fall) had already received the visit of Fernando Muñoz Romero in the course of a murder investigation, in 1683. The finding and extraction of the body resulted in the case solution, and to what might be considered the first documented cave rescue in History. Nowadays five speleological groups continue their explorations in the Sierras Subbéticas UNESCO Global Geopark, in a very active way (Speleological Group G-40, Lucena, GEAL, Gespriejo, GAEL and GAEA). The speleological activity in the Sierras Subbéticas Geopark has provided deep knowledge of endokarst, highly valuable for a complete management approach of the territory. The studies and cave explorations realised by the G-40 since its beginnings were published in 2006, in the Sierras Subbéticas Cavities Inventory. This offers crucial information on subsoil karst, like geolocation data, speleometry and internal morphology, difficulty grade, and technical datasheet. These scientific studies bring out interesting geological data (speleothem characterisation); palaeontological (quaternary fauna); biological (entomofauna study and bats colonies state); or archaeological (human presence confirmation). Moreover, these results serve to assess the underground heritage, its conservation state and environmental vulnerability, as well as the touristic potential of certain caves. The Cave Inventory currently includes more than 900 cavities. In 10% of them archaeological remains of diverse periods have been verified, or their walls show cave paintings ascribable to Palaeolithic or recent prehistory; 28% of them have been reported in detail; in 27% of them, topographic survey has been made. The collaboration between the speleologists associations and the Geopark produces numerous benefits for the territory management, like:

- Continuous advice (establishment of regulations for speleological activities, assessment of new caves opening for tourism, advice for infrastructure installation, etc.)
- Development of Cave conservation activities, like the one carried out in 2017, to clean the Murciélagos Cave in Zuheros (in collaboration with the group GRUTAS, University of Granada).
- Organize joint courses on Speleology, to promote Geopark knowledge among speleologist as well as cave knowledge among the local population.
- Presence of nearby rescue teams ready to act in cavities and other difficult access sites ...
- Emergency research possibility, like that requested when a new sinkhole (ponor) occurred in the Bailon river bed (La Nava de Cabra polje), in 2012.

FOSSILS AND FOSSIL PRESERVATION IN STONEHAMMER UNESCO GLOBAL GEOPARK

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Keywords: *fossil, preservation, research*

Session: Conservation, science and research

The fossil record of Stonehammer UNESCO Global Geopark is a remarkable story of the evolution of life on Earth, found in an area only 2500 sq km in size. *Archaeozoon acadense* discovered in Neoproterozoic marbles was described in 1890. It was the world's first Precambrian stromatolite described in a scientific paper. The geopark's Quaternary record has yielded starfish, mollusks, whales and walrus fossils from the most recent ice age. The geopark's fossil record includes Cambrian trilobites, 'small shelly fossils' traces fossils, acritarchs; Ordovician graptolites and trilobites; Silurian fish, eurypterids, trilobites and corals; Devonian fish; Mississippian plants, fish and vertebrate traces; Pennsylvanian plants, insects, land snails, and tetrapod traces; Permian vertebrate traces; and Triassic and Cretaceous plants. Among these fossils are some of the world's first and oldest discoveries of their kind.

Preservation of fossils is a key concern of the geopark and also the Province of New Brunswick where Stonehammer is located. In Canada heritage conservation is both a national and provincial responsibility with jurisdiction over many land issues resting with the Provinces. In 2010 New Brunswick enacted the Heritage Conservation Act, the first provincial legislation to specifically provide protection for fossils as heritage objects. This was the same year Stonehammer achieved global geopark status. Previous Acts concerning mining and land ownership stated that fossil materials belonged to the government, but provided no management framework. The Heritage Conservation Act requires permits to collect fossils and to alter significant fossil sites. Collected specimens are normally directed to the New Brunswick Museum, an institution located in Stonehammer and a founding partner of the geopark. The museum's Curator of Geology and Palaeontology is designated as a Provincial Heritage Inspector for Palaeontology and provides recommendations to the Minister of Heritage concerning permit applications.

The New Brunswick Museum developed from a museum built by the first Provincial Geologist in 1842, followed by a museum of the Natural History Society of New Brunswick in 1862. Many fossils discovered in the geopark since the 1840s are housed in the museum and form the foundation of the palaeontology 'Type Collection' of new species and specimens cited in more than a century of scientific literature. Under provincial law Stonehammer UNESCO Global Geopark has no legal authority for the protection of fossil resources within its borders. New fossil discoveries are made every year in the geopark, with work carried out under permits managed by the New Brunswick Museum and with fossils repositied in the museum's collections. The geopark does have a significant role in the promotion and awareness of fossil research within its borders and the value of the Heritage Conservation Act to protecting the Province's palaeontological heritage.

THE KEY PROTECTED OBJECTS OF THE "YANGAN-TAU" GEOPARK

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Keywords: *nature protection, geopark, protected areas, functional zoning*

Session: Conservation, science and research

The protection of key objects of the geopark "Yangan-Tau" is carried out within the framework of federal laws on specially protected areas and on cultural heritage.

Nine objects is a monuments of nature of regional importance. Five objects have been protected since 1965): Yangantau mountain, Kurgazak mineral spring, Laklinskaya cave, Stone gate on the Ai river and Kuselyarovskiye hydrosulphuric mineral springs. For more than 10 years, the Arkaulovskoye and the Laghevo marshes, the Kyzlartau mountain and the Mechetlino section have been protected. Their total area is 495 hectares. The regime of conservation hinders the activity leading to the destruction and degradation of these objects.

Since 1960, the object of cultural heritage is protected: petroglyphs in the cave Idrisovo.

The appearance of the geopark contributed to the decision to protect a number of other sites in order to preserve their recreational appeal.

Under the laws of the Russian Federation, municipalities on their lands can organize protected areas. Currently, a project has been prepared for the creation of 10 more local nature monuments with a total area of 326.05 ha. Three objects have a geological profile, three - hydrological. 4 objects are complex, because are of interest to geologists, geographers, biologists and historians. The regime of protection also prevents the destruction of these objects, while tourism, educational and scientific activities are allowed.

More than 40% of the geopark is occupied by forest lands, which are federal. It is planned to create 5 wildlife sanctuaries in order to protect unique natural complexes: coniferous-broad-leaved forests representing the northeastern border of their range in the Republic of Bashkortostan; populations of rare birds. This form implies the presence of state inspectors for the implementation of protection. These territories have a large biosphere importance and high assimilation potential.

For the sustainable development of the geopark in the conditions of Russia it is important to have legitimate powers to harmonize economic decisions. To this end, we have developed a zoning project for the territory of the Yangan-Tau geopark in which nine zones have been identified that have their specialization: protection of geological and natural heritage, protection of historical and cultural sites, forestry, agriculture, rational recreational nature management, protection of the resort of Yangan-Tau, economic-communal, organic farming and integrated development. However, there are aspects that are common to all zones. It is not recommended littering, anxiety of birds, kindle a fire in unequipped places, as well as mining and smuggling the remains of a megafauna. This scheme will be approved by the Government of the Republic of Bashkortostan in November this year.

In the geopark, not only prohibitive measures are practiced. Since the inception of the geopark, seminars have been held with local residents to explain the value of the legacy of the geopark. A number of villages (Mechetlino, Lagerevo) are already actively participating in the preservation of their geological, natural and cultural resources. To save geobjects this summer, work has begun to prepare replicas for the implementation through the visit-center of the geopark.

ROLES OF FOSSIL PROTECTION ACT IN GEOCONSERVATION, THAILAND

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Keywords: *fossil, conservation, Act, legislation*

Session: Conservation, science and research

Many geosites have been introducing as the outdoor learning sites decades ago. For determining the geosite value, the methodology considers two main criteria scientific and management, with their respective series of sub-criteria. They are ranging from local to international level, and some geosites are popular for tourists. In terms of conservation, there are many legislations and acts used to protect these geosites such as National Park Act and environmental legislation. However, some geosites are not protected properly, they are still destroyed by ignorance and natural weathering especially the sensitive one fossil site for example. Without appropriate management, fossil site will be damaged permanently, so, introducing Fossil Protection Act as a tool for protecting fossil site then started from this point. Thailand has enforced this act since 2008, there are many problems occurred during that time. Problems related to peoples understanding seem to be the most important matter, so, fossil conservation workshops are arranged in many areas to inform and educate people. So far, 15 fossil sites are registered including the site of Satun aspiring UNESCO Global Geopark. Enforcement of Fossil Protection Act needs a co-operation of local people, local authorities and Department of Mineral Resources who regulates this act. The main procedures are 1) discover and notify the local authority 2) conduct and finish a preliminary examination 3) establish the area for survey and academic research on fossil site and fossils, and 4) notify the area to be registered fossil site. In addition, person who has lawful rights over the land shall have right to receive compensation for being unable to use the land. After registered, fossil site will be protected intensely with the final goal i.e. supporting sustainable development in the area.

EVOLUTION OF SANDSTONE LANDSCAPES IN ZHANGJIAJIE UNESCO GLOBAL GEOPARK

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Keywords: *Landscape evolution; Geoheritage; Scientific research; Science popularization; Zhangjiajie UNESCO Global Geopark*

Session: Conservation, science and research

The sandstone landscapes in Zhangjiajie UNESCO Global Geopark of Hunan Province, China, are characterized by >3000 sandstone pillars and peaks of 25 to 350 m height circular with a large number of deep gullies, sandstone walls, stone gates and streams. To address the mechanisms and timescales of the longer-term evolution of this spectacular type of geoheritage, we use in situ cosmogenic nuclides combined with GIS analysis to investigate the erosional processes and to identify their relative roles in the formation and decay of the landscapes. Model maximum-limiting bedrock erosion rates are the highest along the narrow fluvial channels and valleys at the base of the sandstone pillars (~83–122 mm kyr⁻¹), and lowest on the peak tops (~2.5 mm kyr⁻¹). Erosion rates are highly variable and intermediate along sandstone peaks and pillars (~30 to 84 mm kyr⁻¹). Catchment-wide denudation rates from river sediments vary between ~26 and 96 mm kyr⁻¹ and are generally consistent with vertical stonewall retreat rates. This highlights the importance of stonewall retreat for overall erosion in the sandstone landscapes. In combination with GIS-derived erosional volumes, our results suggest that the sandstone landscape formation in Zhangjiajie UNESCO Global Geopark commenced in the Pliocene, and that the general evolution of the landscape followed our sequential refined model: (i) slow lowering rates following initial uplift; (ii) fast plateau dissection by headward knickpoint propagation along joints and faults followed by; (iii) increasing contribution of stonewall retreat in the well-developed pillars and peaks and a gradual decrease in overall denudation rates, leading to; (iv) the final pillars and peaks. These results provide a solid basis for undertaking science popularization activities in Zhangjiajie UNESCO Global Geopark.

OMICA PARK - FOREST MANAGEMENT SYSTEM FOR CONTINUOUS AND STANDARDIZED MONITORING OF PROTECTED AREAS

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Keywords: *Forest Management System, Remote Sensing, Internet of Things, Artificial Intelligence*

Session: Conservazione, scienza e ricerca

The continuous monitoring and the assessment of the state of conservation of protected areas are increasingly pressing requirements for parks managers and scientific community. In European Union, nature protection gained increasing importance with the implementation of the Habitats Directive that states the need to assess the biodiversity protection of different habitats in the mid/long term. Reporting the conservation status with a systematic and standardized process, requires both the detailed knowledge of habitats at different spatial and temporal levels and the capability to process big data using advanced analytics techniques. The most promising solution to face this challenge is the integration of different capabilities provided by the new emerging technologies a) Satellite Remote Sensing, to collect geospatial information over wide areas with satisfactory spatial resolution and revisit time b) Internet of Things, to measure environmental parameters with high precision in the most relevant areas c) Artificial Intelligence, to process and analyze big data and generate new knowledge.

OMICA-PARK is a Georeferenced Forest Management System designed to integrate such technologies in the same platform and able to automatically process, manage and analyze environmental data collected by heterogeneous sources: hyperspectral satellite remote sensing, on-ground monitoring with smart sensors and precision aerial monitoring with drones. In addition to the more evident benefit of making this big set of data available to the community minimizing user interactions, the system provides advanced and added-value functionalities like: a) assessment and evolution of different environmental components (type of vegetation, bare soil, snow/ice), b) mapping and evolution of habitats in terms of extension and health status using supervised classification algorithms, c) monitoring of spatial variability and temporal variation of vegetation parameters like biomass, water stress and chlorophyll content, d) warm monitoring of forests health status with satellite remote sensing, e) early detection of critical areas affected by pests or diseases allowing a prompt reaction of operators, f) hot monitoring with drone survey over critical areas with identification capability up to single tree, g) monitoring and assessment of glaciers in terms of extension, yearly evolution and mass balance.

The warm/hot monitoring services (satellite + drone) have been successfully applied on two different areas in the Slovenian Alps affected by bark-beetle infestation obtaining promising results for what concerns early identification and precise mapping. The system is currently being tested in the area of the Adamello Park and first results are presented.

OMICA-PARK is a solution addressed both to parks staff, for smart management of natural areas, and to scientific community for research focused on biodiversity or impact of climate change on natural environments. It allows the reduction of operational costs for monitoring activities limiting surveys only when/where necessary and, at the same time, the general improvement of the situation awareness over the whole area of interest. A standardized data processing chain allows to adopt a data-driven approach in management of protected areas common to different stakeholders at international level. Moreover, a common methodology for evaluation of habitats status compliant with Habitats Directives can be established and extended to the validation of preservation policies.

ROKUA UGG ENHANCING THE IMPLEMENTATION OF MODERN TEACHING METHODS

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Keywords: *education, pervasive teaching, sustainability, geoheritage, multidisciplinary*

Session: Education, public awareness and communication

Rokua UNESCO Global Geopark (UGGp) is located in central Finland. The main territorial theme is the heritage of the Ice Age since the traces of the Weichselian glacier can be recognized exceptionally clearly in the region. The genesis of the Rokua esker chain and the later development of the area's nature and culture are tightly connected to each other. They offer a natural laboratory to investigate geomorphology, ecology, cultural history and sustainable development, among others. In Rokua UGGp area, six educational units have been acknowledged as Geopark schools. According to criteria, Geopark schools respect the values and aims of Rokua UGGp and integrate the Geopark themes in their curricula. This is very well in line with the new Finnish national core curricula, since they require more emphasis on multidisciplinary teaching. This means, for example, sustainable development and sustainable way of life, scientific teaching methods and critical thinking as part of broad based objectives in teaching. During last few years Rokua UGGp has developed new materials and methods together with Oulu University and the Geopark schools to reach the new requirements. The methods include traditional vegetation investigations combined to geomorphological studies, groundwater analysis combined to soil explorations and field works combined to lab works in class room. Collaborative group working is emphasized due to its many profits e.g. for social skills and for deeper understanding of new knowledge among learners. The methods have been evaluated during different nature days (in past four years) with school groups. Rokua UGGp has carried out research and collected feedback from students and teachers together with Faculty of Education of Oulu University. Both the experiences as well as the results of the studies reveal that the environment, materials, themes and values of Rokua UGGp offer beneficial settings to implement outdoor education in accordance with the new Finnish national core curricula. In wider scale this also suggests that the UNESCO Global Geoparks, which combine valuable geoheritage and UNESCO values in the single unified area, have a lot of potential as multidisciplinary learning environments for modern teaching methods in globally relevant topics.

GEOPARK PROJECTS ENHANCE SELF-ESTEEM OF LOCALS

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Keywords: *local people, self-esteem, locals' mind and attitude, intangible heritages, results of involving in Geopark projects*

Session: Education, public awareness and communication

This presentation will discuss how Geopark ideas have changed locals' mind about their hometown. The author of this presentation is the Secretary General of Muroto UNESCO Global Geopark and also a city official who has worked at a city hall for over 30 years. This presentation, therefore, will tell the audience an actual example how locals, like the author, have been influenced when they involve in Geopark projects. Muroto UGGp has accepted many tourists, researchers, and Geopark colleagues from all over Japan and the world so far. This situation made locals realized that they are actually one part of this big world. It brought a huge change into locals' attitudes. Before we started Geopark, locals seemed not to be proud of their hometown, Muroto City (Muroto UGGp covers whole administrative area of Muroto City). They totally believed that they had nothing in this land, a very rural area. Today, however, they already know that nature in Muroto UGGp is very significant geologically and geographically. Moreover, locals found that their culture, history, or lifestyle which have been established in harmony with nature in this land, are also important heritages for tourists or researchers want to know. Locals happily share their lifestyles and wisdom of living with tourists from all over Japan and the world. They proudly explain and show what they have in their hometown, today. Such locals' mind and attitude are nurtured throughout Geopark projects. Most of those shared knowledge by locals are categorized as intangible heritages. Geopark saves nature and culture in terms of conservation and preservation; and at the same time, it also saves locals who did not have any confidence in their hometown. It has been 10 years since Muroto UGGp started its projects. This presentation shows how locals' mind about their hometown has changed in the past 10 years. It is an example that Geopark has worked to enhance locals' self-esteem. The author is very excited to share this experience as a local.

GEOLOGICAL SURVEY OF SOURCE DEPRESSION AREA HELPS TO PRIME TOURIST ATTRACTION

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Keywords: *Geology, Tourism, Odsherred, Moraine, Survey*

Session: Education, public awareness and communication

The prominent arcuate end-moraines in NW Sjælland are the backbone of the geology of Odsherred UNESCO Global Geopark (Denmark). The largest and southernmost of the end-moraines, the Vejrhøj arc, is a glaciotectionic hill-hole pair landform. The source depression makes up the innermost part of one of Europe's largest reclaimed areas, the Lammefjord. It constitutes a basin that has been filled with Late Glacial and Holocene deposits. As part of a large outreach program, the basin was investigated in a drilling campaign and ground penetrating radar investigations was used in the sandy areas. In the deepest recognized part of this basin, 25 m of sediment has been deposited. Macrofossils show that the basin initially was a Late Glacial lake, where sand and clay is deposited. The freshwater lake environment continued into the Holocene, and peat was deposited at the shores of the lake. During the Atlantic transgression the area was flooded, and the present surface is now 3.8 m below sea level. In the initial phase of the change of environment from freshwater to marine, brackish sediments are deposited in form of laminated gyttja deposits. In this phase some of the lake deposits where re-deposited. Subsequently a full marine sequence deposited in the basin as marine gyttja with numerous shells. At the edge of the basin marine sand is deposited, and oyster banks developed at relative shallow water depth. The geological survey conducted in 2016 and 2017 helped to understand the governing processes of the filling of the innermost part of Lammefjord area, now reclaimed land. As a part of a larger EU sponsored project, Odsherred UGGp initiated the surveys in order to highlight the spectacular geology of the area – and in order to regale the public on the many fascinating stories connected to the reclaiming of the old fjord system. An important part of the project is the construction of a 10 km bicycling trail around the innermost fjord area, and the establishment of a visitor's field, both disseminating the results of the survey.

DEFENSIVE ROCKS, DUGOUTS AND TRENCHES ALONG THE GOTHIC LINE (1944-45): EQUIPPED TRAILS IN THE APUAN ALPS BETWEEN NATURE AND CULTURE

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Keywords: *cultural heritage, defensive rocks, fortifications recovery, equipped trails, Gothic Line*

Session: Education, public awareness and communication

During the Second World War, the Apuan Alps and northern Apennines were the scene of bloody trench warfare along the Gothic/Green Line: a deep belt of German fortifications against the Allies (Anglo-American armies) and Italian partisan forces, from the Ligurian Sea to the Adriatic Sea, through the natural defensive wall of the same mountain ranges. This battlefield had a length of 320 km and took advantage of the physical conditions of the places. It was modelled following the morphology of the high peaks, steep ridges and rock faces with other natural obstacles such as rivers and wetlands. The natural defensive system was supplemented by military fortifications built by the Todt Organization in the early months of 1944, employing mainly Italian workers under the command of German engineers. In the Apuan Alps, along the westernmost sector of the Gothic Line, the rocky bastions hid observation posts, trenches, dugouts, and some bunkers. From October 1944 to April 1945, these natural and military fortifications were manned by the 4th Alpine Division "Monterosa" (Italian Social Republic) in the highest area of the mountain range. It was the only sector where the battlefield has stopped for six long months and where German and ISR armies realized the only war action in their favour during the whole Italian Campaign, thanks also to impervious conditions of this area. Nowadays, large section of these fortifications are sufficiently preserved in the Apuan Alps, even without specific activities of conservation and reconstruction. However, Geopark and local communities agreed to carry out the progressive restoration and promotion of the most significant trenches and dugouts in the Mt. Corchia-Mt. Pania group. The first goal is passing down the historical memory of tragic war events from one generation to another, so that nobody can forget. Here, the Second World War has left behind itself a long trail of blood, whose peak was the nazi-fascist massacre of 560 local villagers and refugees in Sant'Anna di Stazzema, on 12th August 1944. The second goal is the promotion along the Apuan sector of the long itinerary in stages, by mountain bike and/or on foot, already existing along the entire development of the Gothic Line, from Massa to Rimini. A gradual recovery and enhancement of these fortifications in the Geopark, with the support of further information panels, increases the tourist appeal on equipped trails along places full of historical and natural topics. The Geopark does not limit its interest to the cultural perspective of the military fortifications, but it also extends its attention to the geological and biological components of the landscape around these buildings. Therefore, it is important to know and explain the different types of Apuan rocks excavated to make the dugouts, as well as the wildlife living protected inside as numerous individuals of Cave salamander, belonging to two different endemic species classified "near threatened" according to IUCN: *Speleomantes italicus* and *Speleomantes ambrosii*.

EQUAL ACCESS TO ENJOY GEOPARK: INTERPRETATION MEANS TO THE SENSORY IMPAIRMENTS

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Keywords: *UNESCO Global Geopark, sensory impaired visitors, interpretation, challenges, equal access to enjoy*

Session: Education, public awareness and communication

Educating, communicating and spreading awareness of the geological heritage(s) and its links to other aspects of the natural and cultural heritages to the visitors among the objectives of the UNESCO Global Geoparks (UGGp). The interest, value, significance of geoheritage as well as the stories and ideas behind must be well communicated to the visitors so they enjoy and gain a pleasurable experience during the visit. Tilden stated ‘through interpretation, understanding; through understanding, appreciation; through appreciation, protection’. Interpretation, especially by appreciation guides or curators is regarded as the most effective means to enable the visitors to understand, appreciate and protect the geoheritage as interpretation is not just about facts and figures. Interpretation of the UGGp should meet the needs of a variety of visitors including people with sensory impairment namely hearing, sight or dual sensory impaired. They may face challenges related to communication, access to information and mobility in the UGGp. At present, it seems many UGGp have not catered for the needs of these sensory impaired visitors. Interpretation for sensory impairment needs detailed and careful planning, design and arrangement. It should be integrated into the interpretation system rather than being presented as ‘special’ or separate, which can lead to the stigmatisation of sensory impaired visitors. This presentation tries to explore ways and shares the experience of how to provide interpretation to the sensory impaired people. Careful design of the interpretation helps to connect the UGGp with the own experience of these sensory impaired visitors. It can also helps to provoke them to think for themselves, coming to their own understanding about what the subjects means to them, making it relevant. The UGGp should make reasonable adjustments to the way they deliver the interpretation services to the sensory disabled people, so that they are not treated less favourably. The impact of their challenges should be recognized so that they have equal access to enjoy the UGGp.

FACING COMMUNICATION CHALLENGES WHEN ENHANCING GEOHERITAGE IN ARMENIA

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Keywords: *armenian culture, creationism, education, awareness, kKhachkars*

Session: Education, public awareness and communication

Armenia – also named Karastan “Land of stones” - has an extremely rich and varied geoheritage: not only numerous sites of geological interest including volcanism, active tectonics, tectoglyphs, ect.... but also a very long history and culture related to rocks, with for example the unique Khachkars - amazing crosses delicately sculpted in local stone – or the vineyard tradition and its relation to the soils dating from the most ancient ages. CalcEre, in association with Teloia and Massif des Bauges Geopark, has been proposing since 2015 an ambitious project for working together with local people for a better knowledge and enhancement of their geoheritage, associated with an additional tourism positioning – namely geotourism. However, this project faces major obstacles in the way the local people perceives geology. First, nearly 95 % of the Armenian people follow the Armenian Apostolic Church, which was founded in the 1st century AD, and became the first Christian state religion. As a consequence, most people rely on the Bible to explain how the world was formed. How do we speak about geoheritage pieces which are millions of years old when people believe the Earth is 6000 years old? Especially when Mount Ararat is the national symbol and can be seen from a great part of the country, it is interesting to experience how people try their best to make links between what geologists explain about sedimentation in a former ocean and Noa’s Flood and the ark landing on the emerged mountain. This vision of geosciences represents a real challenge in terms of geo-education, which concerns not only rural people but also well educated students. Second, Armenia has long been part of the Russian Empire and then Soviet Union. As the land is very rich in ore (copper, iron, gold...) it has been severely exploited for the industry, with generally little care about the environmental consequences: huge open pits, pollution... Today, for most Armenian people, geologists are associated to exploitation of local resources and destruction of nature; they are absolutely not welcome. How to make people accept that some geologists are also able to protect and enhance the treasures of local geoheritage is a second ambitious challenge.

MEANINGFULLY ENGAGING WITH YOUTH IN UNESCO GLOBAL GEOPARKS

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Keywords: *youth, UNESCO Global Geopark, tools, guidelines, partnership*

Session: Education, public awareness and communication

The foundation of a UNESCO Global Geopark is celebrating Earth heritage and the promotion of sustainable development, hand in hand with local communities. The bottom-up process involves all kinds of stakeholders and authorities in the area, men and women. A lot of effort is made to include and empower of women at all levels within a UNESCO Global Geopark. Most UNESCO Global Geoparks also have very strong education programmes, giving children a central role in a UNESCO Global Geopark. However, youth, defined by UNESCO as the group between 15 to 24 years old or even to 35 years old when considering young professionals, is an under-served demographic in most UNESCO Global Geoparks. Youth accounts for nearly 25% of the world's population. They are societal actors. Their every-day choices and actions, although not always conscious, influence society. They are actors, knowledge holders, innovators and partners. We have to recognize the capacity of youth as the leaders of today. We don't want young people to get 'reached', we want them to meaningfully participate in and lead development. A holistic approach to youth development acknowledges and respects young people as whole individuals who change over time with their surrounding contexts. Meaningful youth engagement is a participatory process in which young people ideas, expertise, experiences, and perspectives are integrated throughout programmatic, policy and institutional decision-making structures to best inform outcomes. This process requires young people to be involved in all levels and all stages of design, implementation, and evaluation of projects. this is especially true of those projects that directly affect their lives. Experience shows that engaging young people as researchers, evaluators, advocates and project designers can improve the quality and relevance of data collected and can increase project accountability and support. Guidance and tools on how to meaningful engage with youth ranging from youth consulting to youth as leaders will be presented in order to fully recognize youth as actors of change.

METHODOLOGICAL PROPOSAL OF WORK TO THE COMMUNITY FOR THE CREATION OF THE PROJECT GEOPARQUE MINERO LITORAL DEL BIOBÍO

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Keywords: *Geology, Strategy, Community, Territory, Geopark*

Session: Education, public awareness and communication

The recent creation in 2015 of the International Geosciences and Geoparks Program, which includes the UNESCO Global Geoparks, shows the importance of managing in a holistic way sites of geological interest. For this reason, there is a need to define work methodologies, management methods, forms of governance and strategic alliances, among the different actors of the territory, to develop a project leading to the establishment of a geopark. The quantity, diversity and interests of each of these actors in the territory, as well as the geological features that characterize it, means that there is no universal formula for working with the community. As a strategy for community participation, in the territory of the Geopark Project, five work sessions are proposed in different themes and under different methodologies. The general objective is to educate the inhabitants of the territory about the geological heritage and jointly build the foundations on which to work in the short, medium and long-term in the territory, the themes leading to the future creation of a UNESCO Global Geopark. The first working session consists of training of the community on "basic geology" themes, through a methodology of plenary exposition, videos and didactic materials, with geological content. The second work session is developed under a "field experience" methodology, to recognize in the field some of the most emblematic Geosites of the territory. The third session, addresses spaces of cultural, historical and environmental patrimonial relevance, identified by the participants, under a methodology of focal groups. A SWOT analysis is carried out by them, based on their knowledge and perceptions of the territory. The fourth work session is carried out under the methodology of focal groups, preparing a portfolio of initiatives for the territory, based on the crossing of the SWOT carried out in the previous session. In the last session, the results are delivered, the Georuta of the commune, formulated as the territorial management tables. The results obtained have been an internalization of the community in the field of geological heritage, a consensus among the participants about the development initiatives in the territory and management tables. This experience reveals a great potential for strong synergies between communities and academia. However, it is a job that requires the proactivity of both the local administration and the community.

ANIMATIONS IS A POWERFUL TOOL FOR DECODING AND INTERPRETING THE COMPLEX GEOLOGICAL HISTORY OF THE TROODOS UNESCO GLOBAL GEOPARK (TUGG) FOR THE GENERAL PUBLIC.

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Keywords: *Troodos, Oceanic Crust, Animations, Geoeducation, Cyprus*

Session: Education, public awareness and communication

The TUGG is one of the most significant geological heritage sites worldwide, due to the fact that is the most complete, well-preserved and well-exposed piece of oceanic crust on earth. Since 1950's, the Troodos Oceanic Crust (TOC) is under detailed research by geoscientists and undoubtedly played a significant role for the development of the theory of the divergent boundary and the formation of new oceanic crust as we know it today. The formation of the TOC as well as its uplift to its present position was implemented under complex geological processes due to the convergence of the African and Arabian Plates with the Eurasian Plate, which begun 92 mya with the opening of the South Atlantic Ocean. At the beginning, the convergence of the plates resulted the formation of the new TOC in the depths of the Neotethyan Ocean in a supra-subduction zone. Later their collision followed, which resulted to the creation and the anti-clockwise rotation of the Troodos microplate and its subsequent uplift. These complex processes that underwent the last 92 million years are well recorded to the ophiolitic rocks of the Troodos as well as its sedimentary cover. Almost every section on the mountain reveals a piece of its evolutionary history, which are not easily explainable and understandable to the general public, as the value of each geosite is high from the scientific and not from the aesthetical point of view. Consequently is very difficult to be explained with common informational panels using text with geological terms and complicated graphics. One of the recommendations of the EGN and GGN Networks that should be carried out by the TUGG, until its next revalidation mission, is the improvement of the exhibition in the Visitor Centre, as the explanation panels for the Troodos Ophiolite formation is very complicated and difficult for general visitors to understand. Under great consideration we decided that if the informational panels of the Visitor Centre are not easily understandable to the general public, then we must turned to animations, as a dynamic medium of geoeducation. Therefore we are proceeding to create a special room inside the visitor center for geoeducation purposes, where through a touch screen we will offer a geoeducation program with 12 specific 2D and 3D animations, in order to explain to the general public how the mantle, plutonic and extrusive rocks and chemical sediments of the TOC were formed and uplifted to their present position all together. Furthermore our group of experts decided to create a more holistic geoeducation program through this infrastructure including and other geological aspects as the earth's structure, how earth's plates move, plate's boundaries and kinematics, faults, earthquakes and seismic waves for a better understanding of the Troodos history. We strongly believe that the geoeducation program with the animations will be for the general public, the proper tool to decode the complicated geodynamic processes of the earth that took place in the area of the Eastern Mediterranean the last 92 my.

KARAVANKE UNESCO GLOBAL GEOPARK - SUSTAINABLE DEVELOPMENT AND DANUBE GEOTOUR PROJECT

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Keywords: *geointerpretation, geo tourism, geoheritage, sustainable development, Danube Geotours*

Session: Geoparks, sustainable tourism and local sustainable development

Cross border Karavanke UNESCO Global Geopark was established in 2011, and in 2013 it became a member of the European Geopark Network. Since the early beginning sustainable tourism throughout the region has been developed. An important component of geopark's activities is raising funding to support the regional development through either the transnational cooperation between European Geopark or through geopark-specific projects. An example of a transnational cooperation is the project "Valorisation of geo-heritage for sustainable and innovative tourism development of Danube Geoparks". Eight geoparks of the Danube region participate in this project with the acronym Danube GeoTour, implemented under the INTERREG Danube Transnational Programme 2014-2020. The main project result will be the Danube GeoTour designed to strengthen cooperation between the regions' geoparks and act as an innovative tourism product that will accelerate visibility and tourist visits in the geoparks. A common strategy for sustainable management of tourism pressures will form the basis for creating innovative geoproducts. Sharing experiences, testing pilot geotourism products and new interpretative approaches should increase local inhabitants' engagement, geopark management capacities and lower the quality gap between Danube and other European Geoparks. In the frame of the Danube GeoTour project, Karavanke UGG implemented a research "New competences in geoheritage interpretation". Of the main research objectives were the introduction of new interpretation trends, techniques and methods which are used in the geoheritage interpretation, observed within and outside the participating Geoparks; to find out how to improve skills and quality of the heritage interpretation in the participating Geoparks by transnational learning interaction; and to complement the uniqueness and character of the overall Danube GeoTour product. The research is made of common findings and recommendations and presents the results of learning interaction, dedicated to one of the fields of geointerpretation, i. e. tectonics, volcanology, geohazards, geology over time, water in time, metamorphic processes and rocks, geomorphology and dialogue between earth & humans. The research geographically covers 7 countries in the Danube region - territories of project partners with geoparks, which contributed best practices, experiences, and gained new skills. Moreover, the research includes best practices outside of the programme area. Different methodologies were used in the research, such as preparation of a questionnaire for project partners, online research method, visiting several interpretation/visitor centres, and implementation of the joint geointerpretation training. As the result of the research, several recommendations were made, which should be followed when interpreting geological or any other (nature, culture, technical etc.) heritage in more efficient and quality way: proper geointerpretative planning; start of the geointerpretation with basics; the combination of personal and non-personal interpretation; personal contact; involvement of the audience; suitability and accessibility of the geointerpretation for different target groups; explanation of complex geological phenomena in simplified and interesting way, in easy to understandable language, supported with illustrative materials, other interpretative tools or technologies; active training programs for Geopark personnel and geotour guides; supportive infrastructure for comprehensive geointerpretation - visitors centres, interpretation points, learning path, etc.

DEVELOPMENT OF GEOGRAPHIC INFORMATION SYSTEM FOR GLOBAL GEOPARKS

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Keywords: *searching system, webgis, Microsoft map API, interactive solution for information, value sharing*

Session: Education, public awareness and communication

By early 2018, 127 geoparks from 33 countries, 5 continents had officially become part of the UNESCO Global Geopark Network family, a mature system that gathers geographic information is demanded to offer research service of these 127 Global Geoparks. To respond the need, Chinese Academy of Geological Sciences successfully initiated the searching system of Global Geoparks through scientific research projects that employ geographic information system API such as Microsoft map and Google map. The system shares information that relates to Global Geoparks including the coordinates, as well as displaying name of Geopark, nation, brief introduction, galleries and relative documents on each Geopark site. Information of Geopark can be retrieved through searching keywords such as name and nation, while information can be uploaded, submitted, edited, deleted and corrected. The system provides an interactive solution for information of Global Geoparks to be published, inquired, searched and functioned in other ways, this satisfies the information demand of scholars and specialists from related discipline. Being a platform which publishes data, the system also possesses well social and economic value in achieving the share of Global Geopark information between Chinese and foreign scholars and students.

CRAIG Y DINAS: AN EDUCATIONAL RESOURCE FOR GEOLOGY, INTANGIBLE AND INDUSTRIAL HERITAGE

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Keywords: *geology, education, caves, landscape, education*

Session: Education, public awareness and communication

Tramways developed for the exploitation of geological resources during the 19th and early 20th centuries opened up access to an area of approximately 3 km² which, despite its size, contains many of the qualities that characterize UNESCO Global Geoparks. Approximately 150 metres of limestone, sandstone and mudrocks of Carboniferous age preserve events in the depositional history of sediments that accumulated in an equatorial setting over a period of 20-30 million years. Geological highlights include the occurrence of a fossil soil horizon in the sequence of sub-tidal limestones which marked the beginning of sea-level changes associated with the initiation of a major glaciation in the southern hemisphere. The formation of the major unconformity between the limestone and younger sandstone sequence is linked with Late Carboniferous plate tectonic processes. Associated events in the folding and faulting history of the Vale of Neath Disturbance recorded at Craig y Dinas reveal hitherto unrecorded episodes in the tectonic history of the much larger, approximately 2,200 km² South Wales Coalfield. From the 19th century the limestone was quarried at Dinas Rock and the silica rich sandstone mined for use in the south Wales metal industry as a flux for smelting and for the manufacture of refractory bricks which lined the furnaces. The geology at Craig y Dinas offers challenges for new and exciting research and is used as an important educational site by schools and universities. In addition to this geosite's significance as a resource for formal and informal education, the caves resulting from underground water systems in the soluble limestone together with deep, steep sided valleys produced by surface glacial and river erosion are features in a dramatic landscape, and are the inspiration for myths and legends. The wooded, romantic vale of Neath was the last haunt of the mythical Gwyn ap Nudd, the ruler of Annwn, which is the Welsh Otherworld and the equivalent of Hades. In Welsh medieval literature Gwyn features both as a god of battle and Lord of the Dead. He is the harvester of the souls of the slain and rules over them in Annwn. The caves and the Craig y Dinas Iron Age hillfort are associated with two famous Welsh stories. The late 12th century story of Eledyr or Elidorus, as related by Giraldus Cambrensis, tells of the encounter between a boy and the world of the fairies. Another legend tells how a sheep drover gained access to a gigantic cavern beneath the hillfort where King Arthur, together with his retinue of knights sleep surrounded by a great treasure. The Dinas Rock limestone quarry, the silica mines and tramways at Craig y Dinas are significant components in Fforest Fawr Geopark's legacy from an industrial age. The tramways now provide the Geopark's inhabitants and visitors with easy access to geological features, the Craig-y-Dinas prehistoric hill fort and to a landscape with a fascinating intangible and industrial heritage.

A FLAGSHIP EDUCATIONAL PROJECT FOR THE SECONDARY SCHOOLS OF THE CHABLAIS UGGP FRANCE

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Keywords: *Education, Toolkit, Secondary Schools, National curriculum, Local heritage*

Session: Geoparks, sustainable tourism and local sustainable development

On the 22nd November 2017, the Chablais UNESCO Global Geopark equipped all 15 secondary schools in the geopark with an educational toolkit. This followed the educational strategy of the Chablais UGGp and builds on its existing actions : the formal partnership with the National Educational Authority; an annual publication proposing more than 55 educational field trip and workshops; participation in the national science festival; international scientific exchanges between high schools etc. The toolkit was conceived to valorize the natural and cultural heritage of the Chablais: it provides a multitude of resources about the territory that meet the requirements of the national educational curriculum. Today its varied contents include books, models, a 12GB digital database of documents, local rock samples, rocks in thin section, tools for outdoor data collection (soil sampling, weather etc.). The Chablais UGGp working in partnership with the schools will continue to add to the toolkit overtime to deliver new content and also through a dedicated web space. An exciting new addition for 2018 is the inclusion of folder of activities and educational games. It is the diversity of the local territory that is used to educate students with the knowledge and skills required by the national curriculum. The educational resources are particularly relevant and interesting for the students because they are taken from their familiar, local environment. Students are therefore more involved in the learning process and achieve deeper, long lasting understanding. The Chablais territory has a diverse heritage and is an educational playground. The toolkit invites the creation of rich cross-disciplinary projects : science, history, geography, civic education, literature, art... Teachers from different subjects are motivated to collaborate to realize projects such as : • Landscape interpretation : literary or artistic expression; • Natural risks : geology, geography and urban planning; • Built heritage : Properties of local rocks, use of natural of resources and man in the 19th century; • Use of natural resources and sustainable development; water resource management; • And also regional produce, the local economy, local history etc... These activities can be reinforced by fieldtrips, visits to cultural UGGp partner sites and through exchanges with local stakeholders. In this way the toolkit is the link between the pupils, the teachers, the territory and its stakeholders.

THE GEOBOTANICAL GARDEN PROJECT IN THE MIXTECA ALTA UNESCO GLOBAL GEOPARK, MEXICO

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Keywords: *Geobotanical Garden, Mixteca Alta Global Geopark, Indigenous knowledge, Mexico, Geoparks*
Session: Education, public awareness and communication

Botanical gardens usually contain an extensive representative sample of the plants of a region. The general objectives of these gardens are education, research, conservation and recreation. However, the influence of soil characteristics, rock types and landforms on their distribution is often ignored. The concept of the geobotanical garden in the Mixteca Alta Global Geopark is novel and focuses on showing the relationship between plants, soils, geology and landforms, as well as the traditional knowledge used by indigenous people. The Geobotanical Garden of the Mixteca Alta Global Geopark is a project carried out by an interdisciplinary group of academics from the National Autonomous University of Mexico with the participation of indigenous inhabitants of the geopark, who possess a deep traditional knowledge of the plants present in the territory. The Geobotanical Garden is an educational project that starts with an inventory of the main types of plants and the soils where they developed. Currently there is a series of monoliths representative of the geopark's soils and the types of rock in which they develop and also shows the influence of the relief in their distribution. Emphasis is also placed on the medicinal and nutritional uses of plants (ethnobotany). Unlike traditional botanical gardens, the focus of the geobotanical garden is adjusted to the objectives of the geoparks and contributes to the dissemination of traditional indigenous knowledge so that biodiversity and geodiversity blend with the culture, offering examples that allows visitors to recognize how nature interacts with society.

SCIENCE POPULARIZATION AND COMMUNICATION IN FANGSHAN UGGP

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Keywords: *Geopark, Science, Popularization, Visibility, Communication*

Session: Education, public awareness and communication

In recent years, the Fangshan UNESCO Global Geopark of China has taken effective measures to carry out science popularization activities, and communication with other GGN members, which are the comparatively weak point in the Geopark. Through a wide variety of geo-science popularization materials and activities, developing multi-functional popularization sites, information system, perfecting geo-science explanation panels, renovating college geo-education base, and strengthening communication and cooperation with GGN members, Fangshan UNESCO Global Geopark has further improved its visibility and reputation, which are appreciated by the GGN.

NAPO SUMACO GEOPARK PROJECT (ECUADOR): ACTIONS AIMED FOR THE CONSOLIDATION OF THE FIRST AMAZONIAN GEOPARK

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Keywords: *Napo Sumaco Geopark, Speleological guide, Napo Runa, LACGN, Geotourism*

Session: Aspiring Geoparks

The initiative of the Napo Sumaco Geopark Project, started from the academy with the support of local government institutions and the active participation of communities settled in this territory, which covers an area of 1,600 square kilometres, and involves two municipalities and 80 indigenous communities approximately, which maintain a great diversity of cultural and traditional aspects, that characterize the territory of the Amazonian Kichwa of the Province of Napo. The project of geotouristic inventory of natural cavities in the Province of Napo: Documentation of orality and related strategic resources, allowed the identification of 34 caves with potential for geotourism. This inventory defined the beginning of the determination of the territory of the Napo Sumaco Geopark. From there, the geopark work team developed activities to strengthen the local capacities of the community guides, such as: workshops in cave exploration techniques, cave geology, training for cave owners and training on conservation and use of karst. After the inventory of caves, was proceeded to the inventory of sites of geotouristic interest, from which were selected 13 sites of geological interest with potential for development geotourism. These sites are great territorial elements that have a cultural affinity with the communities and form the basis of the territory. In addition, 5 interpretative trails were established which involve multiple interests: Sumaco Volcano Trail (24 km), Grand Canyon Trail (3 Kkm), Tamia Yura Trail (2 km) and Chiuta Hill Trail (4 km). During the months of February and June 2017, public hearings were held to make the initiative public, in the towns of Tena and Aguayaku respectively. The social reception was important and even letters of support for the project were signed. From this, work groups were established for landscape interpretation projects based on local cosmovision, and the Maquita Foundation, collaborator of the project, awarded scholarships for training of local guides certified by the Ministry of Tourism of Ecuador. In September 2017, the Speleological Guide of the Province of Napo was published, as one of the main inputs that the Napo Sumaco Geopark share with the cave owners, tourism managers, local governments and the general public. This guide gives details (location, contacts, characteristics, services, etc.) about 35 caves present in the Napo Province, being the first thematic cave guide in Ecuador. The Napo Sumaco Geopark participates actively in the events organized by the Latin America and the Caribbean Geoparks Network (LACGN) and Latin American Geopark projects. For example on March 31, 2018, the LACGN promoted the celebration of the Latin American Geotourism Day; the Napo Sumaco Geopark organized a guided walk along the Chiuta hill trail, with the valuable participation of local communities, members of the institutions that drive the project, academics and the general public, showing the general interest in the geopark initiative.

WHEN GEOSCIENTISTS MEET PAINTERS: INTERPRETING NATURAL LANDSCAPE IN DANXIASHAN GEOPARK OF CHINA

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Keywords: *Danxia landform, painting, photography, aesthetics, interpretation*

Session: Education, public awareness and communication

Arousing public interest in the natural and cultural landscapes of a UNESCO Global Geopark (UGGp) is the first step to incite appreciation and desire to learn, love and protect them. Humans are born to love beautiful landscapes. Despite the subjectivity of its nature, beauty can be described as the quality or characteristic which stimulates an admiring pleasure or delights the eyes or the aesthetic sense of humans. Natural landscapes are of special attraction to many people, whether they are ordinary UGGp visitors, poets, singers, musicians, photographers or painters. This is particularly valid in China where aesthetics of natural landscape is strongly influenced by Taoism, which forms the foundation of Chinese landscape culture. The aesthetic value of natural landscape is built upon its colour, shape (two dimensional), form (three dimensional), structure, line, texture and size. Even the most advanced cameras are unable to capture all the subtle lights and colours that we can see with our eyes and therefore very often require post-shooting improvement by photo-editing software. Painting must be done on site by the aesthetically sensitive professional and amateur painters or by ordinary visitors such as students who can paint by highlighting the most appealing landscape features based on their own perception. It is through this painting process that all the painters acquire the sort of satisfaction by revealing the details and characteristics of a particular landscape. This satisfaction is unmatched by photography. Landscape paintings can be more alluring to viewers than photographs because of this personal linkage between the painters and the landscape scenery. Through this connection, some landscape features can only be seen through the eyes of the painters but not through the lens of cameras. In popularizing geosciences in Danxiashan UNESCO Global Geopark, geoscientists need to talk to and work together with painters when developing and upgrading the interpretation system which includes museum displays, interpretation panels and other printed materials. By doing so, the aesthetic quality of Danxia landform can be fully perceived. It not only enhances the attraction of the interpretive materials, but also unearths the hidden geological and geomorphological stories. Danxiashan has been encouraging and inviting both local and overseas painters to paint her landscape since early 1980s. A permanent painting workshop has been established within the geopark, providing convenient workplace, tools and equipment for painters as well as training for schools and interested organizations. Spacious exhibiting venue is also provided for regular painting exhibition. This paper begins by comparing the roles of photography and painting in recording natural landscape. It is followed by sharing the experiences of using landscape paintings in Danxiashan to increase the aesthetic value of the geopark and conclude by applying them to establish a more attractive and powerful interpretation system in the UNESCO Global Geopark.

COLLABORATIVE EFFORTS TO PRESERVE AND PROMOTE AMERICA'S GEOHERITAGE

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Keywords: *awareness, management, publicity, education, workshop*

Session: Education, public awareness and communication

Sites of geological significance in the United States are protected at a variety of management levels and administered by federal land-management agencies, including the National Park Service, the Bureau of Land Management, and the U.S. Forest Service, as well as by state, tribal, and local entities. The most notable U.S. program focused on protection of the nation's geological heritage is the National Park Service, which encompasses more than 400 units. The U.S. National Academy of Sciences' National Committee on Geological Sciences (USNC/GS) represents the United States in the International Union of Geological Sciences (IUGS) and provides direction and advice on geological science issues of national importance. In 2016, as a program development activity, the USNC/GS established the U.S. Geoheritage and Geoparks Advisory Group to facilitate communication about geoheritage issues at local, national, and international levels. The advisory group's principal aims are to expand the recognition and understanding of geoheritage domestically and to provide information and advice to local communities as they pursue development of geoheritage areas and geopark-like entities through currently available designations. Key advisory group goals for 2018-2019 include working with aspiring communities; hosting an invitational U.S. geoheritage workshop in 2019; and collaborating with partners, including the Geological Society of America, the American Geosciences Institute, and the Association of American State Geologists, to co-develop programs that highlight individual states' geological diversity. Through these efforts as well as national and international presentations, the advisory group will continue to raise awareness about geoheritage and promote sound policies to ensure that the United States' remarkable legacy is protected for future generations.

*“WORDS, WORDS, WORDS....”. FEWER WORDS, MORE COMMUNICATION:
AN INTERPRETER’S VIEW IN JUST 15 MINUTES!*

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Keywords: *interpretation, communication, evaluation, information, all media*

Session: Education, public awareness and communication

The soliloquy written by William Shakespeare (1564-1616) for Hamlet, Prince of Denmark, seems to be taken as a literal instruction by many would-be communicators when they write information panels (too often presented as ‘interpretation’ panels). Though Hamlet, the play, is much read and frequently performed many of the panels stay unread.... or barely read.... with only the first few words read. Certainly that’s what Evaluation Studies (something never on the syllabus in Shakespeare’s time) tell us. Many workers have timed how long it took them to read a panel, and then stood back and recorded how long each visitor spent looking at that panel – and most do not spend long enough to read all the text. So how can we engage visitors, and tell them more by telling them less? Interpreters do this all the time! Of course interpreters want to tell visitors lots of interesting ‘stuff’. Of course, because it is interesting to the interpreter (and if it does not interest the ‘interpreter’ then they should be in another job). So passion is needed. But mere passion can result in great slabs of text – great slabs of undigestible text, which most visitors will ignore. No-one likes indigestion! So this short – 15 minutes! – talk will give some pointers about making information/interpretation panels which say to visitors: “READ ME!” And if visitors only want to read a little, that is OK because the structure of the text means these people will still get the key ‘take-home’ message. And, of course, we hope they will find this so interesting that they want to read the whole panel. The same principles apply to all media – traditional panels and other printed media as well as digital media. The author has given many 2- and 3-day workshops on interpreting geoheritage, but has also condensed this down to 33 minutes for the Norwegian Geological Survey (available on YouTube – search NGU + Macadam) and even this year to 22 minutes for the Finnish Geological Survey. 15 minutes for GGN will be a further challenge! I am sure Shakespeare could do this more eloquently, though it might take longer! For others there’s a chapter – chapter 15 – on interpretation in the recent book on geoheritage edited by Reynard and Brilha.

MAPPING LITTLE ICE AGE GLACIAL DEPOSITS AND PERMAFROST AREAS FOR HAZARD PLANNING IN THE ADAMELLO BRENTA GEOPARK

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Keywords: *Little Ice Age, permafrost, paraglacial environmental, natural hazards, Adamello Brenta Geopark*

Session: Geoparks, climate change and geo-hazards

The Little Ice Age (LIA) is a well-recognized climatic event during which the glaciers in the Alps advanced and reached their maximum Holocene extent. During their retreat following the LIA, the glaciers left large areas of loose or unconsolidated glacial deposits in their forelands, which are often in permafrost conditions. These high-elevation debris slopes are subject to paraglacial reworking and may represent potential hazards for human infrastructures located downstream and in the valleys. In this work, we present a large scale mapping of the LIA and post-LIA glacial deposits and the reconstruction of the maximum LIA extent of glaciers in the Adamello Brenta Geopark. Some examples of the main geomorphic processes potentially leading to hazards for infrastructures are also shortly described. This work was motivated by a local law requiring the classification of areas subject to natural hazards in Trentino (Italian Alps). Results highlight that in the Adamello Brenta Geopark glaciers shrunk more than 60% from the LIA maximum (from about 52.5 km² to about 15.25 km²), leaving 14.3 km² of unconsolidated deposits, which are subject to geomorphic paraglacial processes. Potentially hazardous consequences can occur, in particular, during high-magnitude, instantaneous meteorological events, causing debris and mud flows, mass wasting from ice-cored moraines, and floods from small moraine-dammed lakes. Further volumes of unconsolidated debris are potentially available from thawing permafrost areas and rock glacier fronts, which are often in close relationships with glacial deposits. Our work demonstrates the usefulness of mapping LIA and post-LIA deposits and assessing related hazards, in particular for densely populated areas, such as that included in the Adamello Brenta Geopark. Under such circumstances, local administrations can benefit from modern, high-resolution mapping technologies, improving their land management role.

GEPARK ACTIVITY-BASED SOLUTION FOR THE 2016 ITOIGAWA STATION NORTH GREAT FIRE

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Keywords: *Itoigawa UNESCO Global Geopark, Great Fire, Damage Investigation Activities, Unique Topography, Renge-oroshi phenomenon*

Session: Geoparks, climate change and geo-hazards

On December 22, 2016, a fire broke out in a shop near the north entrance to Itoigawa Station. Southerly winds caused the fire to spread quickly, to become the largest fire in Itoigawa City since 1954. It has been given the name “2016 Itoigawa Station North Great Fire”. The gale force winds allowed the flames to leap from building to building, complicating efforts to contain the fire which damaged 147 buildings, including many of historical value. Although there was no loss of life, roughly 40,000 square metres were consumed in the fire, making it the worst fire in Japan in the past 20 years.

In 2009, Itoigawa City became one of Japan’s first three Global Geoparks. Even before that time, the city worked to promote the “geo-stories” which connect the region’s unique climate, topography and geology. For this reason, the city was able to quickly explain that this fire’s devastating spread was a result of the *Renge-oroshi* wind phenomenon, a product of regional geological features such as the tall mountains and valleys which formed along the Itoigawa-Shizuoka Tectonic Line. In Japan, disasters deemed to have been caused by natural phenomena are eligible for special government assistance. This is the first anthropogenic fire in Japan to be classified as a natural disaster as defined by the Act on Support for Reconstructing Livelihoods of Disaster Victims due to the effect of strong wind. The government’s decision to classify this fire as a natural disaster is in no small part due to the efforts of the Geopark in making a clear case to the administration that this fire spread as a result of the Renge-oroshi phenomenon and that this phenomenon is related to Itoigawa’s unique topography, geology and climate.

Damage investigation of the great fire was conducted with the help of volunteers from the Itoigawa Geopark Council. Their efforts resulted in a map of the spread of the fire. Hours after the fire broke out, the flames leapt to a building a few hundred metres from the original fire and the strong winds made extinguishing the flames difficult. We also learned that windows broken by the fire caused the fire to leap into the buildings where the flammable interiors quickly burst into flame. Also, burning embers falling in between cracks in roof tiles caused the roofs to catch fire. Information like this has made a great contribution to understanding how the fire spread and how to prevent further disasters.

The Itoigawa UNESCO Global Geopark places particular emphasis on regionally intimate disaster risk reduction activities, for example volcanic disaster risk reduction and education about the active volcano Niigata Yakeyama. In response to this fire, new facilities and information panels will be put into place to preserve the memory of the fire and transmit the lessons we have learned as a community. In addition, we will work to share this information within the Geopark Network in hopes it will assist in the furthering of disaster prevention and risk reduction.

FUTURES EXERCISE WITH LOCAL COMMUNITY: APPROACHES AND FIRST RESULTS OF THE PROJECT LIFE FRANCA (FLOOD RISK ANTICIPATION AND COMMUNICATION IN THE ALPS)

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Who will be presenting: Rocco Scolozzi

Keywords: flood risk management, community resilience, climate change, natural hazard communication, anticipation

Session: Geoparchi, cambiamenti climatici e rischi geologici

Along with climate change in the future, even local society and the economy are going towards profound changes; flood risk management requires not only skills and tools to tackle natural processes, but also social sciences and social innovations to anticipate adverse natural events and improve the resilience of local communities.

The main objective of LIFE FRANCA is to promote a culture of anticipation in the Alps through the participatory processes, analysis and modification of collective socio-cultural attitudes, decision-making practices and common perceptions of environmental risks.

The hydrogeological risks in the Alps derive from the geomorphological, hydrographic and climatic conditions of the region, as well as from the significant increase in urbanized areas that often occurred without proper spatial planning. Alluvial events in the province of Trento, particularly in the last 3 years, are not rare at all. Despite this, there is limited awareness of risk among the population and correct communication on the management of flood events is sporadic. The effectiveness of risk prevention and mitigation depends on the participation of all the parties involved.

The LIFE FRANCA project includes, as pilot areas, the municipalities of Strembo and Bocenago, included in the Adamello Brenta Nature Park. Several mitigation facilities have been built to regulate sediment transport in streams and new facilities could be added in the coming years. The floods that characterize this territory have a significant transport of solid materials, are impulsive and difficult to predict.

To increase the communication of natural hazards and risk management by public institutions and improve the adaptability of the population to adverse climatic events (for example, sudden floods), two participatory processes were organized involving citizens, experts and administrators. These participatory processes are future-oriented and based on methods derived from futures studies (originating in the field of defense and business strategy). In detail, the "Shell" method of Scenario Building (proposed by Royal Dutch Shell).

Disregarding here the methodological details, the results of the first consist of a series of 3H Maps including shared concerns, common aspirations, useful indications of possible allies and technical and social innovations (or "seeds of the future in the present"). From the 3H Maps, it is possible to draw useful strategic indications for subsequent developments.

The results of Scenario building were narratives of possible 2030 worlds from which the local administration can extract insights and suggestions to prepare the community and territorial management to deal with the coming possible changes (the core principle of anticipation).

The adapted participatory approaches are fully transferable to other regions, as well as to other natural hazards connected with climate change.

ARTACLIM PROJECT IN 2 FRENCH GEOPARKS: “ADAPTATION AND RESILIENCE OF ALPINE TERRITORIES FACING CLIMATE CHANGE”

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Keywords: *climate change, adaptation, natural hazards, public policies, vulnerability*

Session: Geoparks, climate change and geo-hazards

Today, most public administrations still lack the proper policy tools to efficiently face the major challenges posed by the impacts of climate change in mountain areas. The ARTACLIM project addresses these gaps and aims to develop and test public policy framework strategies for identifying and implementing climate change adaptation actions in alpine areas. ARTACLIM - “Adaptation and Resilience of Alpine Territories facing Climate change” – is a project supported by the Interreg Programm ALCOTRA 2014-2020, a program of cross-border territorial cooperation between France and Italy. Gathering 8 partners – universities, associations and territories -, it has officially been launched in December 2017 and the first actions are now in progress. On the French side, both of the application territories are global Geoparks: Massif des Bauges Geopark and Haut-Chablais Community of communes (part of the Chablais Geopark). ARTACLIM will investigate most-suited strategies accounting for regional socio-economic landscape, spatial planning and land use, urban planning, natural hazards, agriculture, tourism, biodiversity and energy transition, for the benefits of cross-border population and areas subject to similar pressures and development objectives. It is a research-action project based on a reinforced cooperation and cross-fertilization amongst its international partnership, ensuring that the developed tools will be innovative and usage-driven. This validated and shared process of adaptation to climate change will contribute to increase the resilience capacity in the ALCOTRA area. As a support of the Grenoble-Alpes University, the PARN – Pole Alpin Risques Naturels – contributes to these goals in the specific field of natural hazards/risks, as the concerned Geoparks are mountain areas submitted to debris flows, rock falls and landslides, which patterns have been drastically evolving due to climate change in the last decades (frequency, intensity, period of occurrence, chain effects...). The first step is an evaluation of territorial issues and planning. This includes i) establishing the state of the art on local climate change impacts, adaptation and planning, ii) defining a set of local climate indicators and iii) studying the vulnerability of territories. Among others, 2 workshops already took place in January, respectively in Massif des Bauges Geopark and in Chablais Geopark, inviting the local people to share their vision of local climate change issues, dealing with agriculture, tourism, forest, water resource, biodiversity, natural hazards... The rich material and ideas gathered will be the base for precise vulnerability diagnosis and adaptation strategies fitting the local context. The second step will aim at carrying out practical means of adaptation and resilience, such as i) training the technical staff, policy makers and local players, ii) proposing strategies and adaptation measures in territorial planning, iii) developing and installing the adaptation of management tools in public institutions. With these actions, the 2 French Geoparks will progressively become leading territories concerning adaptation to climate change.

MITIGATION OF NATURAL DISASTERS BY INTEGRATION OF FOLKLORE AND SCIENTIFIC KNOWLEDGE: A LESSON FROM IZU PENINSULA, JAPAN

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Keywords: *Natural disasters, volcanism, earthquake, tsunami, scientific knowledge*
Session: Geoparks, climate change and geo-hazards

The Izu Peninsula UGGp locates at the Izu Peninsula, which bulges into the Pacific Ocean from the central part of the mainland of Japan. This peninsula, locate on the northernmost tip of the Philippine Sea plate and the northern end of the Izu-Bonin volcanic arc, is a terrestrial part of a volcanic massif formed by subduction of the Pacific plate. The Izu block drifted by the northward shifting of the Philippine Sea plate, and collided with the mainland ca. 1 Ma before. After the collision, volcanoes have erupted and active crustal deformations develop the topography of the Peninsula. Active faults run the gamut of the Peninsula, and monogenic active volcanos developed at the east of the Peninsula. In case faulting activity occurred in the ocean floor and tsunamis cause damage coastal area. Therefore the area has witnessed frequent natural disasters such as earthquakes, volcanism and tsunami since ancient times, and flooding and landslides due to heavy rainfall and steep landforms as well. Since Izu has been exposed to the fury of nature throughout geological and historical time, not only are the scars of past disasters preserved as lessons for the future, but also the avoidance and mitigation of disasters is an integral part of the tradition, wisdom and skills. Geoparks are places where local people and visitors can learn about past natural disasters. For example, in the tsunami suffered area, at the stairs of various temples stairs stelae stand showing the tsunami reaching heights. These monuments raise awareness of possible future disasters among communities in daily lives. In addition these folk legend, we organize workshops for local communities how should we evacuate from possible tsunamis, checking the evacuation route and area for refuge and making safety maps. Education about such disasters enables to assimilate knowledge gained from the past and prepare to respond effectively in case of any future disasters. Integration of traditional folklore with present day's scientific knowledge will be a strong tool to mitigate disasters. A Geopark in this region is therefore a tool for raising natural hazard awareness among locals, by extending understanding of nature and the cause of natural hazards.

**"SENGI GAME (SAKURAJIMA'S VOLCANIC DISASTER PREVENTION
VERSION)" A DISASTER PREVENTION THEMED GAME CREATED BY
SAKURAJIMA-KINKOWAN ASPIRING GEOPARK**

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Keywords: *aspiring geopark, volcano, disaster prevention, education, public awareness*

Session: Geoparks, climate change and geo-hazards

Sakurajima-Kinkowan Geopark is an active volcanic area which has been continuously erupting hugely since about a million years ago. Its majestic natural features are the active volcano Sakurajima and the deep, rich bay Kinkowan that was created by volcanic activities in the past. On the top of that, just 4 km away from the volcano, that has been actively erupting more than 60 years, a big city, with a population of about 600,000, spreads out. The coexistence of people with an active volcano is rare in the world. The proposed Aspiring Geopark theme is '*connection between the volcano, human being and Nature*' since volcanic activity has strongly influenced and connected with the landscape, ecosystems, human settlements and cultures in the area. About 4,000 people live in Sakurajima district, despite the fact that the volcano erupted hugely four times in recorded history: Tempyo eruption (764-766), Bunmei eruption (1471-1476), An-ei eruption (1779-1782) and Taisho eruption (1914-1915). The residents have managed to overcome volcanic disaster and to lead their life with the active volcano. Reportedly, almost 90% of magma quantity that flew out during the Taisho eruption is restored in Aira Caldera's underground magma chamber in recent years. A huge eruption, that is comparable to Taisho eruption, is likely forecast to happen in the future. Moreover, 8 hours after the Taisho eruption, an earthquake with a seismic intensity of lower 6 affected the city area. Taking into account the magma quantity and the possibility of earthquakes, it is necessary to prepare people against a huge eruption now. Therefore, Sakurajima-Kinkowan Aspiring Geopark developed a card game. Through the game, the residents can learn volcanic disasters and prevention measures against them. It also encourages them to think about disaster itself and to take action when it occurs. This card game is based on a traditional regional education method that was used by the Satsuma clan during the Edo period. The core idea of the education is to make the learners think and discuss over possible solutions for situations that are likely to happen and yet hard to give a right judgement to them. Sakurajima-Kinkowan Aspiring Geopark promotion council communicated with Kagoshima City Disaster prevention department and local communities in the process of preparing subjects for the card game. Basic information about Sakurajima, lessons from the past eruptions and evacuation plan were included in the subjects. The Geopark promotion council conducts the game for the residents at public Geo-lectures and an annual Sakurajima volcanic disaster drill. The aim of the game is to offer the local residents an opportunity to learn Geo-hazards in their area and necessary preparations for a possible disaster. The program is highly important as it involves many people regardless of age and encourages every single person to evacuate in the face of Sakurajima's possible huge eruption in the future.

DEFENSE AGAINST FLOODING IN ALMADÉN DE LA PLATA (SIERRA NORTE DE SEVILLA NATURAL PARK - UGG)

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Keywords: *geo-hazards, floods, geomorphology, engineering*

Session: Geoparks, climate change and geo-hazards

The village of Almadén de la Plata occupied, during its last urban development, a large part of the floodplain of the La Villa stream, a tributary of the Calzadilla Stream, diverting it to a water pipe of the sewage system. Several episodes of heavy rains in recent years have shown that this solution has been totally insufficient to evacuate the floods, causing frequent damage in the urban area. The constructions of the urban area of Almadén de la Plata take up the natural channel that runs from West to East that evacuated the waters of the basin head, and on the other hand collected the waters of the north and south slopes, that reach to the channel through the area currently occupied by buildings. With the strong slopes in these hillsides, especially the one located to the south and the occasional heavy rainfalls in this region, with precipitation between 800 and 1,000 mm / year, the number of episodes with floods in recent times has increased, in parallel to the growth of the urban area. The General Secretariat of Water of the Junta de Andalucía (regional government) studied the level of risk to which the urban area was subject to flooding in the Plan for the Prevention of Floods in Andalusian Urban Streams. The village of Almadén de la Plata was classified with the level A, being therefore a priority action of the Plan. The executed works was divided into four actions: Channelling works to the rolling tank or storm tank; North Channel, which collects all the water from the northern slope of Almadén valley and evacuates it beyond the urban area; South Channel, which runs along the southern slope of the valley collecting all the water from that area and evacuating it to a collector that flows into the Calzadilla stream; and Urban Channel, a subterranean collector that collects all the rainwater of the urban area and flows into the Calzadilla stream below the town. With the executed works it is foreseen to solve the problems derived from a peculiar geomorphology and the past urban growth, and that the estimated floods for a return period of 100 years will be drained without problems.

"LIFE-IP ZENAPA - ZERO EMISSION NATURE PROTECTION AREAS" IN UNESCO GLOBAL GEOPARK VULKANEIFEL

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Keywords: *ZeroEmission, ClimateAction, Biodiversity, Bioeconomy, LIFE-Project*
Session: Geoparks, climate change and geo-hazards

On the 1st of November 2016 the EU LIFE program approved, under its sub-programme for Climate Action, funding for the integrated project “LIFE-IP ZENAPA – Zero Emission Nature Protection Areas”. The project aims at the CO₂e neutrality of larger scale designated areas such as Biosphere reserves, National parks as well as Nature and Geoparks, transforming them into hot spots of climate action and incubators of change in the surrounding regions. The UNESCO Global Geopark Vulkaneifel is among the 11 project areas in Germany and Luxembourg. On the one hand, LIFE-IP ZENAPA will contribute to the protection of climate, nature and biodiversity by taking concrete climate positive measures, and on the other hand it demonstrates that goals of protection are not contradictory but rather complimentary and they can be achieved cooperatively. The main requirement and goal is the implementation of national and European climate protection targets (CAP 2020 and CPP 2050), taking into account national and European strategies on biodiversity and bio-economy. As a basis for the implementation of the proposed measures, regional climate change and biodiversity master plans are created in which regionally specific actions are assessed and potentials analyzed. Strategic climate change and biodiversity concepts will determine the strategies for a number of communities on communal levels. Climate change managers are employed in every region to coordinate the implementation process, to build up capacities and to raise awareness. Just like designation statuses and conditions of the partner-regions differ do the planned actions vary too. For example, the low-carbon production of meat from cattle grazing against shrub encroachment, biochar production to lock up carbon in agricultural soils or investing in the energetic refurbishment of public buildings with ecological insulation materials under the consideration of bird and bat nesting. In the UNESCO Global Geopark Vulkaneifel, among other measures, investments in infrastructure for e-mobility will take place, species-rich feed-stock for biogas plants will be tested and short-rotation coppice hedges will be promoted as feedstock for community-owned district heating systems. ZENAPA seeks to create a network of information and competence for communal learning and exchange of experiences between the partners. Continual media work will raise awareness and it will demonstrate that climate change mitigation measures can support biodiversity, make economic sense and contribute to regional added value and rural development. The project is led and coordinated by the Institute for Applied Material Flow Management (IfaS) of the Trier University of Applied Science and it receives funding of approximately 8 million Euros through the European Union’s LIFE program.

NATURAL DISASTER UNDERSTANDING AND PREPARATION IN HAKUSAN TEDORIGAWA ASPIRING GEOPARK

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Keywords: *Natural disaster, Disaster prevention, Preparation for disasters, Hakusan Tedorigawa Aspiring Geopark, Japan*

Session: Geoparks, climate change and geo-hazards

Hakusan Tedorigawa Geopark covers the whole area of Hakusan City which is located in the southwest of Ishikawa Prefecture facing the Sea of Japan, in the central part of the Japanese archipelago. The Tadori river flows northward, pouring into the Sea of Japan from Mt Hakusan, an active volcano with rich nature surrounding it. With a direct distance of only 50km between the 2700m Mt. Hakusan and the Sea of Japan. The Tadori River is one of the fastest flowing in the country. The source of the river whilst located in a region of low latitude is also a region with one of the heaviest snowfalls in the world. The area surrounding Mt. Hakusan that receives vast amounts of melt water is fundamentally old sedimentary rock from the era of the dinosaurs with ash and other material on top from eruptions of Mt. Hakusan. This makes for a geologically weak structure which is prone to collapsing. Within this kind of environment, the melt water is a blessing and a curse; the people cannot live without, but on the other hand, it has also been the cause of landslides, floods and other natural disasters. Not only this, the active fault is located on the boundary between the flat land and the mountain region. Mt. Hakusan also erupts roughly once every 300 years. The people who live in these areas have to live alongside the possibility of natural disasters occurring such as earthquakes and volcanic eruption. However despite being such a high risk region, there is a reason why people have continued to live there. Natural disasters happen suddenly and unfortunately often take people's lives but on the other hand, water related disasters such as floods create rich, fertile soil, bountiful forests and high level of biodiversity. It is because of this land, rich with plants and animals as well as the water from Mt. Hakusan that people have continued to live in the area. Because of the potential impact on residents of the area, it is crucial that the Geopark is involved in programs that promote awareness, understanding and respect for these natural phenomena. To this end, The Hakusan Tedorigawa Geopark is carrying out a number activities such as lectures aimed at local residents and using a DIG (Disaster Imagination Game) to have the residents correctly learn about the scientific origin of the region, how natural disasters influenced it and how to prepare for natural disasters. In order for people to continue living in this region and to protect and conserve the geological resources into the future, it is vital that residents correctly understand natural phenomena and learn about both the benefits and disadvantages of living in such a region.

A TREASURE OF KHORAT : KHORAT GEOPARK, THAILAND

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Keywords: *Khorat geopark, Thailand Geopark, Cuesta, Fossils, Thailand*

Session: Aspiring Geoparks

Khorat Geopark located in Nakhon Ratchasima Province or “Khorat”, northeastern region of Thailand it’s area of the middle – lower of Lam Takhong river basin, especially in Sikhio, Sung Noen, Kham Tha-le So, Meuang Nakhon Ratchasima and Chaloe Phra kiat District. Total area is 3,167 km² or 15.22 percent of the province. It located at the edge of the Khorat Plateau and supported by sedimentary rock layers of the Mesozoic Era, called Khorat Group. So, new geopark in this area has been named "Khorat Geopark". Khorat geopark has remarkable natural scenery of double cuestas of sandstone in Phra Wihan Formation and Phu Phan Formation of Khorat Group aged around 140 and 120 million years ago, respectively. The international significance is the fossils especially fauna and flora in Neogene sedimentary layer, especially ancient proboscidiens, the most numerous in the world with 10 genera from 55 genera worldwide such as *Gomphotherium*, *Prodeinotherium*, *Stegodon* and etc., new species of mammal including *Khoratpithecus piriyai*, *Merycopotamus thachangensis*, *Aceratherium porpani*. In addition, there are also Cretaceous dinosaurs (Aptian – Albian) have been found such as *Sirindhorna khoratensis*, *Ratchasimasaurus suranareae*, *Siamodon nimngami* as well as reptiles *Kizylkumemys khoratensis* and *Khoratosuchus jintasakuli*. Several sizes and species of petrified wood have found both in Neogene and Cretaceous ages. That’s lead to establish the largest one fossil museum in 7 of the world since 1999 and the beginning of geological resources and geoheritage conservation in this area.

Khorat Geopark has mostly dry dipterocarp forest in the plains to low hills and dry evergreen forest in the mountain area along the Lam Ta Khong antecedent stream which is the main river for more than seven hundred thousand Khorat Geopark citizen. The history and archeological heritages of the area related to the Neolithic or around 4,000 years ago including the Bronze Age, Iron Age. The important historical and archeological heritages such as prehistoric color painting at Khao Chan Ngam, Sandstone Reclining Buddha, Sema Historical City of Dvaravati civilization, Phanom Wan and Mueang Khaek Stone Sanctuary of Khmer Civilization, gate and the moat of Mueang Khorat that is the main cities of the northeastern region of Thailand since the history more than 300 years ago.

Therefore, local communities, local governments, universities and Khorat people has established the Khorat geopark since 2015 and promote their geological heritage and the uniqueness nationally and internationally for sustainable socio-economic development of the area and protecting their heritages for the next generations.

DESIGN THINKING FOR GEOPARKS

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Keywords: *design thinking, wicked problems, geopark*

Session: Aspiring Geoparks

This presentation explores the benefit of design thinking in developing new Geoparks or strategic renewal of existing Geoparks. The team of the Rhine Meuse delta aspiring UNESCO Global Geopark in the Netherlands adapted the design thinking curriculum taught by Stanford University's Hasso Plattner Institute of Design to the challenges of developing Geoparks. The basic practice of design thinking is the design thinking innovation process, which is represented by five distinct stages. Following this cycle, our creation sessions start with empathize, where we introduce techniques for stakeholders to investigate the nature of a problem and the underlying emotions or needs influencing it through interviewing or self-observation. Second, in define, we help stakeholders identify the core of the problem—which may not be immediately obvious—and then reframe the problem so that it is a concrete statement. Third, in ideate, stakeholders brainstorm possible solutions to the problem that they have identified. Finally, in prototype and test, the stakeholders create a 'wireframe' representation of their selected idea and test a rough version of a solution for one or more of their ideas. Using a design-based development framework, we reflect on our observation of our creation studio workshops, stakeholder debriefs, and a feedback of participants of co-creation sessions to assess the value of design thinking for Geopark developments and the wicked problem character of sustainable development in this field of endeavour. We find that stakeholders felt the design thinking approach enhanced creativity, productivity, and confidence, stakeholders appreciated applying the mindsets of a bias toward linear working and embracing experimentation to their development efforts, stakeholders learned to be mindful of their development process, and participants valued the design methods as supportive, nonjudgmental atmosphere cultivated in the co-creation workflows. As developing new Geoparks or implementing strategic renewal of existing Geoparks could be seen as wicked problems in the light of the challenges of sustainable development with multi-stakeholder, multi-layer environments, design thinking could support innovation processes by building on open mind, trust and respect.

ULTRA HIGH RESOLUTION GEOMORPHOLOGICAL MAPPING AS A TOOL FOR RESEARCH AND MANAGING GEOSITES

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Keywords: *Ultra high resolution, geomorphological mapping, research, geoconservation, geosites*

Session: Aspiring Geoparks

Geological and geomorphological maps have been, for a long time, important tools for the characterization, analysis and management of geosites. The recent development of ultra high resolution aerial imagery (< 5 cm/pixel) obtained with unmanned aerial vehicles (UAV) using RGB and multispectral sensors, allows for producing orthophoto mosaics and digital surface models of unprecedented detail. The later, show accuracies of ci. 10 cm, allowing to derive accurate maps, such as slope angle, aspect, potential insolation, viewshed, etc. 3D visualization is also facilitated, with numerous applications from management to outreach. The 3D models, together with expert knowledge and systematic field surveys, enable producing ultra-high resolution geomorphological maps, with accurate mapping of landforms and deposits of decimeter to decameter scale. They also allow to derive various morphometric measures not easily available with earlier techniques. On the other hand, multispectral sensors facilitate the automatic classification of landcover, including vegetation communities, soil erosion and even lithological and weathering patterns. UAVs also allow for resurveying the geosites regularly and generate comparative maps and 3D models enabling monitoring soil erosion and other changes in landscape and vegetation, contributing to decision making, to promote geoconservation and reduce environmental impacts. Furthermore, such ultra high-resolution data also enable advances in geomorphology, with detection of features which are difficult to identify with ground-based surveys or lower resolution imagery. In this presentation, we present the workflow followed by the Estrela Aspiring Geopark team at the Covão do Boi geosite. This geosite includes features typical of granite weathering, together with glacial erosion landforms, that show a rich geomorphic history making it one of the most remarkable geosites of the Estrela. The geosite shows a large number of visitors and is integrated in a biogenetic reserve, at the main road leading to the summit of Estrela, including the Senhora da Boa Estrela sculpture, which gives it a very high cultural value. The geosite is thus very sensitive to human pressure and ultra-high-resolution mapping becomes a very valuable tool for characterization, monitoring and geoconservation.

SALPAUSSELKÄ - AN ASPIRING GEOPARK OF SAND AND WATER

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Keywords: *glaciofluvial deposits, groundwater, aspiring geopark, Finland, none*

Session: Aspiring Geoparks

The aspiring Salpausselkä Geopark is located in the City of Lahti and the surrounding region, in southern Finland, about 100 km northeast of Helsinki, the capital. The geopark covers an area of some 4000 km² extending to seven municipalities and including the Päijänne National Park. The ancient bedrock of the area formed 1 900-1 850 million years ago and is covered by a layer of deposits formed during and after the latest ice age. The most significant of these deposits are Salpausselkä ice-marginal formations, the best-known geological features of Finland, which are at their most representative in the Lahti region. In addition to the Salpausselkä formations, their feeding eskers of which some lie in Päijänne National Park, are central features in the proposed geopark area. The Salpausselkä formations are formed of sand and gravel deposited at the margin of the continental ice sheet during the deglaciation stage of the last ice age, when the climate got suddenly colder, and the retreat of the continental ice sheet stopped. The cold period, known as Younger Dryas, started about 12 800 years ago and lasted for approximately 1 200 years. Eskers of the aspiring geopark formed on the bottom of the meltwater streams that transported material to the ice sheet margin. Today the glaciofluvial formations offer stunning views and peaceful walks, but are also vitally important for the wellbeing of the communities: their forest-covered thick sand and gravel layers absorb most of the average annual rainfall of 600 - 700 mm feeding the renewable groundwater reserves. Finland's groundwater reserves are abundant, even though the groundwater formations are scattered and small in worldwide comparison. The most important groundwater recharge areas in terms of both quality and quantity lie in the ice-marginal formations and eskers. The aquifers in Finland's glacial deposits rank in quality among the best reserves of groundwater in the world. However, the quality is sensitive to contamination and climate change impacts. The groundwater recharge areas of the aspiring Salpausselkä Geopark are of great importance at the national level. The largest of these, situated in the First Salpausselkä, is among the three largest aquifers of Finland, measured by water yield as well as area. Groundwater is an important natural resource in the aspiring geopark for the region's strong brewery and food industry, for example. All of the high quality, drinkable tap water in the region comes from groundwater. Water consumption in the region is on a sustainable level - only one third of the renewable groundwater is used. Almost 70 % of the population of Lahti live on top of groundwater bodies, and the groundwater resources are partly located underneath industrial areas. A regional groundwater protection plan, drafted in 2012, includes an extensive list of measures to improve groundwater quality. The aspiring Salpausselkä Geopark aims to highlight the hydrogeological processes providing us with clean fresh water, and the need and means of protecting the groundwater in glaciofluvial deposits.

GEOPARKS IN RUSSIA: CURRENT STATE AND PROSPECTS

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Keywords: *Russia, geopark, UNESCO, Heritage Sites, Atlas "Unique Geosites of Russia"*

Session: Aspiring Geoparks

Russia, owing to its geographical location, diversity of geological settings, and vast area, has all the possibilities for creating full-scale geological parks which, with appropriate information promotion and support from the state, business, and local community, could become successful and cost-effective commercial projects. In 2016, under the Commission of the Russian Federation for UNESCO, the Russian Committee of the UNESCO International Geoscience and Geoparks Programme was established, whose main task is to submit applications from Russian geoparks for the status of the UNESCO Global Geopark and the development of a geopark network in Russia. Geological monuments of nature, which number about 3,000 in Russia, are the basis for creation of geoparks throughout the world. The most famous geological monuments of Russia included into the UNESCO World Heritage Sites list are: the Lena Pillars, the Golden Mountains of Altai and the Volcanoes of Kamchatka, Lake Baikal, and Putorana Plateau. To date, three regional geoparks have been established in Russia: Altai in the Republic of Altai, Geopark Undoriya in Ulyanovsk Region, and Yangan-Tau in Bashkortostan, which presented its nomination dossier for the UNESCO Global Geopark status. At the same time, many regions of Russia are working on the creation of geoparks. In Siberia - geopark "Baikal", which includes the island of Olkhon; in the Urals - "Urals Semiprecious Ring", in the north of European Russia - geopark "Kenozero", in the Caucasus - geopark "Sarykum" in Dagestan. Particularly promising areas for creating geoparks of international importance are the Kuril Ridge, Kamchatka, and Primorsky Krai. Constraining factors hampering the development of a network of geoparks in Russia are: 1) lack of regulatory and legal framework for geoparks. In the Federal Russian legislation there is no concept of a "geopark", although the law on "specially protected natural areas" permits organization of "other" nature protection categories; 2) poor awareness of the public and local authorities on the tasks for creating geoparks. Geoparks are identified as natural monuments and reserves, where legislation prohibits economic activity. This fact contradicts to the main UNESCO geopark criteria, one of which is the economic development of the region and involving of the local population into geopark organization and management. 3) relative inertia of the business community, which is not in a hurry to invest in projects to create geoparks. Although there are many successful examples of combining environmental objectives and development of eco-tourism in Russia. With the support of the Russian Committee of the UNESCO International Geoscience and Geoparks Programme, the Atlas "Unique Geosites of Russia" was prepared by the oldest geological institute in Russia (VSEGEI). The Atlas was prepared relying upon the created information retrieval system containing systematized data on more than 3000 sites approved and proposed for approval as Russia's natural heritage assets (<http://www.vsegei.ru/ru/info/>). The state supports the development of a network of geoparks, based on natural heritage sites, as tourist and recreation zones, where these sites are part of a unified concept of conservation and sustainable development of the area.

ASPIRING GEOPARK OESTE IN PORTUGAL: SCIENTIFIC HIGHLIGHTS AND IMPORTANCE

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Keywords: *Portugal, Jurassic, Atlantic coast, dinosaurs, Scientific Research*

Session: Aspiring Geoparks

Since 2016 that the Museum of Lourinhã, in central west Portugal, and the Portuguese Forum of UNESCO Geoparks and been cooperating and debating together, in an effort that culminated in the signature at March 15th, 2018, of an agreement by five municipalities of Portugal for joint application to the Geopark UNESCO, as Aspiring Geopark Oeste - Jurassic Land. These municipalities, Óbidos, Peniche, Bombarral, Lourinhã and Torres Vedras, that bound the Aspiring Geopark Oeste comprise an area of the 680 km² mostly occupied by Jurassic outcrops (67%), 21% Early Cretaceous and 12% others units from Late Triassic to Quaternary, in a total of 20 geological formations or units. Many of them with names after the Oeste localities, such as Lourinhã Formation, Bombarral Unit or Torres Vedras Group. The 61 km of Atlantic coast, often with sand beaches, are a popular destination for tourists and the extensive and spectacular geological outcrop exposures along the sea cliffs, many with dinosaur fossils, attract scientists and the scientific tourism around the world. The richness and diversity of the Aspiring Geopark Oeste can be perceived in ten geological facts and figures: i) more than 40 geosites identified, ii) one GSSP golden-spike, at the base of the Toarcian, iii) more than 200 fossil sites (vertebrates and invertebrates), 37 of them in international databases, iv) 38 Ph.D. theses on the geology of the area, mostly in paleontology, v) more than 40 type-species, most of them with species name dedicated the Oeste localities, such as the theropod dinosaur *Lourinhanosaurus* after Lourinhã, or the crinoid “*Pentacrinus*” *penichensis* after Peniche, vi) more than 200 scientific articles have been publish, including in high-profile journals, and vii) two museums comprising a significant exhibition component in Paleontology, and at least two more spaces are planned, viii) 15 dinosaur species unique in the world, such as *Lusotitan* or *Miragaia*, ix) eight high-quality wide geological maps at scale 1:50000; and x) one of the most relevant Jurassic localities in the globe, with nearly continuous fossiliferous stratigraphic record of outcrops comprising all Jurassic, and ranging from Late Triassic to Early Cretaceous. These numbers illustrate well the geological international importance and the scientific potential for aspiring territory to Geopark. The area is highly touristic and is the home for 158 thousand inhabitants that can benefit by the Geopark strategy for sustainability.

KÜTRALKURA: THE FIRST ASPIRING GEOPARK OF CHILE

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Keywords: *Kütralkura, Aspiring Geopark, Local development, Araucania, Chile*

Session: Aspiring Geoparks

In the Andean active volcanic zone of the Araucania Region, southern Chile (38°-39°S), people from public and private entities have been working since 2008 to establish the first UNESCO Global Geopark of the country. This initiative aims to contribute to the development of local communities, the education of inhabitants and visitors about Earth and Environmental Sciences, and the protection of its valuable natural and cultural heritage. The proposed geopark is named Kütralkura, a compound word from the native language Mapudungun that means “stone (kura) of fire (kütral)”. The territory is integrated by the counties of Melipeuco, Vilcun, Lonquimay and Curacautin and has an area of 8,100 km² with a population estimated at more than 55,000 inhabitants, of which 30% correspond to Mapuche-Pewenche indigenous communities. This area has a great geodiversity that evidences a geological history of more than 200 million years related to the subduction and orogenic processes, including the intense Holocene activity of Llaima, Lonquimay, Tolhuaca and Sollipulli volcanoes. The area partially overlaps with the Araucarias Biosphere Reserve of the Man and the Biosphere UNESCO’s Program, and includes the Conguillio National Park and other five natural reserves. In addition, important archeological vestiges indicate the presence of the first inhabitants of the zone at least since 2000 years ago. A first inventory of 42 geosites has been achieved, from which 33 can be visited through 15 Geo-routes, and 10 have been implemented with interpretation panels. The Environmental Information Centre of the Conguillio National Park has been remodeled incorporating information about the international network of geoparks and the geodiversity of the territory, including relevant aspects of the volcanic hazards. A geotouristic guide, a website, and audiovisual material have been produced. Moreover, educational and training activities have been performed, and the first Symposium of Geoparks and Geotourism in Chile was organized on 2011 at Melipeuco. The recently created Association of Cordilleran Municipalities of the Araucania (ACMA) has assumed the responsibility for the management of the aspiring Geopark. The administrative structure is integrated by the Technical and Scientific Committees which are supported by the General Assembly constituted by representatives of the local community and public and private institutions. Specifically, this assembly is integrated by the National Geology and Mining Service, the National Forestry Corporation (CONAF), the Regional Government of Araucania, the National Tourism Service (SERNATUR), the universities Austral de Chile and Católica de Temuco, the Geological Society of Chile, and tourism and indigenous associations, among many others. On November 2017, the ACMA presented the dossier required to be a member of the UNESCO Global Geoparks Network. In the present work, we present the main advances of this initiative and the challenges to consolidate Kütralkura as the first Chilean UNESCO Global Geopark, and as a national model for local sustainable development, education and protection of natural and cultural heritage.

THE GEOPARK ACTIVITIES OF MINE-AKIYOSHIDAI KARST PLATEAU GEOPARK IN JAPAN

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Keywords: *Japan, Mine-Akiyoshidai Karst Plateau Geopark, limestone, geopark activities, local residents*

Session: Aspiring Geoparks

Mine-Akiyoshidai Karst Plateau Geopark authorized in September, 2015 as one of the Japanese Geoparks is located in Yamaguchi Prefecture on the westernmost of Honshu (the main island of Japan). There are many geoparks that have volcanoes in Japan. However, the main content is a karst plateau that results from limestone dissolved in our geopark. It is called "Akiyoshidai" and it is the largest karst plateau in Japan (Approx. 100 km²). Limestone was formed when the skeletons of coral and other creatures living in warm seas accumulated and hardened. The skeletons of coral and other sea creatures built up in a continuous layer on the peaks and sides of seamounts located in the oceans. This limestone formed on a giant moving slab of rock on the Earth's surface known as an oceanic plate, which moved to the edges of the continents over a period of around 80 million years. Many giant limestone deposits are found around the world, and the Akiyoshidai limestone that was formed by continuous deposits over 80 million years is an extremely valuable global resource. For example, through a close examination of limestone, we can learn not only the shapes and living histories of past creatures, but also the changes in the global environment. Activities aiming for sustainable development were started at the Mine-Akiyoshidai Karst Plateau Geopark beginning in 2011. At first, the activities were led primarily by the government (city office), however beginning a few years ago there was an increase in spontaneous activities led by residents of local communities. For example, a gathering known as the "Geocafé" is held once each month in order to share information and ideas among the residents who are involved in geopark activities. Then, we opened the visitor center "Mine-Akiyoshidai Karst Plateau Geopark Center" in December 2016. We hold the "Geocafé", geoguide meetings, and workshops. The geoguides handle geotours from the visitor center on the weekends. In this way, local residents have started some geopark activities. We believe that the geopark activities lead local residents to have spiritual happiness. We are hoping to create communication and share cultures and techniques with people from other karst and limestone regions around the world so that everyone can have spiritual happiness too.

PROTECTION AND CONSERVATION OF GEOLOGICAL HERITAGE IN THE ASPIRING GEOPARK – GEOLAND OF THE HOLY CROSS MOUNTAINS – FROM TRADITION TO MODERNITY

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Keywords: *geopark, protection, conservation, geosites, geoheritage*

Session: Aspiring Geoparks

The traditions related to the protection and conservation of geological heritage in the Świętokrzyskie region date back more than 50 years. The western part of the Świętokrzyskie Mountains, covered by the boundaries of the Geopark, has a particularly rich history of the protection and preservation of inanimate nature. In this area, in 1952, the first geological reserve in Poland was created - Rock Reserve of Jan Czarnocki memory. The Chęcińsko-Kielecki Landscape Park, which is the core of the Geopark, was established in 1996 as the first landscape park in Poland focused on the protection, preservation and sustainable use of geological and mining heritage. An important tool for the protection and conservation of geological heritage was the establishment in 2003 of a territorial self-government unit - Geopark Kielce, geared for management of geosites - post-mining facilities, in the city of Kielce. Currently, within the Geopark area, various legal protection categories occur that provide preservation of animate and inanimate nature elements, areas and sites. The total legally protected acreage within the Geopark ranges 381.87 km², which yields 72.6% of its area. The most valuable geosites as well as elements of cultural landscape, which comprise an extraordinary combination of abiotic and biotic nature as well as cultural heritage, are protected by various forms of legal conservation. The nature reserve is the most restrictive category of protection of a state rank, which is applied in the Geopark. Within its area 15 nature reserves were established, 12 of them are inanimate nature (geological) reserves and in 3 others important geological elements are also protected. It should be emphasized that the activeness connected with the protection of the geosites within the nature reserves are related to three key aspects: - Legal: the creation of proper recommendations concerning a protection of abiotic and biotic nature in protection plans and protection obligations for these nature reserves; - Practical: protection and conservation of natural valuable sites, as well as the construction of touristic infrastructure in the way providing the reduction of human pressure on the most relevant elements of these reserves; - Educational: the education of local societies in a field of needs and methods of protection of such sites. During the last two years, the communities participating in the Geopark project and partner institutions have performed many such activities, among which the conservation of the geosites and construction of infrastructure have been the most important. The most important examples are investment activities related to the construction of large education and science centers along with an additional tourist infrastructure in the post-mining areas (currently geosites): Wietrznia and Góra Rzepka. Good examples of activities related to the protection and conservation of geosites related to mining heritage are the construction of infrastructure combined with maintenance works at geosites: Karczówka, Dalnia, Grabina, and Miedzianka.

THE SOUTH FYN ARCHIPELAGO ASPIRING GEOPARK - INFRASTRUCTURE AND TARGETED INTERPRETATION

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Keywords: *The South Fyn Archipelago Aspiring Geopark, outdoor tourism, targeted interpretation, infrastructure, sustainable development*

Session: Aspiring Geoparks

The South Fyn Archipelago is an aspiring marine Geopark, with an area of 1.400 km², located in central southern Denmark. Many visitors consider the area one of the most idyllic places in the country due to its beautiful landscapes, an impressive number of castles and manor houses, and - last but not least – an outstanding maritime cultural heritage. The famous author Hans Christian Andersen, who was born on the island of Fyn, often found inspiration for his poems and fairy tales in this particular landscape. With its central location in Denmark and the Western Baltic, the island of Fyn played an important role in the exploration and understanding of the Danish glacial landscape. In 1948, Danish geologist Vilhelm Milthers wrote: "In a peculiar way, Fyn became the pivotal point for the formation of the entire Danish landscape". The main event in the geomorphology of South Fyn Archipelago Aspiring Geopark is primarily the Holocene global sea level rise, which caused the archipelago to form around 9000 BP after the end of Weichsel ice age. The clayey culmination points of the submerged landscape are now the cores of islands - eternally exposed to wind and waves. This, together with the variable sediment budget, produces ever-changing coastal cliffs and islets with littoral meadows, associated beach ridges and reefs, barrier beaches, spits, tombolos, foreland ridges and coves. Divers and snorkelers can still experience the submerged prehistoric landscape with their own eyes. Stumps from flooded forests and submarine remains of human settlements from Stone Age can still be found at shallow depths of just 2- 3 meters. For the last 10 years, the cross-municipal organization Naturturisme I/S has developed The South Fyn Archipelago to become a world-class destination for active outdoor tourism. Among some of the most important results achieved in this process is the 220 km hiking trail "The Archipelago Trail", mountain bike trails, bicycle trails, horseback riding trails, a huge network of campsites with shelters, sea kayak facilities, sailboat harbour facilities and scuba diving facilities including an artificial reef. The planning of the outdoor tourism infrastructure has been carried out with the utmost respect for sustainability, stakeholders and local communities. A process basically in compliance with UNESCO Sustainable Development Goals although the work was carried out before aspiring for a geopark designation. This unique outdoor tourism infrastructure will form the future backbone for visitors of the aspiring geopark. Among other forms of activity, visitors can now choose to hike, bike, dive or sail the The South Fyn Archipelago Aspiring Geopark. A targeted interpretation of the geology will be the next focus area in the development of the geopark. Ways of designing interpretive signs and exhibitions, which build on different motivational patterns, will be approached. Targeted interpretation will be based on a thorough understanding of visitors' motivations, existing knowledge and outdoor preferences e.g. hikers, scuba divers, kayakers or horseback riders. This presentation will show examples of the infrastructure planning and results in combination with ideas for targeted interpretation.

INTERNATIONAL GEOLOGICAL SIGNIFICANCE AND JUSTIFICATION OF THE ASPIRING HANTANGANG GLOBAL GEOPARK (KOREA) TO BE ENDORSED BY UNESCO GLOBAL GEOPARK

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Keywords: *Hantangang, Geopark, Korea, Aspiring geopark, Volcanic landform*
Session: Aspiring Geoparks

The Quaternary Hantangang River volcanic field of the central Korean Peninsula hosts unique and outstanding volcanic landforms associated with fluvial system. The intraplate volcanic field by fissure eruption originated from Mt. Orisan and 680 m-Peak in North Korea, consists of a series of the Late Quaternary basaltic lava flows. The lava flows filled the paleo-river channel, extending more than about 120 km to the terminus in the northern part of South Korea. Afterwards, the lava flows were eroded along the antecedent river system, producing an array of precipitous exposures of columnar-jointed lava along the channel walls and other volcanic landforms. In addition to fantastic columnar joints along the river, special geological features such as pillow lavas and basalt flow layers overlying fluvial sediments are present along the river, implying that the lava flowed along the paleo-channel bed. Fifteen geosites are included in the geopark, and geological elements of several geosites are intimately associated with ecology, history, culture and archaeology. Comparative analysis with other volcanic landforms (WH sites and Global Geoparks) strongly suggests that the volcanic landform of the Hantangang Geopark is truly a unique geological feature in the world and includes invaluable geoheritage values of international significance. The presence of other types of Precambrian to Quaternary rocks (high geodiversity) also provides good chance of geotourism in this area. The location of the geopark is near Demilitarized Zone (DMZ), thus the site has been the area of very limited economic development. Therefore, geological as well as socioeconomic potential of this geopark can strongly justify the qualification of this aspiring geopark as a member of UNESCO Global Geoparks.

ASPIRING TABLE MOUNTAIN GEOPARK, WEST SWEDEN

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Keywords: *Aspiring geopark, West Sweden, Table Mountains, Cultural landscape, Peneplain*
Session: Aspiring Geoparks

Aspiring Table Mountain Geopark is situated in west Sweden, in the region of Västergötland. The area of the proposed geopark covers nine municipalities and approximately 4500 km², and is situated between Sweden's two biggest lakes, Vänern and Vättern. The geopark's main attractions are the classic table mountains, which has been an important area for geological research since 18th century. The cultural landscape surrounding the mountains is one of the most prominent in Sweden, with a history going back to the Megalith culture 5000 B.P. The fertile soil and the mountains led people to build large farms and communities that thrived here, and the area of the table mountain landscape has been the scene for important events in Swedish history with large Viking farms, monasteries, royal battles, and Swedish crusaders. The people of the table mountain landscape have always had an economic and emotional connection to the mountains, and we find a large amount of ancient quarries, millstone mines, stonemasonries and stone buildings in the area. Underlying the table mountains is the sub-Cambrian peneplain, which is well preserved and well visible in the Geopark area. The peneplain is an extremely flat surface modified by deep weathering and erosion during the late Neoproterozoic and uplifted by tectonic processes. The Table Mountains themselves are relicts of Palaeozoic cover of sedimentary bedrocks and stands out as prominent features in the landscape. The mountains are preserved due to their thick sheeted dolerite caps, which were intruded as sills at different levels into the sedimentary succession around 280 Ma. Another internationally outstanding feature of the geopark are the abundance of fossil meteorites found up on table mountain Kinnekulle. The region also contains landforms created during two of the most important events during the late Quaternary of Sweden; the Younger Dryas cold interval and drainage of the Baltic Ice Lake. The multiple features related to the deglaciation history are for example seen in the same landscape of Valle, and in the narrow isthmus Hindens rev, a terminal moraine extending several kilometres out in Lake Vänern. Aspiring Table Mountain Geopark aims to become Sweden's first UNESCO Global Geopark, and send in an application 2019.

THE PROSPECTS OF GEOPARKS CREATION IN AZERBAIJAN

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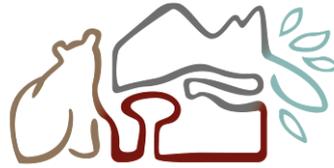
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Keywords: *geopark, geosite, diversity, Nakhchivan, Azerbaijan*

Session: Aspiring Geoparks

The territory of Azerbaijan Republic covers the eastern part of the Caucasian segment of the Alpine-Himalayan folded belt. The area is characterized by the special diversity of the geological forms and landscapes with complex ratio of the structural-formation units differing from each other by the lithological-stratigraphic section, type of deformation and the geologic history. Very often, these relief-expressed forms are in harmony with the diversity of geological landscapes – from the semi-desert to highland-nival ones. In some cases, these forms represent the rare geological objects of the local, regional and even the global significance. In particular, these are the world greatest mud volcanoes, which recently had acquired the status of specially protected area of national level. At the same time other rare geological objects like Naftalan oil with the unique medical properties, springs of thermal mineral waters, the chronostratotypes' sections of the regional level, tectonic forms of the various genesis, geological landscapes of the volcanic and tectonic nature, etc., corresponded to the areas of allocation of the geological heritage objects (geosites) are under the increasing influence of the anthropogenic factor and also require the decisions on their geopreservation. The main approach, applied within the present context to the rare geological objects and currently used in practice worldwide, is concluded in implementation of set of the administrative, scientific, educational and other measures oriented for the objects' preservation and long-term use. Great activity on geosites' inventory had been made under the mentioned strategy in various regions. Over 480 rare geological objects of different classes had been defined: paleontologic-stratigraphic, tectonic, geomorphological, mineralogic-petrographical, hydrologic, hydrogeologic and historic-mining-geological. The geosites of various nature are typical practically for the whole territory. Many rare geological objects had remained at the territories occupied by the Armenian troops, so no information regarding their current state. Analysis of the geosites' spatial distribution by the categories, environment-oriented significance and correspondence to the known objects of the historic-cultural and recreational purpose reflects the significant potential of Azerbaijan in terms of creation of National geoparks having the global reach. At the initial stage, it is proposed to create Ilandag (Julfa) geopark of 1200 km² area within the southeastern part of Nakhchivan region of Azerbaijan Republic. The present territory has the rich landscape and biological diversity, thermal and mineral springs of various balneological properties, complex magmatic and structural shapes expressed in the relief, representative lithological-stratigraphic sections of the great chronological range, and numerous ore manifestations of the various genesis, mountain-historical, historical-cultural and archeological monuments. The priority to create the mentioned geopark is also its transboundary significance: Julfa geopark was established at the border territory of the South Azerbaijan area of Islamic Republic of Iran. This geopark has the similar natural characteristics allowing creating the geopark of the international significance in future. This will assist rapprochement of the local communities and promote the natural diversity of the territory.



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GEOHERITAGE IN UNESCO GLOBAL GEOPARKS ON VOLCANIC AREAS AND THE GGN WORKING GROUP ACTIVITY

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Keywords: GGN Working Group on Volcanic Areas, international significance of geology, World Heritage, outstanding universal value, comparative analysis

Workshop: GEOPARKS ON VOLCANIC AREAS

Volcanoes are for sure the best known and the most spectacular of the Earth's geological features and their scenic landforms and structures are easily recognized by the general public and are often important tourism sites: from the majestic Mt. Fuji (Japan), to the unique Mt. Lengai (Tanzania), from the outstanding Giant's Causeway (UK) to the giant caldera of Yellowstone (USA) and the hydrothermal system of the Taupo Volcanic Field (New Zealand). In addition, the volcanic heritage in such territories includes a diverse range of volcanic landforms, global tectonics and regional settlements. Geographical locations and eruptive activities worldwide besides impact on Man and society may also represent a threat to several territories and communities living on and around volcanoes. Volcanoes are therefore true wonders of the planet and territories whose management constitutes a complex challenging task, in particular in active volcanism environments.

As UNESCO Global Geoparks (UGGs) are areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development, geoparks on volcanic areas offer peculiar conditions to enhance such holistic strategy namely through public awareness and geotourism. Volcanic areas occupy a large proportion among UGGs. They involve not only the Quaternary volcanoes but also the Cenozoic and older volcanic areas with important geological heritage. Also, those volcanic areas cover all aspects of volcanic activity along the plate divergence and convergence, and within the plate.

It is a minimum requirement to list up those UGGs with geosites that help understanding diversities of geological and other natural and cultural values among those UGGs on volcanic areas. This is also important for the general public to find attractive touristic destinations and, thus, is one of the goals of the GGN working group on volcanic areas.

Presently, volcanic sites classified in World Heritage under the natural criteria are very limited, and geoheritage values of volcanic areas as World Heritage nominees are very hard to be listed as new identification with the "Outstanding Universal Values." The nominees showing a similarity to the existing volcanic sites in World Heritage are nearly "automatically" excluded in the "comparative analysis" usually adopted. This may come from the difficulty for general people to distinguish one volcano from others, compared with genetically distinguishable species of fossils, animals and plants. Unfortunately, the simple definition such as monogenetic volcano, stratovolcano, caldera, hydrothermal system, lava plateau, etc., ignoring the volcanological background, global tectonic setting, regional distribution and modern research results, are often used for this comparative analysis.

Geoparks are areas including geoheritage with international geological significance, not concerning only the worldwide uniqueness like World Heritage. Therefore, listing up and categorizing the volcanic heritage in UGGs are a key and major task of the GGN working group on volcanic areas, together with publishing photographic eBooks of UGGs on volcanic areas in the European, Asian-Pacific and Latin-America and Caribbean regions, calling attention of the general public and tour operators to this unique and scenic places. In this workshop, we share some examples of strategies, initiatives and projects put in place on UGGs on Volcanic areas worldwide and the GGN Working Group on Volcanic Areas.

THE ACTIVITY THAT WE CAN DO AS TOYA-USU UGGP FOR NEXT ERUPTION OF MT.USU.

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Workshop: GEOPARKS ON VOLCANIC AREAS

Keywords: *Usu volcano, Volcanic hazard, disaster prevention, conservation of remain, next eruption*

In Toya-Usu UGGp we have an active volcano "Mt.Usu". Mt.Usu has erupted every 20-50 years. Last eruption of Mt.Usu occurred in 2000. At Mt.Usu, the crater is open at different place at each eruption. So Mt.Usu often erupts from the foot of a mountain, and a lava dome or a cleft dome are made. Showa-Shinzan that is famous with Mimatsu-diagram is one of the lava dome where was formed by eruption of Mt.Usu. Around Mt.Usu, we also live in the very near place from the mountain. Thus, many volcano disasters happened in this area. For example, the crater was open near the town in 2000 eruption. And many buildings and roads were broken by the eruption. We believe that Mt.Usu will erupt again in the near future. Therefore the volcano disaster prevention education for the next eruption is very important. One of the ways for the volcano disaster prevention education, we conserve the ruins of a past volcano disaster. In Mount Usu, some artificial structures protect the remains of disaster from the erosion caused by wind and rain. On the other hand, vegetation covers these remains and becomes hard to observe it. So in Toya-Usu Geopark, we have kept remains of the eruption in good condition with a citizen for learning volcano disaster. In this presentation, we report about some volcano disasters that happened at Mt. Usu, and about some activities we do for a disaster that will happen from now on.

HOW TO FACE ACTIVE VOLCANOES: AN EXAMPLE OF THE KIRISHIMA JAPANESE GEOPARK

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Workshop: GEOPARKS ON VOLCANIC AREAS

Keywords: *active volcano, volcanic eruption, geo-hazard, sustainable development, resilience*

Increasing resilience to natural disasters is an essential element for regional sustainable development. In Kirishima located in the southern Kyushu region of Japan where active volcanoes crowd, eruptions or volcanic unrests have continued throughout the last ten years. It just overlaps with when Geopark activities in Kirishima became active. All that time, we have explored how to face the volcano while encountering such volcanic activities; the concrete efforts include interactively sharing volcanic information using social networking service, providing opportunities for learning geo-hazards through simple experiments of eruption using familiar materials, and focusing the spotlight on some geo-stories about relationships between volcano and human. It is noteworthy that activities of citizens themselves are becoming active through these activities.

PERIDOTITE-GEOPARKS TELL OF EARTH'S DYNAMIC MOVEMENTS

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Workshop: GEOPARKS ON VOLCANIC AREAS

Keywords: *Mt. Apoi Geopark, peridotite, Earth's mantle, plate boundary, dynamic movement*

Mt. Apoi and other UNESCO Global Geoparks are promoting 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 the basaltic magma source beneath volcanoes, and also about the global-scale dynamic movement such as mountain formation during plate collisions. Mt. Apoi Geopark was located between two major plates in the northern hemisphere, the Eurasian and the North American plates, during the creation stage of the Hidaka mountain range in the middle Miocene geological age. The geology of the Hidaka mountains is characterized by a stratified mass of high-grade to low-grade metamorphic rocks (granulite, amphibolite, biotite gneiss ~ schist, hornfels) and plutonic igneous rocks of peridotite, gabbro, diorite, tonalite, and granite, representing a successive section of deep-seated lithosphere from the Earth's mantle to the lower ~ middle ~ upper crust. The uplifting event of the peridotites has been explained as a westward thrusting of the North American plate onto the Eurasian plate. The plate boundary can be traced northward through the eastern border of the Siberian shield, near the North Pole, then connected with the Mid-Atlantic ridge in the opposite side of the globe. This is a global-scale mobile belt, giving an easy understanding about the background of the Hidaka mountain range formation and a simultaneous interpretation on a dynamic movement of the Earth. Furthermore, we have another excellent example of global mobile belt of the Earth, which is the Tethys ophiolite belt from the European Alps ~ Greek ~ Cyprus ~ Turkey ~ Iran ~ Oman ~ Pakistan ~ Indus Suture ~ Andaman ~ Great Sunda toward the east, including the continent-continent collisions between Africa and Europe, and India and Asia. Also, in some UNESCO Global Geoparks with older ophiolites, many serpentinized peridotite geosites are nicely organized. On account of a small number of peridotite-geoparks in the world, peridotite-networking may be small in size. However, it is valuable for all peridotite-geoparks to establish a close collaboration to know how to study scientifically, and how to explain educationally about the Earth's interior and the dynamic movement of the Earth.

STONE CULTURE BEHIND THE VOLCANO

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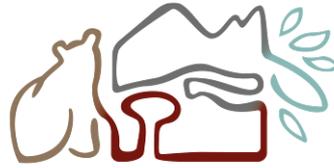
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Workshop: GEOPARKS ON VOLCANIC AREAS

Keywords: *volcanic geopark, volcanic eruption, basalts, stone culture, stone dog*

Leiqiong UNESCO Global Geopark is a typical and one of the most important volcanic geoparks in China. Its boundary stretches 180 km from Zhanjiang City in the north to Haikou City in the south. The geographical territory seems to be interrupted by the 80 km long and 30 km wide Qiongzhou Strait, which is a submerged rift valley in geological term. However culturally it may not be the case, particularly when its famous stone culture is taken into account. Leiqiong's stone culture is a ramification of the diversified and interesting volcanic culture of Leizhou Peninsula, representing the unique character of the region. Its existence is closely associated with the local volcanic geology. Previous volcanic eruptions produced extensive coverage of basalts in the whole area. Indigenous people used it for building houses and bridges, making household appliances such as grain grinder, sugar cane crushers, storage basins and hand tools. More importantly, basalts are used for religious activities such as building temples and altars. Stone dogs are the most common household protection icons against evils and bad luck. This presentation will begin by introducing the interesting stone culture of the Leiqiong UGGp. It will be followed by demonstrating how it is integrated into the daily operation of the geopark and shaped its unique image and attraction. It is concluded by sharing the preservation methods of these valuable cultural treasures of the geopark.



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42/5000 COMMUNICATE THE MESSINIAN SALINITY CRISIS

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Keywords: *Geoeducation, Messinian, Communication, Sicily, Earth interpretation*

Session: Education, public awareness and communication

The Messinian Salinity Crisis represents the most evident event in the geology of the Rocca di Cerere UNESCO Global Geopark. Moreover, the extent of the crisis becomes, if well communicated, an interpretative path of great fascination for the vast public. From the story, which intersects with the myth, to the scientific description, the communication of this event represents the greatest challenge that our Geopark has met so far in his work on Earth education. The poster will present the most valid experiences realized in these years.

ARARIPE UNESCO GLOBAL GEOPARK IN SCHOOLS AND COMMUNITIES

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Keywords: *Araripe UNESCO Global Geopark, Community awareness, School involvement, Geopark concept*

Session: Education, public awareness and communication

The research consisted on analyze the level of awareness and involvement of schools and communities in the Araripe UNESCO Global Geopark (UGG), which is characterized by shared management and has strong natural and cultural attractions, clearly demonstrating the potential of production and integrated economic and social development, based on the activities of the Environmental Education Sector and the projects developed throughout the territory. In this sense, it is of fundamental importance to carry out works focused on the environment, and involve the communities in the various educational segments of the region. The research has a qualitative approach, using questionnaires and interviews as instruments to collect data. The research instruments were applied in the six municipalities that comprise the territory of the Araripe UGG and had the participation of students, teachers, coordinators, headmasters and representatives of Associations, Institutes and Foundations, with a general sample of 601 participants. From the obtained data, we identified that the majority claims to know the Araripe UGG even without properly conceptualizing it, and know some projects developed by the Environmental Education Sector. With this results we conclude that it is important to strong the divulgation efforts about the importance of the Geopark. It is necessary that more actions take place, involving schools and communities so that they can have knowledge and know how to take care of the riches of the region.

CHALLENGES TO THE MEMBERSHIP OF UNESCO GLOBAL GEOPARK – LESSONS FROM QUANG NGAI

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Keywords: *Management plan, Sustainable development, Quang Ngai, challenges, lessons learned*

Session: Aspiring Geoparks

Certain hindrance, as usual, turns up on the way to global geopark, to ensure the nature is preserved, the tourism sector appropriately promoted, the local community better off and the economics sustainably developed. In the context of Quang Ngai, lagged behind the nation's average economic development whilst a global geopark emerges as a new concept unfamiliar with most of the government organizations and the population, challenges facing the development of a global geopark arise as an inevitable matter. The first challenge facing the local government could include, but not limited to, a long-term master management, especially in term of consistent compliance through different levels of authorities. Balance and synergy between investment luring policy and working for the better off of local population aiming at win-win game also appear as a hard puzzle for policy makers of the province. Adopting good approaches in education and awareness raising for sake of behavioral change, for instance, in waste water and solid garbage control, in reasonable exploitation of natural resources or in promoting community-based tourism, is an uneasy task to the province. The presentation will brief few of these challenges and lesson learned, then come up with recommendations for further discussions.

LEARN EDUCATION FROM NET CELEBRITIES

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Keywords: *Education, internet, public, celebrities*

Session: Education, public awareness and communication

There are more and more popularisation accounts on social media networks. Some are quite successful. They attract hundreds of thousands of followers, who are really interested in their content, and check their updates often, which means their influence is true and effective. This is what we expect for our education work. So maybe we can learn something from those net celebrities to improve our education work. Observing those accounts, we can update some part of our education concept. First thing is not the tough science we should deliver, but the common sense and basic knowledge. Fei Zhi, who has got 800 thousand followers for presenting Chinese history, is an illustrator with no history profession background. His content is mostly basic history for middle and high school. It is still attractive and popular, besides his cute illustrations, we can see there is a need. Even though our education and civilisation are getting better, there are still a large number of people lack basic knowledge. I was shocked when two years ago a normal adult pointed at a compass asking me what it was. We can also learn from this example that not only professionals can do education work. As long as man has great interest or passion on something, they can do it. When geoparks seek an education worker, their profession should not be an obstacle. We should involve more people with different backgrounds. Professionals are good, they know the science, but most of them are trapped in their field. It's not easy for them to make things simple and translate their language into daily words. Another thing is that we should find some more interactive, effective ways to educate. Bo Wu, is a natural science magazine published by Chinese National Geography. In 2009 their official Weibo account opened, posting information and pictures like most of geoparks do. But they got comment and reshare in single figures at that time. But since 2016, they changed their style. When people find something they don't understand, or never see before, they will post picture or self-drawing and make an @ of Bo Wu. The magazine will reshare it and answer their question almost about everything in a funny and easily approachable language. Today they have 8.5 million followers, and have a high interaction rate. The attraction is from both Bo Wu and questioner. There are more things we can learn from those net celebrities. We all want to take advantage of the new media era. Most of our geoparks have many different platforms to show themselves. But most effort is ineffective. The majority of viewers or users are our colleagues and partners.

SOIL CHARACTERIZATION STUDY IN THE BEAUJOLAIS VINEYARD

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Keywords: *vineyard, Beaujolais, soils, terroir, cartography*

Session: Education, public awareness and communication

Between 2009 and 2018, a specific study of characterization of soils and “terroirs” of the Beaujolais’ vineyard was conducted by SIGALES; a consulting firm specialized in mapping, soils and “terroirs” studies. On the basis of a huge field work into the whole vineyard, this study delivered valuable results in many fields. The name “Beaujolais” is worldwide known mainly for its wines and vineyard. It extends along the Saône River, about 50 kilometers long and 15 kilometers wide between the south of Burgundy and north of Lyon city (France). Twelve denominations make up the Beaujolais vineyard, including 10 Crus and the Beaujolais and Beaujolais-Villages. The geological diversity of the region plays a major part in the landscape morphologies and in the creation of specific “terroirs”. In order to learn more about the natural characteristics of the vineyard, it has been decided to launch a study to characterize wine-growing soils and “terroirs”. A better geological, pedological and spatial knowledge of the vineyard Based on scientific research and methods, this characterization study makes it possible to obtain new knowledge on the composition of the soils and the geological formations of the Beaujolais’ vineyard. The near-field mapping work is so precise that it has been possible to refine the boundaries of geological terrain in some areas. Also, particular geomorphological formations could be identified. Awareness-raising and pedagogy with the different actors of the wine industry and the public On the basis of the results obtained, it will be possible to recommend an adaptation of cultural practices to the environment in collaboration with local partners (winegrowers and technicians). Advices maps can be produced to help winegrowers to control production costs and respect the environment. Soils maps can also be wonderful educational tools for different audiences. The valorization of the soils and “terroirs” to improve the image of Beaujolais wines Soils maps are not perceived as an outcome but as a working tool available to all professionals in the field. The notion of “terroir” will be able to take full meaning in the communication that will be made around the wine as an economic product, thus participating in restoring a quality image to the Beaujolais’ wines. This can be associated with the territory and its landscapes as part of a promotion of destination oriented towards sustainable tourism and experiential. The Aspiring Geopark Beaujolais has already been able to understand the importance of such a study in its project of knowledge and enhancement of the geo-heritages of its territory. Some valorization projects were created thanks to collaboration with SIGALES, the viticulture and tourism community: creation of an exhibition module on the links between soils and parental geological materials, giant maps for sensitization of public, training courses for students in viticulture, and more to come.

A ROLE OF GEOPARK RESEARCHERS IN A LOCAL COMMUNITY - AS AN EXAMPLE OF MUROTO UGGP, JAPAN-

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Who will be presenting: Hiroko Matsuchi

Keywords: *local community, narrow-area geopark, local guide, relationship-building, geopark researcher*

Session: Education, Public Awareness and Communication

As a researcher (sociologist) of Muroto UNESCO Global Geopark (Muroto UGGp, hereafter), the author has participated in several workshops and training courses held in Asia. Many aspiring Geopark officers were there and we discussed how we could start and manage Geoparks. Most participants were earth scientists and local government officers from aspiring Geoparks. They seemed to have a same problem: how to practice “bottom-up” approach. They sounded no idea how they could communicate locals. In Japan, almost all Geoparks has its own researcher living within the Geopark territory. Most of them are earth scientists. One of the main missions of those researchers is actually not doing a research but to being a vehicle between academic/scientific knowledge and local community.

Because Muroto UGGp covers only narrow area as 248.20km² and has only 13,000 populations, distance of locals and researchers is very close. Locals usually do not know how significant heritages (geological, natural, cultural, and historical) they have in their community. Geopark researchers, therefore, should show how those academically significant heritages connect to local’s daily lives and convince locals to protect and conserve the heritages.

A local guide group is always a key factor when researchers want to involve in a local community. Local guides need academic backgrounds for their guide activities and researchers need locals to collect firsthand information of a community. This presentation will show several specific examples/events how Muroto UGGp researchers have worked to build a concrete relationship with locals.

WORKSHOP IN QESHM ISLAND UGGP: FOSTERING COOPERATION FOR NEW UGGP

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Keywords: *Cooperation, Networking, IGGP, Qeshm, Iran*

Session: Regional and International UNESCO collaborations

Networking and cooperation between UNESCO Global Geoparks (UGGps) is placed at the centre of the International Geoscience and Geoparks Program of UNESCO (IGGP). In fact, networking has been one of the core principles of UGGps since the beginning of the creation of the Geoparks concept. As stated in the Statutes and Guidelines of the IGGP, “networking strongly contributes to the success of the Geoparks movement and plays a valuable role in facilitating the sharing of experience, quality management, formation of joint initiatives and projects and capacity-building”. In this context, UNESCO encourages the strengthening of regional Geopark networks and the Global Geoparks Network (GGN) and with the approval of the IGGP one of the main commitments of the Program is to offer its support and assistance to such networks, promoting capacity-building for UGGp and encouraging exchange of best practice between these territories and among new aspiring one’s. In this framework, it was organized between 28th- 30th of April 2018, an International Meeting and Workshop in Qeshm Island UGGp, Iran, with a view to promote capacity-building on UGGPs and promoting the creation of new aspiring UGGp in the Middle East region but also in Central Asia. This initiative gathered different partners and it was organized by the IGGP Secretariat (UNESCO) along with the Qeshm Island UGGp, with the support of the UNESCO Tehran Cluster Office and with the support of the Geological Survey & Mineral Explorations of Iran and Qeshm Free Zone. Taking into account the Sustainable Development Goals (SDGs), Goal 17 “Partnerships for the Goals” was the thread of the meeting, which gathered several representatives of UNESCO National Commissions for UNESCO, experts and representatives from the IGGP Secretariat, members of the Council of the IGGP, representatives of the Global Geoparks Network (GGN) and coordinators of National Fora of UGGp from different countries, gathering a total of 270 participants and 20 representatives from 17 countries). The meeting focused themes such as the procedures and criteria to become an UGGp, the activities led by GGN and the National Fora for UGGp, the SDGs, Geotourism, Geoparks Heritage, Geohazards, UGGp validation and revalidation procedures of UGGp. A panel was also dedicated to the presentation of aspiring UGGp in Iran (Aras & Tabas). The meeting ended with a very fruitful and positive open discussion, regarding the creation of new aspiring UGGp, exchange of ideas, experiences and best practices. Finally, it was also possible to visit some of the most emblematic geosites of Qeshm Island UGGp, natural and cultural heritage and contacting with some local communities.

DANUBE GEOTOUR AS PART OF THE EUROPEAN YEAR OF CULTURAL HERITAGE

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Keywords: *Culture, Heritage, DanubeGeoTour, Europe, Label*
Session: Regional and International UNESCO collaborations

The Interreg Danube GeoTour Project has been selected to be labelled as relevant project on culture and/or creative industries for EU Year for Cultural Heritage 2018 (EYCH 2018). The project has been labelled because it contributes to achieve one or more of the objectives of the European Year for Cultural Heritage. The 8 participating Geoparks of the Interreg Danube GeoTour project are rich in geo-heritage and represent unique areas in the Danube region. Their sustainable tourism development however lags behind quality standards of top European Geoparks. This project faces a challenge recognized by all partners: the sustainable use of the exceptional wealth of Geopark natural resources and heritage through sustainable tourism development that avoids the negative environmental impacts. The main project result will be joint Danube GeoTour designed to strengthen cooperation between the regions' Geoparks and act as an innovative tourism product to accelerate visibility and tourist visits in the geoparks. Common strategy for sustainable management of tourism pressures will form the basis for creating innovative geoproducts. Sharing experiences, testing pilot geotourism products and new interpretative approaches should increase local inhabitants' engagement, Geopark management capacities and lower the quality gap between Danube and other European Geoparks. This funded project of the EU Interreg Danube Transnational Programme is contributing to the general objectives (as well as the specific objectives) of this special European Year: • Cultural heritage as a pivotal component of cultural diversity and inter-cultural dialogue • Cultural heritage's contribution to the economy • Cultural heritage as an element of the relations between the EU and third countries The is giving awareness of the cultural heritage in each partners Geopark and is showing the cultural activities at the partners area due to the labelling of the project. Furthermore, the author is highlighting the benefits, the connections between cultural heritage and Geology as well as the fact that Geoparks are deeply involved in local culture and traditions. In conclusion, the Communication manager of the Danube GeoTour gives an overview about the European Year of Cultural Heritage in UNESCO Global Geoparks.

HOW TO PRESERVE GEOHERITAGE IN A QUARRY SITE? THE EXAMPLE OF THE MONTE NETTO HILL (NORTHERN ITALY)

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Keywords: *Loess/paleosoils sequence, Palaeogeographical and paleoenvironmental and paleoseismic value, Quarrying activities, Monte Netto Hill, Po Plain, Dispersed Geopark*

Session: Conservation, science and research

Human pressure on natural environments, and especially the exploitation of natural resources, threatens the preservation of geoheritage. In the Po Plain (Northern Italy) human settlements took advantages, since a long time, from a landscape partly shaped by active tectonics. Due to its specific location near the Alps piedmont and along the sediment conveyor belt from the Alpine region, during Late Quaternary, tectonic uplift rates exceeded the erosional/depositional rates, occasionally shaping landforms disconnected from the hydrographic system, which became excellent sedimentary traps for wind sediments. This evolution generated specific pedosequences developed on Pleistocene loess deposits, which preserve (i) excellent records of Pleistocene glacial/interglacial paleoenvironments, (ii) optimal conditions for human settlement since the Middle Paleolithic, (iii) aggradation of fine-grained materials suitable for peculiar agricultural use (e.g., high-quality vineyards), and quarry exploitation (e.g., brick industry, waste disposal sites). For these reasons, widespread excavations characterized these sites since the end of the XIX century. From a scientific point of view, the Monte Netto Hill is the most significant of these isolated hills in the middle of the Po River basin, located at the top of a Late Quaternary anticline. The site was (i) uplifted and slightly folded by the compressive tectonic regime characterizing the Alpine foredeep and (ii) is presently sticking out from the surrounding piedmont surface due to the cumulative coseismic growth of compressive structures over the mid-Pleistocene to Holocene. In one of the quarry, investigated for over more than 10 years, the stratigraphic section includes a complex loess-paleosol sequence lying upon weathered fluvial and fluvio-glacial deposits and dates back to Mid-Upper Pleistocene to Holocene. The Monte Netto site is, hence, characterized by a high scientific value (i.e., paleo-geographical/environmental/seismic meaning, rarity, integrity, geohistorical importance) and cultural value (i.e., archeological), qualifying it as a potential geosite. As common in quarrying sites, the Monte Netto potential geoheritage was threatened by human activities, but thanks to an agreement between the owners of the quarry (Fornaci Laterizi Danesi S.p.A.), the municipality of Capriano del Colle and the Superintendence for the Archaeological Heritage of Regione Lombardia, the main exposure has been protected. Currently, the extant main threat is the natural erosion of the deposit and adequate measures are needed to prevent it. The site is located inside a Regional Agricultural Park and it is approachable along cycle paths. In order to ensure an adequate valorisation and the suitable protection measures towards both natural and human threats, to this site and to similar sites in the Po Plain region, a proposal of a thematic Geopark linking all the loess sequences of the region may be hypothesized. Alternatively, the balance between human exploitation of natural resources, natural processes affecting the site and their conservation and, as a consequence, the required protection measures should be perceived, also in sites located out of Geoparks areas. These "satellite sites", a sort of "Dispersed Geopark, in fact, provide further scientific knowledge about the geological evolution at regional scale linked with Geoparks areas.

GEOLOGY AND LANDSCAPES OF THE KHORAT GEOPARK, THAILAND

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Keywords: *Khorat Geopark, Thailand, cuesta, fossil faunas and floras*

Session: Conservation, science and research

The Khorat Geopark, an area as a part of Nakhon Ratchasima Province in northeastern Thailand. It comprises five administrative districts including Mueang Nakhon Ratchasima, Chaloe Phra Kiat, Kham Thale So, Sung Noen, and Sikhio with a total area about 3,167 square kilometres. The southwestern boundary is marked by a double cuesta mountain ranges paralleled together with the escarpments facing to the southwest and the dip slopes facing to the northeast as a part of long cuesta mountain chains circling the Khorat Basin with a total length about 1,313 kilometres. These cuesta mountains are cut by the Lam Takhong River regarding as an antecedent stream flowing in this area prior to the mountains have been built. This cuesta area is where people have inhabited since prehistoric period left by pictographs in a sandstone cave and abandon sandstone quarries made by ancient humans for building the Dvaravati Sema and Khmer Angkor Raj empires. Undulating terrains and flat plains in the most northeastern part characterize the northeastern terrain of the geopark area. It is mostly composed of Cenozoic unconsolidated sediments underlain by Khok Kruat sandstone formation and rock salt-bearing Maha Sarakham sandstone formation. The conglomeratic sandstone of the Khok Kruat Formation abundantly yielded fragmentary dinosaur bones together with other contemporaneous organisms including Ratchasimasaurus suranareae, Siamodon nimngami, Sirindhorna khoratensis, Khoratosuchus jintasakuli, Thaiodus rucha, Kizylkumemys khoratensis, and Shachemys sp. with abundant carnosaur teeth with some pieces of petrified woods. Along the Mun riverbanks and its tributaries, many sandpits in Chaloe Phra Kiat and Khok Sung yielded abundant and diversified species of fossil faunas and floras. The faunas include Khoratpithecus pirirai, Merycopotamus thachangensis, Aceratherium porpani, Rhinoceros unicornis, Macaca sp., Sus barbatus, Axis axis, ?Megalochelys sp., Chitra sp., Crocodylus sp., Gavialis sp., Crocuta crocuta, Batagur sp., Heosemys cf. grandis, Heosemys annadalii, Malayemys sp., Amyda sp., Ziziphus khoksungensis, Dipterocarpus costatus, Melia azedarach, Dracontomelon dao, Cyperus sp., and Bolboschoenus. In particular, the proboscidean remains are reported at least ten genera comprising Prodeinotherium, Deinotherium, Gomphotherium, Tetralophodon, Sinomastodon, Protanancus, Stegolophodon, Stegodon, Zygolophodon, and Elephas. This is an exceptional diversity compared to those living proboscideans found today are only two species of Loxodonta in Africa and one species of Elephas in Asia. Moreover, a Quaternary petrified wood site in Ban Krok Duean Ha is widely renowned comprising Mangiferoxylon spp., Canarium sp., Terminaria spp., Combretum spp., Irvingia sp., Cynometroxylon holdeni, Cynometroxylon spp., cf. Millettia spp., Careya spp., and Azadirachta sp. leading to the Petrified Wood Museum construction and later being the Khorat Fossil Museum, a main geopark museum.

*DAEDALUS: SYMBOL OF THE BRIDGE OVER THE ARMORICAN QUARTZITE
UNITING VILLUERCAS-IBORES-JARA (SPAIN) AND NATURTEJO (PORTUGAL)
UNESCO GLOBAL GEOPARKS*

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Keywords: *Trace fossil, Armorican Quartzite, Ordovician, Paleoichnology, Geotourism*

Session: Conservation, science, research

Daedalus is a highly characteristic Lower Palaeozoic trace fossil, particularly well developed in Ordovician shallow water sandstone deposits of the Armorican Quartzite facies in the Iberian Peninsula, France and northern Africa. This complex burrow consists of a vertically oriented tube that was progressively displaced in a helicoidal fashion within the sediment to form a complex conical or spindle-shaped body, reaching sizes of several decimeters. Daedalus occurs in high densities often completely dominating the structure of beds. The more common ichnospecies of Daedalus in the Iberian Peninsula are differentiated on the size and shape of the generating tube. In *Daedalus desglandi* the menisci-filled tube is J-shaped and relatively wide and form bodies with an irregular surface. In *Daedalus halli* the tube is narrow and straight, showing no evidences of active filling, and its displacement forms smooth carpet-like walls. The producers of Daedalus are unknown but probable were “worm-shaped” animals that opportunistically exploited recently deposited storm beds in search for nutrients. Daedalus is well represented with the Naturtejo UNESCO Global Geopark in central Portugal and the Villuercas-Ibores-Jara UNESCO Global Geopark, central Spain. In the Naturtejo Geopark beds extensively bioturbated with *Daedalus desglandi* can be followed for several kilometres in the Muradal Mountain through the Portuguese section of the famous International Appalachian Trail. In the Villuercas-Ibores-Jara Geopark Daedalus can be examined in Interpretation Centres and in several Geosites. Among these the “Risco Carbonero” Geosite offers the possibility to examine *Daedalus desglandi* in loose blocks and outcrop in a setting with a spectacular view of an “Appalachian” landscape of tightly folded elevated synclines. The “Cerro de las Amoladeras” Geosite offers particularly good lateral views of dense aggregates of *Daedalus labechei*. The Naturtejo and Villuercas-Ibores-Jara geoparks offer fantastic opportunities to study or observe a spectacular trace fossil formed in unique conditions some 470 million years before the present. Several outcrops offer the possibility to literally walk upon an Ordovician sea-floor. Within the context of the evolution of Earth’s Biosphere these are some of the earliest examples where the activity of animals thoroughly reworked the sea-floor. Under the framework of a paleoichnological research project for the elucidation of the evolutionary paleobiology represented in the Daedalus behaviour a new INTERREG project was forged between these Iberian territories. “The Bridge over the Armorican Quartzite” is a cross-border, over 800 km-long Tourist Route, signalling the existing tourism offer related to the Appalachian-like quartzite landforms and thus strengthening Geotourism as an innovative and differentiating product for the whole region.

IDENTIFICATION OF GEODIVERSITY AND GEOHERITAGE IN SOUTHERN LOMBOK IN ORDER TO EXPAND THE GEOPARK'S AREA TO THE WHOLE ISLAND OF LOMBOK

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Keywords: *rinjani-lombok geopark, southern lombok, Lombok, geoheritage, geotrail*

Session: Conservation, science, research

Rinjani-Lombok UNESCO Global Geopark in Indonesia is a new member of UGGps endorsed in 2018 after followed-up the 10 recommendations given in 2017. One of the recommendation was about to enlarge the geopark's area to the whole island of Lombok. So, since the end of 2017 until the beginning of 2018, Management Board had mapped the geodiversity and geoheritage, natural heritage and cultural heritage in the southern Lombok. The delineation of the identified area is in the National Tourism Strategic Area and adapted to the provincial strategic area of tourism in the spatial planning of West Nusa Tenggara Province. The method used was primary data collection, ie. geological data (geological heritage) and secondary data especially for natural and cultural heritage. Furthermore, the results of this identification were analyzed using Analytic Hierarchy Process (AHP) and SWOT methods by incorporating other variables such as accessibility, management by local community and the integration with natural and cultural heritage. The southern part of Lombok actually has a geological heritage that is no less valuable than the northern part (the current geopark area). After the identification there are several sites that can be defined as geoheritage, geological reserve and many places that have opportunity to serve for geotourism. The analysis results showed which sites can be developed first as geopark sites and for geotourism (toward geopark site) in the medium term. The Analysis also produced three geotrails in Southern Lombok namely, the trace of mineralization on ancient volcano of Lombok Island, the Trail of Oligo-Miocene volcano and the trace of Tectonic uplift of Lombok Island. In addition, the analysis of geoheritage potential also generated some recommendations based on the strengths and weaknesses of each geotrail in order to be followed up by the provincial government and district government in Lombok Island to prepare the southern part as a geopark area.

HISTORICAL ROUTES IN THE VILLUERCAS-IBORES-JARA UGG: EXPLORATION THROUGH GIS

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Keywords: *Historical routes, geosites, Villuercas-Ibores-Jara, GIS, geotourism*

Session: Conservation, science, research

The different routes and byways that cross the Villuercas-Ibores-Jara UNESCO Global Geopark are the best way to get to know this important natural space that promotes geotourism as a commitment to the conservation and regional development, where the geology of the territory and other heritage features are combined. This study is integrated in the line of work developed in the Geopark using GIS tools. It aims to contribute to a better knowledge of these routes by generating information of interest that complements its attractiveness. Information regarding accessibility and difficulty is provided through GIS tools, as well as identification of points of the route in which the geosites can be integrated as elements to contribute to a great tourist offer, based on visibility analysis. The new information generated is open to the introduction, expansion and modification of data allowing a better adaptation in the management of the Geopark routes.

TYPES OF GEOHERITAGE IN TAM GIANG - BACH MA AREA, THUA THIEN HUE PROVINCE, VIETNAM

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Keywords: TAM GIANG - BACH MA, Hue, Geoheritage, Paleontology, Pleistocene

Session: Conservation, science, research

With an area of about 1,600km², Tam Giang - Bach Ma area, Thua Thien Hue province has a variety of terrain and geomorphology, with many unique landmarks. Based on the point of view of geo-heritage, there are 9 types of geo-heritage in Tam Giang - Bach Ma area as bellow: - Type A (Paleontology): Fossilized pollen spore, algae, micro - paleontology complexes in Quaternary sediments. - Type B (Geomorphology): Topography of sandbanks, sand dikes, lagoons, rivers, generations of sea terrace, abrasive surfaces and waterfalls. - Type C (Ancient environment): Marine environment, continental environment and transitional environment are present in the study area that showing the history of geological development of the area. - Type D (Rock): Intrusive rocks with felsic and mafic components; terrigenous sediments and unconsolidated sedimentary formations of Quaternary age. - Type E (Stratigraphy): stratigraphic units from Paleozoic to Quaternary. - Type F (Minerals, Mineral resources): Glass sand, titanium mineral sand, clay for brick and tile, ..., ... - Type H (geological economics): geological tourism, titanium mining pits in Quang Dien, gabbro mining pits in Loc Dien, ... - Type I (tectonics, geologic evolution history): Typical sand dike - lagoon symbiotic structures. The geologic development history recorded in the mountains is the Indosini orogenic cycle, while in the plain is the subsidence motion in Neogene-Quaternary. The elevation and subsidence of the neo-tectonics had greatly influenced on characteristics of the terrain, geomorphology and hydrological network of the region. - Type L (Characteristics of Quaternary geology - marine geology and continental-oceanic heritages): Quaternary sedimentary formations with 5 stages of development; sea terraces, river terraces; The generations of sea sand were created in the Quaternary. Among the geological heritages in the region, the first step may identify prominent heritage values, distinct from different areas in Vietnam are symbiotic structure system of sand dikes- lagoons with the differentiation of characteristics of geomorphology and Quaternary sediments according to linear form parallel to the coastline was determined by the differentiation of neotectonics motion and sea level change (marine transgression/marine depression) in the Quaternary. In the study area, the markings of sea level changes (marine transgression/marine depression) from Late Pleistocene to Late Holocene were clearly recorded through generations of sea-sand. Here, four generations of sea - sand are distributed from the plain edge to the sea, including: dark yellow sand with late Pleistocene (Q13) distributed along the plain edge; white sand, white-gray sand with early-middle Holocene (Q21-2) distributed in the central plain; Yellow - gray sand with Middle - Late Holocene (Q22-3) distributed in the sand-dike of coastal zone and gray sand with Late Holocene sand (Q23) distributed in intertidal areas. Each generation of sea-sand is created correspondingly to a period of change of sea level from Late Pleistocene to late Holocene

EUROPEAN GEOPARKS ON ISLANDS

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Keywords: *Geodiversity, Geotourism destinations, Geoparks on islands, UNESCO and European Geoparks Network*

Session: Geoparks, sustainable tourism and sustainable local development

The significant growth in geotourism across European islands has created a strong demand for more creative, systematic approaches to assessing the potential of natural and rural areas. That identified suitable sites of geological and geographical interest which provides comprehensive frameworks for management. Geodiversity potential of islands affects increasing geotourism destinations. In the opposite situation, numerous of destinations and accession of interests about islands geotourism, resulted in geoparks creation. Geoparks as an innovation for the protection of natural and geological heritage play an important role in the development of geotourism and knowledge exchange. For that purpose it is relevant to apply the network concept of geotourism activities. This paper is aimed at reviewing activities of geoparks on islands, based on their geodiversity. The activities related to the natural objects occurring in geoparks, presents the sustainable development, which refer to UNESCO and Global Geoparks goals.

DEVELOPMENT OF GEOTOURISM BY LOCAL PARTNERS IN THE LUBERON UNESCO GLOBAL GEOPARK, FRANCE

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Keywords: *geotourism, ochre, slow tourism, cooperation, touristic season extension*

The Luberon Regional Nature Park, UNESCO Global Geopark covers several touristic areas around the Luberon range with many cultural and geological sites. The funding programme “*Espace Valléen*”, financed by the Region Provence-Alpes-Côte-d’Azur, the State and European Regional Development Fund, propose to enhance naturel and cultural heritages. The strategy were driven in cooperation between the Geopark, tourist offices and economic professionals. One of the principal thematic axes is about geotourism. Two local partners proposed projects to develop geotourism in link with tourist offices. Their common aims are enhancement of cultural heritage linked to geology, networking with the territory's stakeholders, touristic season extension.

1. The first project “*Opération Grand Site – Le Massif des Ogres*” is managed by the *Pays d’Apt-Luberon* Community of municipalities. This area very famous for its red, orange and yellow cliffs, an outstanding natural heritage and a rich cultural heritage is visited by 600 000 people per year. French, European and some Asian tourists spend about 2 000 000 overnight stays in this attractive area. The aims of the project are: showing the heritage linked to the ochre outcrop, informing and people about geology and culture, preserving biodiversity and natural areas, managing transports and increase economic benefits. Some actions are achieved and many others are in progress: new tourist office interior design, management of the *Provence Colorado*, landscaping of an ochre site... This project has been awarded as a European Destination of Excellence on the Cultural tourism thematic in 2017.

2. The second project “*Geotourism in Luberon Côté Sud*” is managed by the Tourist Office of South Luberon. The general purpose of this project is to promote slow tourism in the Luberon UNESCO Global Geopark and to bring a complementary tourist offer to « Le Massif des Ogres ».

The tourist office makes the link between geological experts, tourist professionals, inhabitants and visitors. At this time, two operations are in progress: the development of a touristic georoute and a stay around geology and cultural heritage (géosites, villages, monuments, wine...).

Values of this project are to discover, to experiment, to contemplate and understand about a landscape and a territory.

As a funding programme coordinated by the Parc naturel régional du Luberon, UNESCO Global Geoparks, “*Espace Valléen*” participated to the enhancement of geotourism and also to the involvement of local partners in a common synergy for the Earth heritage awareness.

AN APPROACH TO DEVELOP TOURISM ROUTES IN SATUN GEOPARK BASED ON COMMUNITY PARTICIPATION

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Keywords: *tourism pattern, geo-natural resources, Tourism routes in Satun Geopark, establish community enterprise groups, sustainable tourism management*

Session: Geoparks, sustainable tourism and local sustainable development

The aim of this study is to investigate and to specify tourism pattern of Satun Geopark based on community participation. Qualitative approaches were employed and data was collected from related documents, field trips, and both participant and non-participant observations. The in depth- information was derived from the participants who consist of 20 community enterprise groups and the samples from the workshop. All of them were purposive samplings. The research instrument was semi-structured interview. The area of Satun geopark covers Manang district, Tungwa district, La-Ngu district, and Muang district (Tarutao and Petra national marine parks). The results from the study revealed that there are numbers of geo-natural resources in Satun geopark such as Stegodon cave, PhuPhaPetch caves, Jet Khod cave, Wangsaithong rafting stream, Tarutao island, Leepoh island, and Adang island. However, the tourism management in these areas has been for the sake of recreation and entertainment rather than for the sake of geo-tourism which aims to give the information about history and value of the sites. At present, Stegodon cave is one of the tourist attractions where homestay, kayak tour through the caves, and mangrove forest tour by long tailed boat are provided. The second one is PhuPhaPetch cave tour where trained tour guides are provided. They have some knowledge about the cave and can guide the tourists. The third place is Petra national marine park where the tour to time-bounded crossing bridge; a fault plane which Cambrian red sandstone is overlain by Ordovician limestone on the cliff of To Ngai mountain is arranged. At the site, there are signboards giving geological information but there aren't any tour guides to serve the tourists. Regarding to other tourism activities such as rafting, waterfalls, and island tours, the focus of these tours are not on giving geological information to the tourists. Therefore, the tourism pattern of Satun geopark based on community participation should be geo-tourism. It is the most appropriate pattern and the routes compose of 1) the route to investigate the geographical features of the area, 2) the route to investigate the fossils in Cambrian period, 3) the route to investigate the fossils in Ordovician period, 4) the route to study about the mangrove ecosystem, 5) the route to study about tropical rainforest ecosystem, 6) the route to study about lifestyle and culture (Sino-Portuguese architecture) and 7) the route to study the lifestyle of the minorities (Mani). An important approach to develop Tourism routes in Satun Geopark is giving an opportunity to the community to participate in determining tourism routes in every single step by promoting the cooperation between communities and government organizations. The tourism pattern should relate to geological, ecological, historical and cultural activities. The community in each tourism route should establish community enterprise groups in order to manage and to serve the tourists under the concept of geo-tourism which consists of geomorphology, environment, and culture. These factors will lead to sustainable tourism management.

ITER HOMINIS – THE HUMANKIND ROUTE OF AROUCA GEOPARK

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Keywords: *ITER HOMINIS, ARCHAEOLOGY, Arouca UNESCO GLOBAL GEOPARK, Thematic Cultural Route, Time and Space of Humankind*

Session: Geoparks, sustainable tourism and local sustainable development

Humankind have done a long journey since the beginning of its species. That's an history of world humanity survival, adaptation and creation, that started to be written a lot of million years ago. There are still a lot of questions to answer, that the science cannot reply, but it's able to help people to understand many possibilities of who we are, where did we come from and where do we want to go. ITER HOMINIS presents a cultural project that we are implementing at Arouca Geopark, pretending to be a simple and modern way to understand and promote our ancestors heritage, between pre-history and actuality, promoting archaeological and scientific tourism of Arouca Geopark, always connected with the geological values. The project has on its base thirty places of archaeological interest, that will work together and in network, comprising megalithic monuments, fortified settlements, castles, monasteries, rock art, typical villages, roman golden explorations, II world war mines and others. That geotouristic product will lead us into the discovery of our history, assembled together, piece by piece, place by place, forming and allowing us to know the Route of Humanbeing of Arouca Geopark.

*THE CONNECTION BETWEEN EARTH SCIENCES AND SOCIETY BY GEOPARKS
-UNDERSTANDING OF GEOLOGICAL IMPORTANCE OF REGIONAL
RESOURCES BY LOCAL RESIDENTS IN CASE OF SAN'IN KAIGAN UNESCO
GLOBAL GEOPARK*

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Keywords: *Geopark, Sustainable local community, Understanding of geological importance by local Residents, San'in Kaigan UNESCO Global Geopark, Earth science*

Session: Geoparks, sustainable tourism and local sustainable development

Regional self-support is very important things in local community. And one of the important roles of geopark activities is resident understanding of the regional resources and features. For this purpose, it is important that local residents participate in geopark activities positively. However, in Japan, where local development has been undertaken by governmental organizations, it is difficult for local residents to take part in geopark activities. So, we planned to research the geological feature with local residents and making “Geopark tour maps” in cooperation with local people, to promote better understanding and communication with local people, government and academia involved in geopark activities. Local residents could understand geological features through this activity. And now, we started disaster self-prevention activity by local residents to guard their life.

BKK REGION GEOPARK - GEODIVERSITY, CULTURAL HERITAGE, HERITAGE PROTECTION SEARCHING, PRESERVING AND PRESENTING GEOLOGICAL VALUES IN 2800 SQ KM

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Keywords: *Karst, Volcanism, Bükk Mt, Aspiring geoparks*

Session: Aspiring Geopark

The 2800 km² area of the Bükk-Region Geopark, which is linked to the organizational system of Bükk National Park Directorate, includes the Bükk National Park in Bükk-Region and the Lázberc Landscape Protection Area and part of Tarna-Landscape Protection Area and six nature conservation areas. (The geopark covers the administrative area of 109 settlements.)

From the geological point of view the most interesting parts of the geopark are the Bükk Mts and the connecting Upponyi Mts which are characterised by fold-and-thrust structures. These mountains were mainly formed during Cretaceous tectogenesis, from Ordovician to the Jurassic. The dominant rock types are Triassic limestones, but there are special formations, such as Jurassic pillow lavas. These are the witnesses of deep sea volcanism. The hilly areas around Bükk is rich in Tertiary and Quaternary sedimentary rocks, as well as Miocene volcanites.

The largest volcanic eruptions occurred in the last 20 million years on the European continent in the area of Bükkalja. More than 4,000 km³ of volcanic debris spread and compacted into rocks in the Pannonian Carpathian Basin. These rocks called pyroclastite. The products of explosive volcanic eruptions accompanying the formation of the Pannon Carpathian Basin can be studied in full and wide variety on the surface of the Bükk Mountains.

The geopark's morphologic and hydrologic character is characterized by karstic forms, karst hydrodynamic systems formed in carbonate rocks and the subsurface thermal karst. Karstic forms are for example: limestone pavements, dolinas, sink holes and caves.

Archeological, historical and ethnographic heritage are associated to the rocks in the Bükk Mtns., Besides of archaeological finds in prehistoric caves, mining and industry history memories, and the prehistoric stone culture, there are a lot more interesting things can be found.

Geotouristic presentation activities are complemented by geosciences-themed educational trails and popular geoscience guidings, hikes and competitions launched by BNPD and its associated partners. Among the collaborations with the higher education institutions of the region and with the local communities, the cooperation with the (Hive Stone)Kaptárkő Association is by far the best. Their cooperation was set up for one and a half decades ago which is great example of co-operation in the area of geology, nature conservation, geo-tourism, landscape planning and care and regional development activities.

Among the demonstration sites in the geopark, many educational trails, tourist caves and exhibition halls were organized around the geological values. Such as the Szarvaskő geological educational trail, the Szomolyai horseshoe nature conservation area, the Szent István cave, the Anna cave, the „Karst and wildlife” exhibition at the Western Gate Visitor Center, the Herman Ottó Museum mineral park in Miskolc, and the Pannon Sea Museum etc. .

Due to tenders, won by the Bükk National Park Directorate, significant geostructural nature conservation interventions took place in the geopark area. Among them, we can highlight the complex renewal of caves, geologic segment sites, beehive rocks, protected areas, open air demonstration sites and study trails.

INTRODUCING THE POTENTIALS OF TABAS ASPIRING GEOPARK

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Keywords: *Tabas, Geopark, Nayband, Kal Jenni.*

Session: Aspiring Geoparks

The vast and civilized land of Iran is full of potentials and landscape geotourism. One of them is Tabas city (East of Central Iran). Tabas, the legendary desert city is unique in terms of historical - cultural, natural and especially geological characteristics. Tabas is known to be one of the most important apt areas of tourism development, especially geotourism in Iran and it has provided very valuable attraction of various phenomena for studies and tourism activities.

Tabas is known by many geological scientists as the geological paradise of Iran and we can see the history of 400 million years from the beginning of Earth history (without the slightest time lag). One of the most characteristic features of Tabas, as the geological paradise of Iran, is Paleozoic sequences, which is unique in Iran and the Middle East. Only from the Tabas area, which is located in the east of central Iran, more than 20 type sections from the Paleozoic and Mesozoic formations have been introduced to the geological society of Iran and the world. In addition to the very high position of Tabas in geology of Iran, the many attractions and phenomena that geotourists and other tourists are looking for are in this county. Valleys (Kal-e-Jenni and Kal-e-Sardar), sand dunes and deserts, hot springs, high mountains, old mines, ancient buildings, structural-geomorphological and Sedimentary attractions, etc. All of them have created a unique geotourism territory in Iran and even in the Middle East.

In addition to natural and geotourism attractions, very valuable mineral deposits (more than 45 types), Tabas has turned into a collection of minerals. These deposits include types of coal, fluorine, iron ore, barite, potash, various types of building stones, celestine, lead and zinc, bauxite, silica, bentonite and tens of other minerals. It should be noted that coal is the most important and valuable mineral in this county. So that, 76% of Iran's coal reserves is located in Tabas and this city is considered as the capital of Iran's coal.

Despite the various geotourism potentials, there are a lot of historical - cultural and ecotourism attractions in this region of Iran. Golshan historical Garden (a prominent example of Iranian gardens), Holy shrine, Caravansaries, the ancient citadel, Shah Abbasi ancient arch and Korit arch dam (As the oldest, tallest and thinnest arc dam in the world) are part of the most important cultural and historical monuments of this region of Iran.

Also, Tabas, with villages and tourist zones, such as: Kharv, Korit, Esfahk, Nayband, Peykouh, Pirhajat, Esfandiar and Tens of other villages along with Ecotourisms residences and traditional customs, diverse handicrafts, the rare and unique species of plants and animals (like the Naybandan or Nayband Wildlife Refuge as the largest wildlife Refuge in Iran and the Asian cheetah habitat) have made it an eternal heritage in Iran.

With such potentials, Tabas can be considered one of the most powerful Geoparks in Iran and the world with various geological attractions, along with cultural - historical and natural various attractions.

INTERNATIONAL GEOLOGICAL SIGNIFICANCE OF THE MALTESE LANDSCAPES – AN OPPORTUNITY FOR A GEOPARK?

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Keywords: *Geopark, Geology, Geomorphology, Malta, Mediterranean Sea*
Session: Aspiring Geoparks

The Maltese Islands, which lie at the centre of the Mediterranean Sea, encompass a large number of sites of geoscientific interest and display considerable geodiversity. This applies in particular to northern Malta and the islands of Gozo and Comino. These areas boast some of the most impressive sceneries of the Maltese archipelago, exhibiting a large variety of geological landscapes as well as unique ecological systems and valuable archaeological and historical heritage. Some of these sites have also been famously regarded as having the world's oldest standing monuments in stone, dating back to the Neolithic period. The geological and geomorphological features, including submarine ones, are highly significant for both their contribution to the understanding of the geological processes acting through time on landscapes as well as their aesthetic importance. The landscape shows strong rock control due to the juxtaposition of contrasting lithologies of the Oligocene-Miocene succession of marine sedimentary rocks which compose the islands. The landscape comprises a large set of landforms shaped through time by several processes: (i) karst dissolution, forming solution subsidence structures; (ii) fluvial processes, marked by the presence of perennial freshwater pools, seepage from cliffs, waterfalls, terraces and several dry valley systems (widien); (iii) marine erosion processes, as evidenced by the large variety of features including sea-caves, tunnels, arches, stacks, beaches and reefs; (iv) mass movements, marked by the presence of several interesting examples of lateral spreading, block slides and rock fall favoured by the juxtaposition of the Upper Coralline Limestones which overlie the Blue Clays. These types of processes have been fundamental in shaping and conditioning spectacular landscapes and landforms which are often tightly linked to the historical and cultural assets. Lately, considerable geological work, especially in the north of the archipelago, has been undertaken by scientists showing the international geological significance of Maltese landscapes. This induced the Maltese government, in particular the Ministry of Environment, to commit itself to apply for possible inclusion of northern Malta, Comino and Gozo in the UNESCO Global Geoparks Network and to submit the relevant application in the near future. In fact, the area's wide variety and density of meaningful geological and geomorphological features, characterised by easy accessibility and great readability to non-specialists, make it an excellent candidate for Geopark designation. The scientific significance of the region is witnessed by a remarkable record of geoscience research papers and publications, also referring to geoheritage, geoconservation and geotourism issues, which is crucial for an aspiring Geopark.

COMMUNICATING SCIENCE IN UNESCO GLOBAL GEOPARKS

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Keywords: *Science, Communication, Promotion, Geoparks, Estrela Geopark*

Session: Aspiring Geoparks

UNESCO territories are spaces of Education, Science and Culture, but also of Communication. Today, communication is an imperative of these territories, both as dissemination strategies and as a way of positioning in different development domains. In any case, knowing how to communicate its resources, differentiating elements or defining strategies, constitutes a competitive advantage that cannot be neglected at the present time. In other perspective, communication translates a strategy defined by the territories, visible in the way it communicates and in what is communicated. However, it's not always easy to convey the values we want, much less when we speak about Science. The UNESCO Global Geoparks, as well-defined spaces where a community development strategy based on geology is built, are also areas of science. As such, communicating scientific knowledge, heritage resources, tangible and intangible values and culture itself are part of the daily life of a Geopark. Assuming the old maxim that we can only value what we know, the development of instruments, strategies and processes is fundamental, allowing the interpretation and dissemination of the geological heritage, but also of what is intended to be achieved with its valorisation, not only promoting greater attractiveness, but also a greater involvement of their communities, leading them to contribute in their own development. At Estrela Geopark, an aspirant to the UNESCO Global Geoparks network, communication plays a prominent role in its transverse development strategy. In each of its vital axes, tourism, science, education and sustainability, communication seeks to achieve three essential objectives: first, greater awareness of the Geopark brand and its own concept; secondly, greater dissemination of the territory; and thirdly, greater attractiveness, with more tourists, residents and investors. However, it's not always easy to communicate science and scientific research. How to convey knowledge in an accessible, interesting and appealing way to the general public, whether visitors or residents? Aware of this difficulty, the Estrela Geopark betted early on interpretation as a central strategy for the whole communicative process. To interpret is the sine quo non condition for spreading knowledge, promoting geoconservation, achieving new forms of education and fostering our sense of belonging and pride. Throughout the last four years, several communication measures have been adopted, among which we highlight the "Portas do Geopark", which are points of information and dissemination of heritage, and provide an entry into the territory. These "Portas" are the materialization of a dissemination strategy for the values of the Geopark throughout the 9 municipalities that compose this Aspiring with more than 2 thousand km². Thus, 9 "Portas" and a tenth in the highest point of Continental Portugal, the Torre of Serra da Estrela, a place that receives approximately 2 million visitors per year, were created. In fact, communicating is much more than a simple way of transmitting knowledge, it's a methodology that leverages the whole strategy of the Geopark, so that Estrela truly becomes a territory of Science, Education, Culture and Communication.

GEOPARK POTENTIAL OF GOKCEADA (IMBROS), CANAKKALE - TURKEY

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Keywords: *Gökçeada (Imbros), Geopark, Geosites, Petrified Forest, Çanakkale*
Session: Aspiring Geoparks

The geology of Gökçeada Island consists mainly of volcanic and sedimentary rock units whereas a small outcrop of metamorphic basement lies in a small valley around Marmaros Bay. Cover sedimentary units starting from Upper Cretaceous – Paleocene to Oligocene age overlie this basement discordantly. These units are cut by Neogene Volcanics consisting mainly of andesite, tuff and agglomerates. Upper Miocene-Pliocene sediments overlie also this volcanic succession and underlie the Quaternary alluvium deposits. Gökçeada is an ideal geological heritage completely in terms of its special landforms, geological diversity, and silicified trees in pyroclastic rocks (petrified forest) located between the Kuzulimanı Harbor and Kefalos Bay, in the SE part of the Island. Total eleven species were identified in the trees. According the laboratory studies, all the species are in Early Miocene age. In addition, many tumulus were discovered from the Neolithic to the Bronze ages with small quarries for producing the raw materials for artificial in use. Moreover, bio-diversity and suitability for the outdoor activities are other advantages for the geo-tourism organizations. This Island is a special piece of land to apply the sustainable development project in terms of preserving the geological heritages, bio-diversity and geo-archeological/ethnographic features. The study started by Istanbul University aims to put forward the Geopark potential of the Gökçeada Island. This Island is a potential “Butique Geopark” with its 18 geosites and other historical/ethnographical features.

THE REGIÓN LOS VALLES, JALISCO MEXICO GEOPARK: A PRELIMINARY PROPOSAL

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Keywords: Mexico, Jalisco, Región Los Valles, Ameca, Guadalajara

Session: Aspiring Geoparks

We present a preliminary proposal to recognize the Valles region as Geopark. It is located at the western part of the Trans-Mexican Volcanic Belt (TMVB). Geologic sites Piedras Bola. Cretaceous ash flow rocks known as Piedras bola are spherical stones formed due to weathering process. This place is located in the Sierra del Aguila. Sendero Minero (El Amparo-Las Jimenez). The El Amparo and Las Jimenez were active mines during the colonial era. There are few very old buildings belonged to the last stage of the exploitation of the mines, was the most important during the first half of the twentieth century. Gold and silver were the main minerals Giant pumice. The Caldera de la Primavera is a 95 Ky old volcanic structure in the western part of the TMVB. The giant pumice probably was formed in a deep lake when the magma and the water interact producing a "non-explosive" hydromagmatic event generating giant blocks of pumice. These blocks rose quickly to the surface of the lake and floated, after the saturation with water the sedimentation comes forming an 8 m thick layer Opal mines. These mines are associated to a rhyolitic dome and related ash flow tuffs from the TMVB located close to Magdalena town. The opals from this part of Mexico were used by the Mexica culture for ornamental and ceremonial purposes. The opal was known as Colibri stone (hummingbird stone) due to its iridescence and similarity with the feathers of the hummingbird Paleolake of Amatitan. Some lakes along the TMVB were formed because of the extensional tectonics. By 4.8 Ma ago, north of Tequila volcano, there was a small lake (Paleolake Amatitan) with less than 100 m deep. This is locality of the oldest known, and at the same time extinct, goodeid *Tapatia occidentalis* fish Cultural sites Guachimontones. South of Tequila volcano there are some circular pyramids known as Guachimontones. This kind of pyramids have not been reported on other sites, they are unique in the world. They belong to the Teuchitlan Tradition (people with specific culture). Palacio de Ocomo. This settlement belongs to the Grillo Tradition, who lived between 450 and 900 AD. Palacio de Ocomo is a monumental structure, developed during the Mesoamerican classic period, with 130 meters long and 8 m height Ruta del Peregrino (Talpa). The Route of the Pilgrim is a field route with more than 200 years of tradition. Starting in the city of Ameca, along the route you can see some mesozoic mountains of the Jalisco block and Plio-Quaternary volcanism of the TMVB. This route is 117 km long and is traveled by around 3 million people a year, particularly in Easter. Paisaje Agavero. The Agave Landscape is an impressive sample of the material and immaterial Mexican cultural heritage, with extraordinary cultural and identity values. It is located at Tequila, Jalisco. Since July 2006 the Paisaje Agavero was distinguished as a World Heritage in the category of Cultural Landscape by UNESCO.

PRELIMINARY INTRODUCTION ON INDIGENOUS KNOWLEDGE OF GEOHERITAGE IN GIA LAI ASPIRING GEOPARK, VIETNAM

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Keywords: *Plateau, Indigenous knowledge, Archaeological, local peoples, geoheritage*
Session: Education, public awareness and communication

The planned area of Gia Lai Geopark includes the districts of Dak Doa, Kong Chro, K'Bang, Mang Yang, Chu Pah, Ia Grai, An Khe Town, Pleiku City. The area includes the Eastern and Western Truong Son mountain ranges (with Kon Ka Kinh Peak 1,748 m high), the Pleiku and Kon Ha Nung plateaus, and the lowland within An Khe Mountain. This area is the land of Bahnar people of the South Asian linguistic society and J'rai people of the Malayo-Polynesian linguistic society. In the 17th century, in An Khe area, the villages of Vietnamese people (the Kinh people) from the delta started to be settle down. It was this land to nourish the Tay Son peasant movement with relics such as Hon Binh, Hon Nhac, Hon Tao, Sa Khong Lo, Ong Nhac Lake or Co Hau Field that has built and preserved the image of the heroes bringing sacred spirit, preserving forever the image of the heroes and described by legends such as the Three Brave Men, the Sacred Seal Silver Sword, the Magic Stone, etc. Moreover, the results of many archaeological excavations and researches in recent years have shown that An Khe is one of the cradles of prehistoric people. About 800,000 years ago, there was the presence of the community of the Archaeozoic period on this land. Regarding geology/geoheritage, the study area is a part of the ancient continent Gondwana, with a history of geological evolution up to billions of years, continuing till the final basalt eruptions of about 12-0.5 million years ago, resulting in many volcanic caves, waterfalls. surely the relationship between indigenous knowledge and geoheritage in the area must be divers . In this special subject, we will introduce some indigenous knowledge values on the process of recognizing natural elements, how they behave and adapted to the natural environment which is reflected in their folklore.

WEBSITE FOR SCHOOLTEACHERS AND RESEARCHERS OF MUROTO UNESCO GLOBAL GEOPARK

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Keywords: *Muroto Geopark, website, questionnaire survey, schoolteacher, researcher*

Session: Education, public awareness and communication

Browsing the websites is one of the most effective tools for collecting information because accesses itself to the sites by using computers and smartphone are easy and speedy. Also in Geoparks, it has been demanded to provide information to schoolteachers and researchers for promoting collaborations with them. However, Muroto Geopark has ever provided the information of sporadic events, and the website of Muroto Geopark lacks perspectives of how schoolteachers and researchers use and what information they need. Due to the above background, I conducted two patterns of questionnaire surveys for schoolteachers and researchers to find out what they want from Geoparks. Main targets of the survey are schoolteachers at an elementary, junior high and high schools and researchers including graduate students at any research institutions. In this poster, trends of answers to each question will be showed. This poster will also display a draft of new website pages for schoolteachers and researchers.

A PILOT STUDY TO VARY SCIENCE POPULARIZATION MODES IN DABIESHAN UGGP

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Keywords: *Dabieshan geopark, Geo-activities, Local participation, Public awareness*
Session: Education, public awareness and communication

On the 2015 CGN Meeting for Global Geopark Candidate Recommendation, Dabieshan National Geopark successfully became one of two Chinese candidates, which both launched the application for the membership of UNESCO Global Geoparks in 2017. Characterized by the continental orogenic belt structure and granite mountain landscape, Huanggang Dabieshan Geopark boasts rich geosites, unique natural and culture heritage. Covering an area of 2625.54 square kilometers, Dabieshan Geopark has a population of 9.3 million inhabitants, located in 23 townships and 452 villages. In order to strengthen the relationship between the geopark and those who live around it, themed on Geopark Develops Local Community, focusing on geoscience education popularization and to raise awareness of the need to protect the precious and unique geological and cultural heritage of the area, series of geo-education activities, including geoscientific education lectures, brochures delivery, contests were held by Administration Committee of Huanggang Dabieshan Geopark among local communities. With time goes by, we realize that compared with traditional geo-edcational activities, local communities prefer to various science popularization modes. So in order to get local communities more actively and voluntarily involved, varies science popularization modes are on a pilot study to come into being, and ready to follow the following principles: --Be cooperative. To take advantage of local regular-based activities by instilling some basic courses concerning about UGG projects to increase local communities' sense of pride. --Be systematic. Courses related to either UGG projects or geoscience should better be carried out systematically in a regular basis. --Be up-to-date. In order to make the courses mentioned above to be output in a more sufficient way, online courses applied by use of new technology, such as Wechat or other ways can be advocated. --Be students-centered. After a master of basic interpretation skills and Geopark knowledge, students can act as interpreters to help enrich travels' journey in a certain degree. Those principles mentioned above aim to promote local participation more actively and efficiently so as to bring mutual beneficiary to Geoparks and local communities.

GEO-EDUCATION IN ACTION: STUDENTS DEVELOPING AN ASPIRING GEOPARK

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Keywords: *education, aspiring geopark, university students, vocational students, geopark development*
Session: Education, public awareness and communication

The aspiring Salpausselkä Geopark is situated in the City of Lahti and the surrounding region, in the south of Finland. The area can be reached in less than hour by train from the country's main airport, Helsinki-Vantaa. Salpausselkä ice-marginal formations and their feeding eskers are central features in the region. Päijänne National Park, located in the southern part of Finland's second largest lake, forms an important part of the geopark. Lahti University of Applied Sciences launched the Salpausselkä Geopark project in 2017, with the goal of applying for UNESCO Global Geopark status. The Geological Survey of Finland and Metsähallitus Natural Heritage Services work as project partners. Seven municipalities situated along the Salpausselkä formations or around Päijänne National Park, with some 182 500 inhabitants in total, form the area of the aspiring geopark and are the main stakeholders. As Lahti University of Applied Sciences is coordinating the Salpausselkä Geopark project, it is quite natural to engage university students in the project. So far, the project has offered learning opportunities for students from the faculties of Technology (students of Environmental Engineering) and Business and Hospitality Management (students of Hospitality Management). There are plans to start study projects with students of the Faculty of Social and Health Care and The Institute of Design as well. Whenever a student enters the Salpausselkä Geopark project, the first assignment is to get familiar with the UNESCO Global Geopark concept, which is not yet well known in Finland. The students also learn about the geological features in the aspiring geopark, and the opportunities for sustainable geotourism in the area. After this introduction to the subject, the students carry out a project that advances their studies as well as the development of the geopark. In the autumn of 2017, a group of students worked on enhancing business co-operation within the geopark area. Guided by the project staff, they contacted enterprises that might be interested in the geopark project, providing the enterprises with basic information on the subject. The students organized and facilitated the project's first business workshop, which was the start of a growing network of co-operating enterprises (now 30 approx.). In spring 2018, a group of students is mapping the geosites, as well as other important natural and cultural sites, within the borders of the aspiring geopark. In the beginning of 2018 co-operation was started with the region's largest vocational education and training institution, Salpaus Further Education. The importance of the Salpausselkä formations for the region is evident in many business names in the area – also this educational institution is named after these best-known geological features of Finland. Salpaus Further Education offers a wide variety of educational programmes. A group of vocational upper secondary level students from the Natural and Environmental Protection programme is involved in practical work planning, developing, mapping and managing the geo routes of the aspiring geopark.

INTEGRATED MARKETING COMMUNICATION AS TOOLS FOR PROMOTING COFFEE AS GEO PRODUCT FOR GEO TOURISM

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Keywords: *coffee as geo product, geo product, geo tourism, integrated marketing communication, Lasswell communication*

Session: Education, public awareness and communication

One of geo product potential that is now publicly recognized is coffee. Almost all of national GeoPark in Indonesia is famous for its coffee. This article will highlight Lilangan Village in Belitung Timur, Indonesia, one of area in Belitung Island that supports the idea of geo product development for its Arabica coffee. Therefore, using case study of Lilangan Village Coffee, this article is aim to develop an integrated marketing communication campaign as tools for promoting coffee as geo product for geo tourism. This campaign can be a prototype that can be utilized for all geo products potential not limited to coffee. Integrated marketing communication is the form of marketing activities that includes all activities such branding, advertising, direct selling, public relation campaign and so forth. The idea is to emphasize the awareness of a product, including to provide information and to reduce product retention. This article will use the Lasswell method as framework, since coffee to be brand as geo product still considered new. Lasswell method offers a convenient way to describe an act of communication that is suitable for re-branding coffee as geo product such: who will communicate the campaign, what is the message, in which channel will the campaign distribute, and to whom the campaign talk, with what effect as a results. Thru the fore mentioned framework, this article will first discuss about the situation analysis of re-branding coffee as geo product, and then to discuss what is the best marketing and advertising objectives to be made. At the end of this article several prototype suggestion and recommendations are provided to follow up the proposed notions for Lilangan Coffee. That includes, the logo, brand, packaging, and some re-branding activities. Therefore this article can be seen as reference for theoretical and practical support pertaining to utilized integrated marketing communication as tools for promoting geo product, especially coffee.

ARARIPE UNESCO GLOBAL GEOPARK ON INTERNATIONAL EARTH DAY 2018

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Keywords: *Araripe UNESCO Global Geopark, Gymkhana, Sustainable development, International Earth Day, Waste management*

Session: Education, public awareness and communication

The target of this work is to report an experience carried out on World Earth Day in the I Gymkhana Recycling and Reusable Material Gathering in the Araripe National Forest on April 22, 2018 along the local road of the Casa da Guarda do Belmonte located in the municipality of Crato, Ceará, Brazil. The work was carried out in a 10-km course with the participation of more than 80 people, including academic and students from several courses of the Regional University of Cariri (URCA), students of public and private schools in the territory of Araripe UNESCO Global Geopark (UGG), members of the surrounding community and teachers of the Physical Education course at URCA. Located in the south of the State of Ceará the Araripe National Forest - Apodi is the oldest forest in Brazil, covering the municipalities of Crato, Barbalha, Jardim, Missão Velha and Santana do Cariri. It is an area with forest cover of predominantly native species, created with the basic objective of multiple sustainable use of forest resources and scientific research, aimed at the discovery of methods of sustainable exploitation of native forests. In this unique environment of the territory of Araripe UGG, within a rich diversity of Fauna and Flora, International Earth Day was celebrated. The goal of the gymkhana was to raise the awareness of the population in general about the need to adopt responsible positions in defense of natural resources, reducing the use of harmful materials to balance natural ecosystems, especially plastics and related, as Agenda 21 recommends, being an initiative of Araripe UGG under recommendation of the Global Geoparks Network and UNESCO, with the support of ICMBio (Chico Mendes Institute for Biodiversity Conservation), Crato's Environment and Territorial Development Secretariat, URCA Extension Pro-Rectorate and ICMBio volunteers. The event adopted the practice of plogging, physical activity that combines running or walking with the act of collecting the litter found on the way. The methodology adopted for the development of the activity was a general orientation by the organization to the participants, then the distribution in 7 teams indicating and leading to the predetermined stretches. At the end of the morning the teams returned with the collected material counted in about 200 kg that were delivered to the Association of Recyclers of Crato. The undue disposal of solid wastes, especially domestic ones, has been a very present problem along the roads and trails of the Federal Conservation Unit, so it is necessary to develop educational activities in order to reduce the impact caused by visitors. Therefore, the Gymkhana contributed to the education of society regarding the disposal of solid waste in forest areas. In addition to providing conditions for more sustainability, once the collection of materials for the purpose of recycling and re-use has taken place, providing them with a new production cycle, thus combating waste.

PROTECTING CHOTT EL JERID VIA GEOTOURISM DEVELOPMENT

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Keywords: *SW of Tunisia, Chott jerid, geoheritage, development, sustainable*

Session: Aspiring Geoparks

Located in southwest Tunisia, the Jerid chott is a playa or closed depression occupying a vast synclinal basin filled with quaternary alluvial deposits, and located in contact with two distinct structural domains, the Atlas domain to the north and the Saharan platform to South. It forms the main element of the alignment of large Tunisian chotts stretching from the Tunisian-Algerian border around the Gulf of Gabès. The Jerid chott has several attractions: • Like other Tunisian playas, the Jerid chott was during the wet phases of the Quaternary era a lake covered by a variable slice of water up to several meters thick testified by different shreds of old successive shorelines, witnesses of climate change, and very rich in aquatic fossils (cardiums, fish ... etc.). • Prehistoric attractions since it contains many fundamental witnesses (authentic lithic industry of the Aterian civilization, 100 Ka) allowing a better understanding of the long history of anatomically modern movements of Men from North Africa to Europe. • Geological and geomorphological attractions related to a wide range of forms related to structural, hydric and aeolian actions, as well as saline efflorescence that some travelers have equated to "a dazzling silver tablecloth", to "a carpet of camphor or crystal "to" a snow-ground "or" a pond whose water is frozen ". • Cultural attractions related to this isthmus that channeled the caravan routes from the Sahara to a string of oases which he determined the ethnic and cultural diversity. These attractions are also linked to the development of oasis agriculture, among which the palm tree crystallizes historical legacies and social practices. The Chott finally inspired in the 19th century the utopian project of a Saharan sea, initiated by Commander François-Elie Roudaire and supported by Ferdinand de Lesseps, and to which Jules Verne dedicated his latest novel entitled invasion of the sea, published post died in 1905. • Potential for biodiversity promotion as the Jerid chott is a Ramsar site and is considered by BirdLife International as an Area of International Importance for Bird Conservation (IBAs) and meets the A3, A4i and A4iii criteria. It is adjacent to the Dghoumes National Park, which is representative of the Saharan ecosystem. • It has also been included on the World Heritage Tentative List since 2008, on the basis of criteria (vii) (viii) (ix) (x). All these attractions constitute undoubtedly a potential that may underlie the socio-economic development of the Jerid region. But in recent years, the Jerid chott knows significant changes: development of roads, extension of irrigated perimeters on its borders, development of tourism and other economic activities (salt extraction, oil platform), which threaten its landscapes and exceptional vestiges and leave uncertainties about the preservation of this ecosystem that the submission of a nomination proposal for inclusion on the World Heritage List tries to stop.

CHARACTERISTICS OF NANKI KUMANO ASPIRING GEOPARK

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Keywords: *Aspiring Geoparks, plate subduction zone, accretionary prism, forearc basin deposits, igneous complex*

Session: Aspiring Geopark

Nanki Kumano National Geopark is an aspiring geopark, placed in the southernmost tip of Honshu, the largest and main island of the Japanese archipelago. These sites were registered on UNESCO's World cultural Heritage site known as the "Sacred Sites and Pilgrimage Routes of the Kii Mountain Range" and the Ramsar Convention Kushimoto coral communities. These two valuable registrations may result in synergy in Nanki Kumano Geopark. These historical culture and nature are based on landscape and rocks, and make it the symbol of Nanki Kumano. The earth in Nanki Kumano is made of 3 geological bodies made with depression of a plate (accretionary prism, forearc basin deposits and igneous complex). For instance, "Sacred Sites and Pilgrimage Routes of the Kii Mountain Range" combined the Shinto and Buddhist faiths into one, known as Shinbutsu-shugo. These combine and development are unlike any other in East Asia. For millennia the rugged Kii Mountains of Kumano, the majestic waterfall have been thought of as Japan's spiritual heartland. The majestic Nachi Waterfall, the highest waterfall cascade in Japan, has been made of igneous complex and accretionary prism. Historical culture and nature of this earth have specialized at Nanki Kumano Geopark.

THE INTEGRATION OF THE COMMUNITIES IN AN APPLICATION PROCESS

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Keywords: *Aspiring Estrela Geopark, Integration, Community, Conferências of Estrela, Application process*

Session: Aspiring Geoparks

A UNESCO Global Geopark builds its strategy on the Communities and their development, contributing to the reinforcement of the sense of belonging and their active participation in the whole process, like it is expected from a Bottom-Up process. In this way, Estrela, as an aspirant to UNESCO Global Geopark, has defined its strategy based on this premise. With a 2216km² territory, 9 municipalities and around 170,000 inhabitants, AGE has been working on the dissemination of both the concept of Geopark and the advantages that an application such as this offers territories with low density and high levels of depopulation. Thus, the year 2017 was marked by the start of several activities with the objective of improving the involvement of the Population in a process so structurant for the territory as this is, because a holistic vision of the territory has finally emerged, opposing the fragmented vision existing until then of the municipalities that compose this application. In this context, the Estrela Conferences advocate a new approach to integrate the people in this application process, giving them an active voice and bringing them to the stage, giving them the opportunity to discuss and participate in the decisions that are being made. The nine municipalities that have promoted this project have been travelled through for nine months, in which the main themes related to Serra da Estrela were discussed through public sessions open to the community, inspired by the concept of Community Forums. These focus groups, with the main objective of discussing and finding solutions to the main challenges that Estrela faces nowadays, were occurred, preferably outside the county headquarters with the clear objective of decentralizing and taking the Geopark to places which usually are removed from the calendar of the municipalities. Examples of this decentralization were the cases of Aldeia de São Francisco de Assis and Caria. These debate sessions made us travel through themes such as "Heritage, Culture and Tradition", "Communication and Territorial Identity", "Geology and Geodiversity", "Tourism: Challenges and Opportunities", "Education and Science: (re)interpreting natural spaces", "Environment and Biodiversity and Mountain Spaces", "Development and Territorial Cohesion", "Depopulation and Low Density" and "Geoparks: new strategies of the 21st Century". Thus, this communication intends to present the Conferências of Estrela as an example of good practices, since in addition to fostering the values of an UNESCO Global Geopark, it also places the Populations at the centre of the strategy of a Geopark, favouring the development of a critical spirit, active citizenship and a sense of belonging. It also helps the sharing of ancestral knowledge by the eldest population, which would otherwise be lost in time.

POTENTIAL VALUES OF KRONG NO – DAK NONG VOLCANO GEOPARK, DAK NONG PROVINCE, VIETNAM

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Keywords: *potentials, lava cave system, archaeological sites, traditional culture, development*

Session: Aspiring Geoparks

Located in the South of the Central Highlands of Vietnam, with favorable geographical position, Dak Nong province has a lot of potentials to impulse the socio-economic development, especially for tourism development. The outstanding features in Krong No – Dak Nong Volcano Geopark are valuable geological heritages for the Earth science, showing tectonic history and geological structure, including lava caves which were recorded as one of the longest lava cave system in the Southeast Asia. The lava caves in Krong No – Dak Nong Volcano Geopark contain archaeological sites of great cultural and historical values. Through excavation, traces of prehistoric cave dwellers are found in the lava caves (such as human bones, stone hand-axes, etc). In the near future, this cave system is mainly used for research, education and tourism development. This is the highlight of Krong No – Dak Nong Volcano Geopark. With its natural features as an intersection between the northern and southern forests, the geopark is of high biodiversity with rare flora in the world. This is also the home to many animal species in the World's Red Book, which are now being protected in national parks and nature reserves. Additionally, Krong No – Dak Nong Volcano Geopark is also home to a wide variety of minerals, including precious stones and semi-precious stones such as sapphire, opal, and especially the world's largest bauxite reserves. In this geopark, there are more than 40 ethnic groups living together, creating the traditional culture exchange and diversity, particularly the Space of Gong Culture of the Central Highlands which was recognized as a Masterpiece of Oral and Intangible Heritage of Humanity by UNESCO in 2005. Thus, the conservation and promotion of traditional culture is essential in the process of development and integration of Krong No – Dak Nong Volcano Geopark. The geological, natural and cultural values of Krong No – Dak Nong Volcano Geopark are the potentials and foundation to develop into a Global Geopark. Participation in the Global Geoparks Network contributes to promote socio-economic development in the region, as well as preserve and promote the values of natural landscape and traditional culture in Krong No – Dak Nong Volcano Geopark.

GEOTRAC – INTERREG V-A ITALY-AUSTRIA 2014-2020 PROJECT FOR THE TRANSBOUNDARY GEOPARK OF THE CARNIC ALPS

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Keywords: *Carnic Alps, Transboundary Geoparks, local sustainable development, cross-border collaborations*

Session: Geoparks, sustainable tourism and local sustainable development

The project aims to create a partnership and the basis for a cross-border geopark in Carnic Alps through the connection between the existing “Geopark Karnische Alpen” in Austria and the Italian side of the Carnic Alps, part of the “Geoparco della Carnia”. The purpose is to highlight the geological heritage and elaborate strategies for sustainable development of the involved area in order to reinforce the awareness about the value of natural heritage, to promote the balance between growth and protection of the environment as well as scientific culture, and to increase the touristic attractiveness of the involved regions. For this purpose, the project entails the following actions:

- creation of a cross-border working group;
- scientific research regarding the whole area involved in the project; the results will be used for travelling exhibitions as well as for scientific and educational publications;
- creation of info-points, use of multimedia technologies;
- creation or renewal of (cross-border) geologic itineraries;
- creation of educational paths and of a “guide for guides” in order to provide proper training of professional figures;
- preparation of a program of educational activities and events in order to promote the geological knowledge and increase visits to the geopark;
- drafting and managing of a communication and marketing plan for the promotion of the cross-border geopark;
- production of publications and videos (documentaries);
- creation of a GIS system supporting the territorial management of the geopark;
- study of organization models for the consolidation of the geopark.

The Lead partner of the project is the Friulian Museum of Natural History (Municipality of Udine), giving also the scientific support to the project. The partner on the Austrian side is the Geopark Karnische Alpen. Other partners on the Italian side are the Geological Department of the Friuli Venezia Giulia Autonomous Region, that represents the regional authority for the protection and promotion of the geodiversity, the UTI (Unione territoriale intercomunale –Inter-municipal union) of Carnia and Canal del Ferro – Val Canale representing the municipalities of the territory of the geopark on the Italian side and the Museum of Nature South Tyrol from Bozen-Bolzano.

The project is now under way and will last until 2019; the entire budget is 1.061.300,00 euro where the 85% is financed by the ERDF.

COMMUNITY INITIATIVES FOR SUSTAINABLE TOURISM IN THE NAPO SUMACO GEOPARK PROJECT (ECUADOR): GEO-TRAILS CHIUTA HILL AND GRAND CANYON OF ÑACHI YAKU.

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Keywords: *Geo-trail, Napo Sumaco Geopark, Napo Runa, Chiuta hill, Ñachi Yaku*

Session: Geoparks, sustainable tourism and local sustainable development

The Napo Sumaco Geopark Project covers an area of 1,600 square kilometers, and involves two municipalities and about 80 settled indigenous communities, which maintains a great diversity of cultural and traditional aspects, which characterize the territory of the Amazonian Kichwa "Napo Runa". The Amazon Kichwa communities, are respectful of nature, of their environment, of their "pachamama", conceiving her as a mother who provides her children with all basic and essential needs. Under this premise, in the territory of the Napo Sumaco Geopark, the conservation of natural resources obeys a process built from the local cosmovision. Some of the geological elements present in the community territories, are used for the development of tourist activities, for examples waterfalls, caves, urku (hills) and trails in general. The trails of Chiuta Hill and Grand Canyon of Ñachi Yaku are two of the main trails present in the territory of the geopark. The geo-trail of Chiuta hill consists of 4 kilometers and is guarded by the kichwa community of El Calvario, who dedicate themselves to guided walks to the top of Chiuta hill. The walk has a medium difficulty level, but it is totally comforting to hear the ancestral stories told by the community guides. The Chiuta hill is a horst limited by faults, and reaches 880 meters in height, its summit is flat, similar to the "tepuyes" of the Venezuelan shield, in addition its hillsides have been strongly attacked by erosion. The community of El Calvario defines Chiuta hill as a "hill alive", since from one of its sides it is possible to see a mythological face which they have baptized with the name of "Shakan". Besides the hill emits noise for take care by the community when strangers approach. Within the local cosmovision, during the universal flood, Chiuta hill was the only dry place, and the "Napo Runa" climbed to survive the flood. The stories tell that while the water levels increased, the size of the Chiuta hill also did. At the top of Chiuta hill, there is a cross of 15 meters, which is called "the Cross of Calvary", in Holy Week about 1,000 parishioners traditionally walk the trail as part of the atonement of their sins. On the other hand, the trail of the Grand Canyon of Ñachi Yaku, is a journey of approximately 3 kilometers, the main interests are the geoforms generated by fluvial erosion processes. In the middle of the trail it is possible to enjoy a lagoon that precedes a waterfall of 7 meters high. In this path, the community associates multiple geological elements with the kichwa narrative: rocks sculpted by water with aspects that resemble guardian animals such as the anaconda, in addition to the use of clays as facial masks with medicinal properties. All the tour takes place within the framework of respect for biodiversity and local traditions.

GUIDE ACTIVITIES OF ASO UNESCO GLOBAL GEOPARK

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Session: Geoparks, sustainable tourism, and sustainable local development

Aso Geopark guides introduce the geological resources of the Aso UNESCO Global Geopark in a way that people will enjoy while learning. They conduct tours as geo-interpreters who are knowledgeable about the park - from the formation of the earth, the ecosystems that have developed and evolved, to the lives of local people, their culture and the history - and can impart their knowledge to both local people and visitors.

The Aso Geopark Guides Association, established in 2012, currently has around 80 geo-guides. The average guide is a retiree in his or her 60s who lives in the Aso area. They come from a variety of backgrounds, such as teachers, engineers, nurses, firefighters, and bus tour guides. They weren't originally geology experts but they live in Aso, love Aso, and became certified geo-guides because they want others to know the attractions of Aso.

The activities of the Geopark offered good opportunities for the guides to learn more about Aso and extend their networks with other guides, local communities, and enterprises. Nowadays, Aso geo-guides not only conduct geo-tours but also independently contribute to the communities. For example, they conduct site clean-up/conservation activities, grassland restoration support activities, and educational programs for kids. They also have active club activities such as trekking, photography, wild flower observation, improvement of computer skills, English, and gourmet programs. They learn more about what they like and are interested in, and use their knowledge in guide activities so that they can introduce Aso from many different perspectives. Their intellectual curiosity never stops them from learning new things and their activities are essential for the Aso Geopark. We proudly introduce their activities to the world.

CAN ONE MAN CHANGE THE ATTITUDES TO LITTERING

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Keywords: *Saimaa Geopark project, lake Saimaa, Sustainable tourism, geotourism, public awareness*

Session: Geoparks, sustainable tourism and local sustainable development

is often said that one man cannot change the world. One person may not be able to change the whole world, but he can inspire other people. This is what Mr. Mikko Huotari did. He is from Finland, Lappeenranta city, living in Aspiring Saimaa Geoparks area. He loves Europe`s fourth largest lake and takes a lot of pictures from lake Saimaa. He has also seen that not everyone respects nature. Unfortunately some people leave their litter to nature and beaches and so Mr. Huotari decided to do something. He arranged a campaign called “Saimaa Siistisi Ihana – Saimaa is neatly lovely” on the 12th of May 2018 which is the day before Mother’s Day in Finland. Cleaning on the day before Mother’s Day has strong message: taking rubbish away from nature is the most valuable present than human beans can give to Mother Earth. On the day of the event the municipalities and cities around aspiring Saimaa Geopark area (Lappeenranta, Savonlinna, Imatra, Mikkeli, Ruokolahti, Taipalsaari and Puumala) provide rubbish bags for the voluntary workers. When the bags are full, the municipalities collect them properly. Now the municipalities have decided to support Mr. Huotari’s work and help him in spreading information to all areas residents. Huotari also contacted to Saimaa Geopark project, and because sustainable development, protection and geotourism are one of the UNESCOs Global Geoparks principals, aspiring Saimaa Geopark wanted to help him. The aspiring Saimaa Geopark gave lottery prizes and also help to spread information about event. The idea now is to make this event happen on an annual basis, although the most desirable thing is that event would not be needed at all. “I wish people would not litter. How come they are strong enough to carry rubbish to nature when it’s full but when it’s empty it will be left to nature.”

QESHM ISLAND UNESCO GLOBAL GEOPARK TERRITORIAL EXTENSION BY INCLUDING HORMUZ AND LARAK ISLANDS

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Keywords: *Qeshm Island, Geopark, Hormuz, Larak, Iran*

Session: Geoparks, sustainable tourism and local sustainable development

Hormuz Island with more than 40 km² area, is one of the salt domes of Hormuz series and located in 18 km north east of Qeshm Island at the entrance of Hormuz Strait. There is only one town (Hormuz) on Hormuz Island with 6,000 residents.

Geologically Hormuz Island dates back to Precambrian era. Since Hormuz Island was created by a diapirism process, it is rich with minerals and known as “Mineralogy Paradise of Iran”. Hormuz is famous for its colorful landscapes caused by minerals diversity. Furthermore, Hormuz Island is rich of geological and geomorphological attractions. Salt cave and valley, sulfur springs, sea caves and stacks are some of geological attractions of Hormuz Island.

Birdwatching, Gazelle watching and sea turtles nesting beach are among the natural attractions of Hormuz Island and represent the biodiversity of Hormuz.

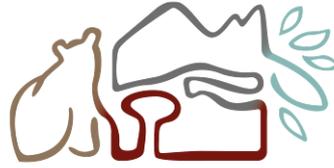
Beside geological and natural attractions, Hormuz is a historical island. Portuguese Castle and church are the most attractive historical sites of Hormuz Island. Moreover, Art Museum attract tourists to grasp more information about the culture of Hormuz and buy handicrafts made by the hands of Hormuz ladies. In Hormuz, geology is strongly tied to people’s life, as they use Ocher as a natural color to make a traditional food called “Sourakh”.

Recently, Hormuz Island receives many domestic and foreign tourists and local people involved in tourism related services like accommodation, restaurants, transportation, etc. One of the prominent features of tourism industry in Hormuz Island is local development without any support by the government. Local people started to develop their services for the convenience of tourist who visit Hormuz Island to enjoy Geotourism. Nonetheless, one of the challenging issues on the Island is lack of management especially in conservation and interpretation fields. Many tourists visit Hormuz Island and take a lot of minerals and rocks back to their homes. Unfortunately, there is no conservation plan to protect Hormuz Island and conserve the geological heritage. Another issue is lack of interpretation materials in the geological sites.

Larak Island is also a salt dome and with more than 48 km² area and more than 480 residents located in 9 km south east of Qeshm town. Larak Island is famous for its culture. They still speak in their very old language called Laraki which can be found nowhere else.

Around Larak Island there are many coral reefs which are attracting many divers and snorkelers during the year. But despite this valuable resources the livelihood of Larak people haven’t improved properly.

Thus, it can be significant to include Hormuz and Larak Islands in Qeshm Island UGGp territory and develop them in a sustainable manner. By this expansion, the area of Qeshm Island UGGp will increase by only less than ten percent and will meet the UGGp Criteria.



ADAMEZZO BRENTA GEOPARK
Madonna di Campiglio - Italy

8th INTERNATIONAL CONFERENCE
ON **UNESCO** GLOBAL GEOPARKS
8-14 SEPTEMBER 2018

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8th INTERNATIONAL CONFERENCE
ON **UNESCO** GLOBAL GEOPARKS

8-14 SEPTEMBER 2018

CULTURAL HERITAGES AND LITERATURE IN IZU PENINSULA UNESCO GLOBAL GEOPARK

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Keywords: *cultural heritages, inventory, literature, regional identity, Izu Peninsula UNESCO Global Geopark*

Session: Geoparks, sustainable tourism and local sustainable development

Geopark is a holistic approach for sustainable development. Izu Peninsula Promotion Council has been focused on enhancing preservation and conservation of geological heritage, environmental education and promotion of geological tourism. In addition, The Council has started to compose the inventory of tangible and intangible cultural heritage and literature and utilize them in geopark activities since this year. The purpose of this study is to reveal the characteristics of the cultural heritage in the Izu Peninsula UGGp and clarify how to connect cultural heritage and literature to geopark activities.

Izu Peninsula Promotion Council has started its geopark management since 2010. It used to be a so-called geological park. Field evaluators pointed out during the field evaluation in 2017 that it was necessary to connect the geopark to other aspects. According to the recommendation, the inventory of cultural heritages has been composed since April of 2018. The criteria for the selection is based on two components; expressing the regional identity and representing the cultural characteristics of the peninsula. It is not necessary to connect them to geology or earth science. The inventory of cultural heritages is divided into three categories; tangible properties, intangible cultural heritages and cultural landscapes (there is some overlapping).

At first, the cultural properties designated by the Japanese Government and local municipalities have been selected. This cultural property database consists of 668 properties including one World Cultural Heritage site and intangible cultural heritages. Then some places, shrines and monuments related natural disasters were nominated to the inventory. 77 hot spring towns in the peninsula are also listed as cultural landscape because Japanese people have been created unique hot spring culture such as Japanese style accommodations and facilities. Hot spring towns have been the most popular tourist destination in Japan, so that these towns are considered as cultural landscape. Meanwhile, literature is a very important component in Izu Peninsula. Many great writers such as Yasunari Kawabata who won the Nobel Prize for Literature in 1968 found inspiration for many works here. The list of writers and their works has been prepared.

There are some cultural events to promote cultural heritages and literature as geopark activities. A physical geographer who is a scientific staff of Izu Peninsula Promotion Council took a field trip to a hot spring site. A book talk event was organized in cooperation with a local book shop owner and a geopark tour guide. There are not only geological heritages but also rich cultural heritages and literature in Izu Peninsula UGGp. Representation of local culture in the geopark enhances its local identity and geopark activities for sustainable development.

PROMOTION AND DEVELOPMENT OF LOCAL COMMUNITY (PANYA BATIK) IN SATUN GEOPARK

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Keywords: *Community, quality of life, sustainable income, unique community product, work*
Session: Geoparks, sustainable tourism and local sustainable development

Panya Batik is the community painted colorful patterns on the fabric in La-ngu district, Satun province, Southern Thailand. This community was established in 2002 by 20 members. Previously, the batik products were distributed in OTOP exhibitions throughout Thailand. The income from the sale of goods was uncertain because there were many competitors. Additionally, it had a high cost that affected many aspects; higher cost, could not meet the demand of customers and the deterioration of health due to frequent trips. This caused the separation of most members leading to only 7-8 members left and continued their activities. The members in the community are older and do not want to sell their products at the exhibitions over again. In 2016, the King RAMA9 passed away. The community loses income entirely because of no demand to use colorful fabrics. So, they had the idea to shut down the group at that time. Since this community is located in the area of Satun Geopark. Mr.Narongrit Thungprue, Director of Satun Geopark, announced the policy of geopark with the community and provided geological experts in this area. As a result of this policy, the community has the idea to use natural materials to dye fabrics, draw the fossil pictures on the fabrics in order to narrate the geological story through the stripes on the fabrics. This style of fabrics was a unique community product that was different from other batik groups. Furthermore, Satun Geopark encouraged this community to be the learning area together with public relations through various channels. The tourists can learn how to make batik through the provided short courses. This made the community more famous and more income from the sale of its own area goods. The impact of mentioned policy and all of activities done could also generate a better quality of life in the community. For example, unemployed housewife group and old people earned more income from working in this community, young people returned to their homeland because of their own career. Consequently, Panya Batik is a present the community model in Satun Geopark that has developed and generated sustainable income.

HORSE TOURISM AS A SOURCE TO RURAL DEVELOPMENT IN DENMARK

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Keywords: *Horse Tourism, Rural Development, local development, sustainability, Women in the countryside*
Session: Geoparks, sustainable tourism and local sustainable development

Riding horses in cultural landscapes and nature, on beaches and in parks, is part of the adventure & outdoor tourism sector, as well as the sector of cultural heritage tourism – two of the fastest growing subsectors of the tourism industry. Further, they offer the opportunity to create sustainable tourism enterprises, when well designed. If these businesses can address all three of the components of the sustainability triad – environment, society, and economy – then they will, in effect, be sustainable tourism enterprises. To do this, three key factors are important:

- Careful thought and management of impacts on the landscape
- Use of local guides, local knowledge, local landscapes, and local tradition in designing the rides
- The creation of jobs through employment by local contractors and service providers.

Landscapes are the outcome of multiple influences – the physical processes, human activities, biotic activities and more. By basing tours in the local landscape, all aspects of that landscape can be sustainably addressed. This makes this type of equine tourism an excellent vehicle for improving rural economies and employing more people (especially women) in rural areas in Denmark, and across Europe. Interest in this type of horse tourism has increased and initiatives among horse entrepreneurs are growing. In Denmark, for example, the classic horseback ride or trek using rented horses can be illustrated by tour riding along its west coast, but new concepts are currently being developed. Now, Ferierytter on Lolland and Falster in the southern part of Denmark offers weekend packages with the client's own horse either as a luxury manor stay, or in a budget class Bed & Breakfast stay, always with the horse in focus. In Odsherred UNESCO Global Geopark, a new concept of guided tour riding where the participants also bring their own horse has been launched this spring. The riders are taken on an adventure tour on private land, tasting all the local products from the area. Further, there is increasing interest in mainstreaming such activity -- using the municipal plan as a tool for development and strategic planning, Odsherred Municipality wants to support the development of riding routes in connection with Hay Hotels, Bed & Breakfasts and other private tourism businesses etc. Last year Ferierytter arranged the first Horse Tourism Conference in Denmark. It was a huge success, where over 100 participants from private businesses, municipalities, politicians and horse organizations met to discuss the potentials of horse tourism, especially for rural areas. One conclusion of the conference was that there is a need for a trade organization where horse people, companies and tour operators in cooperation with public organizations, can get good advice and guidance and work together to develop horse tourism in their area. This presentation examines the use of the Danish landscape and Cultural Heritage resources in the development of such sustainable equine tourism enterprises

COMMUNITY EMPOWERMENT IN TAMBORA GEOPARK THROUGH THE DEVELOPMENT STRATEGY OF SARA E NDUHA GEOSITE

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Keywords: *Tambora geopark, Sustainable, development strategy, Saraenduha*

Session: Geoparks, sustainable tourism and local sustainable development

The Sarae Nduha geosite is one of the new attractions in West Nusa Tenggara. Sarae Nduha Geosite located just below of Tambora mountain, around the Teluk Saleh beach, Sori Tatanga Village, Pekat District, Dompu Regency, West Nusa Tenggara. The Sarae nduha geosite is still undeveloped due to the lack of governmental attention and the role of the community regarding the strategies used to develop tourism objects. The development of this tourism object needs a developing tourism strategy or become a famous tourist destination such as the development of facilities and circulation and the role of society and government that can make this location become attractive. Currently, Sarae nduha has become the main destination for local residents, suitable to be a destination for a vacation with family, as well as easy access to these tourist sites. The high interest of tourists visiting the Sarae nduha geosite is believed to be the driving force of the economical community around Sarae nduha geosite. Therefore, Tambora geopark team was formed a working group to manage the geosite. The aimed of this study was to determine the development strategy of Sarae Nduha geosite. SWOT analysis has been used as a methodology in this study. The result based on SWOT analysis were shown that the development strategy of Sarae Nduha geosite is to form a working group (pokja) that is the community around sarae nduha geosite, facilitation of each working group is based on the existing potential related to training, procurement of work tools (from related offices, such as; training and promotion of products from cooperatives, procurement of work tools and product packaging by the Department of Industry) etc. Promoting the products of each working group through certain events and social media (products are exhibited on the stores in West Nusa Tenggara through the provision of specialized products storefront Geopark). The development of Product is divided into five forms of geosouvenir that are wood waste that can be used as key chains, miniature Tambora mountain, glasses, plate, wood mortar, and pestle, etc. Then the Ganitri seeds that can be used as a necklace, bracelet, prayer beads, etc. Geohomestay, home community residences used as accommodation for tourists, decorated with the theme of geopark, as in the room there are geosite maps, miniature Tambora geopark. Geoproducts, Non-timber forest products such as coffee, honey, cashew, maize, ganitri seeds, which are products of the community are promoted by Tambora geopark. Geoculinary, culinary specialties that are around Tambora Geopark (branding name according to geosite, examples of typical food menu: Palumara Vulkano, noodles Erupsi). Geoherb, by utilizing the original Tambora spices hence can produce herbal products, which are called Lo'i pa'i mpiri, lo'i keta (local language/mother tongue).

STATE OF THE ART OF PETORCA VALLEY GEOPARK

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Keywords: *Tourism, Geopark, Interdisciplinary, Geosites, Prehispanic*

Session: Aspiring Geoparks

Located in Central Chile, the Petorca Valley Geopark project emerges as a non-extractive economic alternative that aims to dynamize the local economy by a sustainable tourism of special interest. Since 19th century, the valley has based his economy on mining and agriculture, threatening the conservation of natural and cultural heritage. Another problem with this extractive economic model is that does not offer enough employment. Thus, the tourism of special interests arises as a solution for these issues. A difference with other geoparks, the touristic product developed in Petorca is based on the connection between different places of interest and how those places explain different stages of the evolution of the territory form an interdisciplinary framework. Geosites does not happen as isolated events, so the study of the evolution of geosites allows to understand how the convergent tectonic boundary of Central Chile has evolved. In Petorca valley, the evolution can be observed by visiting the geological places of interest from west to east, making the tour more interesting and educational. Also, this evolution shapes the actual relief, enabling the development of the biodiversity that was used by prehispanic human groups. The symbiosis between biodiversity, geodiversity and prehispanic cultures has been recorded on petroglyphs by motifs ascribed to local cultures. However, those petroglyphs also show influences from other cultures such as Inca, Limarí or Aconcagua-Salmon. Some results from the research has been visible by the linkage with the community that has developed local products with topics related to the geopark. One example is that some craftsmen are incising the petroglyph's motifs on rocks to sell them as souvenirs. The information of geosites and biodiversity has been an important input for touristic events and tours. The Petorca Valley Geopark project has been developed since 2016 thanks to the effort of a small group of researchers with a strong connection with the community which considers this project as a job opportunity. Despite the limited government support, the strong ethic and social role of the researchers has enabled the development of the project with a budget lower than US\$4000 in two years.

RESPONSIBLE TOURISM DEVELOPMENT IN LAKE SAIMAA AREA

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Keywords: *Saimaa Geopark project, Responsible tourism, Destination management, sustainable tourism, Lake Saimaa*

Session: Geoparks, sustainable tourism and local sustainable development

In Lake Saimaa area the process towards responsible tourism destination management is going on, supported by a joint project. Lake Saimaa regions South Savo and South Carelia are developing their tourism including the entire area of aspiring Saimaa Geopark. Geopark is a gem of the regions and with two national parks and versatile tourism services the regions excellently frame the development of the Geopark. Responsible tourism is “about “making better places for people to live in and better places for people to visit.” As tourism is rapidly growing all over the world there is an urgent need to identify its impacts in local, regional and national level. UNWTO has committed itself to UN Agenda 2030, developing tourism to support sustainable development. Simultaneously there is a growing interest in tourism businesses and destinations to define and take actions to develop tourism more sustainable, partly due to changes in tourism market. While tourism is growing 4 % globally, responsible tourism demand is estimated to grow even more, offering sustainable destinations and enterprises increasing business opportunities. By the end of year 2018 the principles, indicators and criteria of responsible tourism of South Savo will be defined and the tourism carbon footprint calculated. The implementation plan of responsible tourism destination model will be launched, including the plan how to monitor and decrease tourism carbon footprint. Also sustainability communication of enterprises and visitor boards is developed. The model is connected to development of the “Lake Saimaa – Purest Finland” brand newly introduced by South Savo and South Carelia regions, where sustainability is one of the core values. In developing the principles of responsible tourism destination various international models have been studied, eg. Innovation Norway’s Sustainable Destination, Developing criteria for the sustainable structuring of tourism destinations in Germany and Tour Cert. Acknowledging the central role of Saimaa Geopark project the first benchmarking trip of the project in fall 2017 was made to Burren and Cliffs of Moher Geopark in Ireland, where much was learned about the geopark scheme and operations in practice. In the project two approaches are used. 1) In bottom-up work ideas are collected, tested and discussed with entrepreneurs and other stakeholders when visiting them and in workshops and other meetings. 2) Top-down approach includes creating a road map with the two regional tourism organisations, aspiring Saimaa Geopark and Business Finland, testing and discussing the ideas and coordinating the actions with Visit Finland Sustainable Tourism programme (2018-2019). The main principles of responsible tourism in Saimaa Geopark project and Saimaa area will have much common but of course there will be differences as well. In near future it is important to recognize the similarities and differences and decide how to proceed in building up a joint process for both approaches. The project Towards Responsible Tourism (2017-2018) is managed by South-Eastern Finland University of Applied Sciences with University of Eastern Finland and University of Helsinki as partners. It is financed by European Regional Development Fund, Regional Council of South Savo, six tourism related enterprises and Econeum Association.

INDIGENOUS KNOWLEDGE CONTRIBUTION TO THE GEOPARK SUSTAINABILITY MANAGEMENT

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Keywords: *local traditional knowledge, sustainability management, natural resources, geopark, El Apante*
Session: Geoparks, sustainable tourism and local sustainable development

The indigenous knowledge in relation to human development sustainability has been researched in aspiring Rio Coco Geopark (Northern Nicaragua) since 2013. Rio Coco Geopark project represent the first aspiring territory to become the UNESCO Global Geopark in Nicaragua. It is located in the mountainous region of the northwestern Nicaragua, on the border with Honduras. Its area covers 967 km² and consists of the substantial part of the Madriz Department including its five municipalities, three of them recognized as indigenous communities: San José de Cuzmapa, San Lucas and Totogalpa. The study area, selected for the case study conducted in the summer 2017, is located in the southern part of the aspiring geopark, concretely in El Apante community inside of the area of Municipality of San José de Cuzmapa. This municipality is situated inside the Natural Reserve Serranía Tepesomoto y Pataste, which is home to species related to the local ecosystems formed by altitudinal gradient. Geologically, it is an area formed by volcanic rocks of “Grupo Superior” with inclusions of the Matagalpa formation. Currently, the only geosites identified by geopark team for future geotourism in the area of El Apante community are the Natural Reserve Mangas Verdes and rocky formation called by local indigenous inhabitants “Orocuina”. In environs of this Tertiary volcanic formation, local archaeologists accompanied by author discovered ancient pieces of ceramics and elaborated lithic material (obsidian) which indicates the indigenous ancestral settlement with possible ritual practices. The purpose of this study, as well as of the previous author’s research, was to identify the indigenous environmental knowledge and to indicate its potential for sustainability management of geotourism and other geoparks’ activities. To achieve this objective, author interviewed the representatives of local households and shared living with one of them for half of month. The related field research methods included life history of Elders, focal groups’ discussions, diary, GPS mapping and photo-documentation. The findings of this study correspond with the author’s previous research results and indicate that the best-conserved indigenous environmental knowledge in the aspiring Rio Coco Geopark is related to the use of land, rocks and plants while expressing and transmitting the spiritual dimension of this traditional knowledge are declining. The main problems indicated by research are connected with the insufficient both knowledge and transmission of the indigenous traditional knowledge regarding nature and its processes. The local people admit that in the past, the land was more fertile and there were less diseases. They feel that the preference of the comfort facilitated by production of the many artificial but instant food, medicine, instruments, construction materials etc. are not only disconnecting them from their “Mother Earth” but also polluting all the resources provided by “her” for their subsistence. This kind of physical and mental contamination of “Mother Earth” they perceived as a real danger connected to the Modernity. They expressed resolution to rediscover some of their ancestral knowledge and nearly forgotten practices regarding the Earth and universe, in particular sustainable use of the soil, vegetation, animals, water and stone.

“THE GREAT ENIGMA” A NEW GUIDED TOUR IN THE BASQUE COAST UNESCO GLOBAL GEOPARK BASED ON OUR GREATEST TREASURE: BASQUE LANGUAGE

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Keywords: *geotourism, intangible heritage, guided tours, native language, coexistence*
Session: Geoparks, sustainable tourism and local sustainable development

A Geopark is much more than geology. Conservation and showcasing of cultural heritage is pivotal to a Geopark, and in the case of the Basque Coast Geopark its intangible heritage is particularly important. This is an area which possesses a cultural treasure in the form of the Basque language—an ancient language which has survived through to the present day. In its report “Interactive Atlas of the World’s Languages in Danger”, Unesco warns legislators, language communities and the general public about endangered languages and the need to protect global linguistic diversity. That said, this matter is notably absent from the Sustainable Development Goals within the UN’s Agenda 2030. The Basque Country in general, and particularly the Basque Coast Geopark, have experienced an increase in tourist numbers over recent years. This is partly down to a general growth trend in tourism in southern Europe, but also because of a favourable political backdrop free from violence. There are two different perspectives on the relationship between tourism and the Basque language or Euskera. Some sectors fear a negative impact of tourism on the use and preservation of the language, while others see it as an opportunity and a channel for disseminating and spreading their language beyond their borders by means of the tourists themselves. This matter has been the subject of numerous political, technical and social reflections. The strategic plan 2017-2021 for Zumaia has been put together over recent months using a participative methodology in which different social agents raise their concerns about how locals and visitors can coexist. In this context, the tourism and culture departments of the Town Hall of Zumaia have worked with the Geopark to develop an innovative experience which tries to bring Basque culture and Euskera closer to Geopark visitors and raise awareness of our most valuable heritage. The great enigma has been designed by a famous Basque philologist and sociolinguist. In his view, there are those who think that the great enigma of Euskera and of the Basque people is their as-yet unknown origin, or perhaps the fact that Euskera is an isolated language with no known linguistic relative. Others might think that the enigma lies in specific customs and traditions. But the great enigma of Euskera, according to the linguist Koldo Mitxelena, is not its origin, but its survival. The visit is part of the official programme of guided visits to the Geopark. More than 1,300 visits have been planned for 2018 to showcase the Geopark’s natural and cultural heritage.

CYCLO TOURISM FOR ENHANCING THE APPRAISAL OF NATURAL AND CULTURAL HERITAGE IN THE SESIA VAL GRANDE GEOPARK AND UNESCO WORLD HERITAGE SITES IN THE “CENTRAL PARK” BETWEEN TORINO AND MILANO

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Keywords: *Cyclo-Tourism, Unesco WHS, Sesia Val Grande Geopark, Cultural Geology, Sustainable Development*

Italy is home to 53 World Heritage sites, 15 Man and Biosphere reserves and 10 Unesco Geoparks, scattered in almost all Italian regions. The fact that they are often placed at a reasonable close distance between them represents an interesting opportunity for their promotion in an integrated way. As they are the expression of the Italian natural and cultural heritage, and of the interaction between man and nature, they also constitute a formidable tool for formal/informal and long life learning education to the 2030 Sustainable Development Goals Agenda.

The Italian National Commission for UNESCO, the E-Scapes Observatory of the Politecnico of Milano and the Earth Science Department of the University of Torino have put in place a test event that took place during 4 days involving 50 persons between bikers and local experts. By using a sustainable and slow mobility system (train + bicycle), they cycled for 270 km connecting two Unesco World Heritage sites (Sacri Monti of Varallo and Crea, the Vineyard landscape of Langhe-Roero and Monferrato) through the Sesia Val Grande Unesco Geopark, learning, along the way, about the connections between, art, history, culture, geodiversity and biodiversity and the opportunities of sustainable development for the local communities.

In fact, geosites of the Geopark illustrate not only a long-term geological history, from the old Sesia Supervulcano (280 Ma), to the collision between Europe and Africa (starting 65Ma), up to the Quaternary glaciations that shaped the Alps and the piedmont. They have been also seen as constrains for human settlements, as cultural georesources, such as ornamental stones and raw materials, as well as supporting ecosystem services for their role in soil processes, viticulture and rice farming.

The tour has given all participants the occasion to meet with several local mayors and administrative staff in charge of culture and tourism with whom this ongoing cultural experiment has been shared. This transect has been traced by the E-scapes Observatory within a study on the system of green infrastructure that is innervating the system of cities and complex landscapes in the “Central Park” between Torino and Milano, at the crossing of the two European corridors 5 (Lisbon - Kiev) and 24 (Rotterdam - Genova) as an opportunity for its sustainable development.

The experience took place in open spaces of cultivated fields, hills and natural resources crossed by a dense network made of linear components such as rivers, railways, canals, historical routes, fast and slow networks of mobility that connect small and medium size historical cities, where cycle routes could contribute to build a better integration between the main cities and the inner areas.

Within this ideal park, the Sesia river represents the central (“main”) tree, whose leaves are the most significant natural and cultural sites of the Sesia Val Grande geopark and the roots are embedded in the Po plain and the Hills of Monferrato and Langhe-Roero. As a result, this UNESCO route offered a complete cross-section on the cultural geology of the Unesco district of the Piemonte Region.

RURAL TOURISM FOSTERED IN YANDANGSHAN UNESCO GLOBAL GEOPARK

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Keywords: *rural tourism, geotourism, dendrobium, local community, jobs*

Session: Geoparks, sustainable tourism and local sustainable development

2018 is the Year of ‘Beautiful China – Regional Tourism’. Yandangshan becomes the centre and foundation of regional tourism development in the region from which stimulant radiates to the adjacent villages and towns and eventually covers the whole area surrounding the geopark. Yandangshan has adopted the new concept of ‘Geotourism and Healthy Life’ for fostering sustainable development through three separate strategic arms of ‘Geotourism and Leisure’, ‘Geotourism and Health’ and ‘Geopark and Dendrobium Farm Enterprise’. The geopark continues to promote itself as an excellent geotourism venue for leisure and education but has added extra health elements to provide visitors with healthy travel experiences. Activities such as guided visits to dendrobium farms, exhibition centres and processing factories as well as providing hand-picking, family farm-stay, spa healing experiences. These activities take place in 15 different villages with the direct involvement of 20,000 local people. The geopark authority works with well-managed dendrobium farms and associated outfits, allowing them the use of geopark logo for their products such as dendrobium powder, capsules, beer and face masks. In 2017, the total dendrobium growing area in Yandangshan has increased to 22,000 acres and has brought about 3.6 billion yuan (USD 58 million) of revenue and created 70,000 direct and indirect jobs to the local community.

MANAGEMENT EXPERIENCES IN ZHANGJIAJIE UNESCO GLOBAL GEOPARK OF CHINA

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Keywords: *Management experiences, sustainable development, geosite, geotourism, popularizing geo-knowledge*

Session: Geoparks, sustainable tourism and local sustainable development

Zhangjiajie UNESCO Global Geopark is located in the western Hunan Province of China and became a member of Global Geopark Network in 2004 and a UNESCO Global Geopark in 2015. Our geopark has been committed to protecting geological relics and ecological environments, providing high-quality services to diversified tourism, promoting and popularizing geo-knowledge, and making geo-tourism which is the core competence of our geopark. Over the last several years, a lot of management practices have been conducted in our geopark. In terms of the feedbacks from all levels of the public, this presentation provides a detailed introduction of these management experiences; typically in the fields of scientific research and science education, protection and exhibition of geological relics, organization of management body, capital investment and image promotion.

RURAL VITALIZATION-THE FINAL GOAL OF NINGDE UNESCO GLOBAL GEOPARK

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Keywords: *Rural Vitalization, public facilities, population of geo-sciences, effective measures, Ningde UNESCO Global Geopark*

Session: Geoparks, sustainable tourism and local sustainable development

Ningde UNESCO Global Geopark has joint the membership of the GGN since October 3rd, 2010. During the past eight years, our geopark has paid great attention to promote the development of rural areas inside geopark, and established long-term development strategy of rural vitalization. The key points of our geopark development strategy are listed as following. Firstly, our geopark gives priority to invest the public facilities, especially in the urban areas. For example, our geopark has helped towns and villages draw up tourism roadmap and improve tourism infrastructures. Also, we have built up a number of modern tourist service centers in several geo-sites of our geopark, which provide more assistances and convenience to the visitors including. Secondly, several actions have been taken to improve the population of geo-sciences knowledge in our residents, especially in teenagers. Our geopark has set up a series of cooperation relationships with a number of primary and middle schools. Our geopark often organizes various types of activities with those schools, such as summer camps, painting competitions, composition competitions and so on. In order to help students have a good education on geosciences and geopark concept, we invite experts to give lectures for teachers and students, and draw up a teaching material on geo-sciences of Ningde UNESCO Global Geoparkgeopark. Furthermore, effective measures have been taken in order to promote tourism industry. Our geopark organizes many tourism festivals in plenty of villages and towns inside our geopark region every year. Those activities attract a large number of tourists, including not only local tourists but also foreign tourists. Meanwhile, we have built up an effective supervision system in tourism industry in order to provide better services to the tourists. There are more than 1,000 local business, including restaurants, hotels and travel agencies, have been listed under our supervision system, which contribute to local tourism development and economic development.

MYTH AS TOOL TO IMPROVE GEOTOURISM: A CASE STUDY IN ANCIENT VOLCANO NGLANGGERAN, GUNUNG SEWU UNESCO GLOBAL GEOPARK (INDONESIA)

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Keywords: *geo-culture, myths, myth tourism, geotourism, cultural tourism*

Session: Education, public awareness and communication

This article aims to reveal the function of a myth, a form of an oral pliable communication, which is formed through word of mouth, and has become a unique cultural tourism attraction in ancient volcano Nglanggeran in the Gunung Sewu UNESCO Global Geopark (Indonesia). Kampung Pitu, located on the summit of the ancient volcano Nglanggeran, has its own uniqueness from its ritual communication, people and art. The concept of ritual communication, using the approach of Kejawen ritual, became the basis of this research. Ritual is a habitual action which contains transcendent value, so that rituals relate to voluntary performances conducted by the community for generations (based on tradition), related to patterned behavior. Communication has become the central of the interaction between humans through language in a particular culture. This study employs phenomenological research approach that seeks to understand the meaning, values, perceptions and goals in every action and decision in all aspects of human life in Kampung Pitu. The result of the study reveals that the people of Tanjung Pitu believes that the village can only be occupied by seven family heads. This belief has been adopted from generation to generation and must be obeyed according to the message of the elder of Tiago village, Eyang Iro Dikromo. The meaning of the myth is to preserve the nature in the ancient volcano Nglanggeran.

GEOPARK TRAIL CONNECTING CITIES, NATURE AND OUR HISTORIES: SAN'INKAIGAN GEOPARK, JAPAN

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Keywords: *long trail, tourism, health tourism, San'in Kaigan Geopark, guide*

Session: Geoparks, sustainable tourism and local sustainable development

People's consciousness of nature and health has been growing in recent years. San'in Kaigan Geopark Trail Council was established in July 2015 under the mutual cooperation between public and private sectors. By utilizing existing promenades, a long trail course with the total length of 91 km was set up for the purpose of promoting the local tourism focused on ecology and sports, and revitalizing the local area while preserving nature of the San'in Kaigan Geopark. This trail has a concept the route connects the coast which shows how the land of the San'in Kaigan Geopark had form, our history and communities. You can not only experience nature but also people's lives in the San'in Kaigan Geopark. Along the trail, you pass through the coast of Tajima Kaigan which exposed rough coastal cliff made of lava and pyroclastic rocks erupted during Miocene when the Sea of Japan was formed, and the Uradome Kaigan coast which alternately appears rocky beaches made of the Cretaceous continental granite and white sandy beaches with very clear water. On the path, you can also see traditional fishing villages, the dynamic ridge of Tottori Sand Dunes, the temple with more than 1100-year history and the 450-year-old castle remains, before you reach the city area. The San'in Kaigan Geopark Trail became gradually recognized by locals, national and international trail enthusiasts. Thanks to our efforts in public relations using websites, SNS and outdoor magazines, organizing the All Japan Long Trail Forum and regular events, and promoting to travel agencies, the number of visitors is increasing. We are also working on the training for trail guides, and 22 persons took the seminar for San'in Kaigan Geopark trail guides. By further extending the course, we make it goal to set up the trail course connecting through the San'in Kaigan Geopark from east to west by 2019. The interregional exchange and cooperation are expected by establishing the trail course across the multiple regions in San'in Kaigan Geopark and jointly hosting the same events. Making a tour visiting the whole San'in Kaigan Geopark Trail is also anticipated.

STRONGER TOGETHER COLLABORATION IN HERITAGE PROMOTION

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Keywords: *Geopark partners, Marketing, Heritage, Collaboration, Communication*

Session: Geoparks, sustainable tourism and local sustainable development

The Chablais UNESCO Global Geopark has for a number of years worked with the Chablais heritage association (Visites en Chablais) which accompanies tourists in the discovery of the wealth and diversity of the region. It brings together cultural and natural sites within the Chablais UNESCO Global Geopark and focuses on pooling resources to create better visibility (brochure, website, social media tools). Each year, 80 000 copies of a free brochure are distributed to hotels and campsites within a 100-km radius around the Geopark limits. This wide distribution is a high valued-added service which benefits every cultural and natural site thanks their collective commitment. The traditional print marketing approach remains a strategic choice given the fact that 69% of tourists consider brochures are essential for the organization of their trip. In 2018, the Chablais heritage association decided to renew its brochure to match promotional trends. Working in collaboration, the Chablais UGGp joined forces with Visites en Chablais to strengthen its marketing tools. Not only is the new publication stamped with the Chablais UGGp label, the Geopark and its tourist geosites are presented on a double page spread.

GEOPRODUCTS IMPROVMENT, CONSOLIDATING LOCALS ECONOMY AND PROMOTING GEOPARKS

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Keywords: *Geopark, Geoproduct, Local Community, Qeshm Island, Aras and Tabas*

Session: Geoparks, sustainable tourism and local sustainable development

Geopark as a unified and comprehensive system is highly depended on local communities and their benefits. There are several ways which locals can benefit from a geopark such as establishing local guest houses and restaurants, local tour guiding, geoproducts production and etc. Geoproducts not only can bring income for producers but also could be an excellent way to transfer knowledge and raise awareness about a geopark and its related features. It is better any aspiring geopark take a self-evaluation and reaches the minimum standards of the UNESCO Global Geoparks. Products of these aspiring geoparks also need to be evaluated quantitatively and qualitatively to resolve their deficiencies. Product evaluation in Qeshm Island UGGp, Aras and Tabas Aspiring Geoparks showed that the main deficiency of their existing products were lack of their relevance to various geopark elements such as nature, geology, landscape and culture. These evaluations were based on the criteria specified in Geoproduct Quality Standard which includes basic quality assessment, product features and characteristics, Informative content, environment friendly, creativity and innovation, etc. Another issue identified in the geoproduct evaluation was the lack of proper packaging and sufficient information on the products. Lack of proper packaging not only causes damage to the product but also due to the lack of proper appearance, customers are less willing to buy these products. Good packaging is a package that protects the product, have an appearance which is attractive and appropriate to the goods and it also includes sufficient descriptions of the product and its storage conditions. In three focused areas including Qeshm Island, Aras and Tabas Aspiring Geoparks, products were damaged due to extreme climate conditions, products were supplied in bulk and without packaging or lack of sufficient description of the product on the packaging were preventing proper recognition of the products and their proper sale. By designing package and bundling for selected products of these geoparks, now the quality level of products has increased and the local community has been keen to improve their packaging. Using the geoproduct evaluation system can determine level of existing products and what actions are needed to be done to reach the optimum level. The work experience in these three aspiring geoparks proved that this issue in geopark needs attention and consideration too. Geoparks may design and prepare new concept products by using artists and designers and transfer the techniques to locals through workshop and training courses. In this way, local people will be encouraged to involve in producing new products in the framework of geopark priorities.

CROWD SOURCING WITH PHOTOS AND SMARTPHONES TO DOCUMENT ENVIRONMENTAL CHANGES WITHIN THE GEOPARK OF THE CAUSSES OF QUERCY

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Keywords: *environmental monitoring, photo documentation, mobile application, crowd sourcing, citizen science*

Session: Education, public awareness and communication

Citizen science and crowd sourcing are modern approaches to collect data, while simultaneously raising awareness and interest of visitors of Geoparks. These institutions need data to detect, visualize, and document changes of the environment. This is the starting idea of the project PAN initiated in 2016 that was presented at the 7th Conference on UNESCO Global Geoparks. Meanwhile the concept has been modified and applied within the Geopark in France. We combined the idea of crowd sourcing and the high level of public acceptance for mobile apps to create a unique and easy tool to monitor their landscapes. The Park of the Causses of Quercy has initiated a photographic observation to follow the evolution of landscape and to document environmental changes. With smartphones and the app “Capture_ton_paysage” visitors of the Geopark take photographs at points of interest, such as Lot valley at Saint-Cirq-Lapopie, entrance of the village at Labastide-Murat. The user opens the app and selects an existing point of interest within the Geopark. Modern technology, such as augmented reality and GPS, guides the user to the desired location. Upon arrival, a virtual target appears to indicate the intended direction of sight (similar to “Pokémon Go”). The app takes the photo automatically and it is uploaded immediately, given availability of data connection and user approval. This approach enables the capture of photos at different times with different devices while ensuring minimum of variance of perspective and location. The users and responsible staff of the Geopark can view the photos in the app or on the website and use these photos for various studies, such as a longitudinal study of environmental changes. As the app is the main instrument, a web-front-end is the control center to administrate the content of the project. This content management system enables the administrator to manage the uploaded photos. It is possible to download the photos, which then can be used within other contexts (e. g. producing time lapse videos). The administrator is able to generate and modify points of interest. Thus, this solution provides a cost and time effective way to integrate the power of crowd sourcing into the Geopark for documentation. Consequently, the Park of the Causses of Quercy can initiate new projects and even challenges to monitor new point of interests. Finally, four important benefits for the Park of the Causses of Quercy as well as for other Geoparks can be mentioned: - documentation and covering of environmental situations - supervision of protective strategies and sustainable development (to use for revalidation of the Geopark status) - sensitizing and mobilizing inhabitants to the Park's landscapes - monitoring impacts of the Park's landscape and urban planning policies

MALLATA PROJECT: REBUILDING LINKS BETWEEN HERITAGE, LANDSCAPE AND PEOPLE

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Keywords: *Shepherding culture, Popular architecture, Landscape, Popular participation, Pyrenees*

Session: Conservation, science, research

In the Pyrenees, part of the landscape is the result not only of the geological frame but also of the shepherds' activity. During millennia, the presence of sheeps, cows and horses in the high grazing areas has shaped the mountains controlling the botanical diversity and also leaving behind an accurate distribution of the land among the local communities. As a result of this high mountain shepherding, there is a large amount of small areas called "mallatas" that include a little hut and are surrounded by spaces to keep the cattle. Due to the reduction on this traditional activity, many of them are collapsing. In the North of Sobrarbe-Pirineos UNESCO Global Geopark, the Ordesa and Monte Perdido National Park hosts an impressive heritage of these "mallatas". The Geoparks started last year the "Mallata Project" in order not only to rebuild this shepherds' huts but also to recover the ancestral skills of dry-stone building, the traditions and historical information linked to the mountain cattle industry and to show the relations between the huts and the geological environment (the source of the rocks employed in the buildings and the landscape). As Ordesa and Monte Perdido is also part of the Pirineos-Monte Perdido World Heritage Site, both for natural and cultural reasons, this project is a cooperation between two UNESCO designations. The funding needed comes from the Pirineos-Monte Perdido WHS while the organization of all the activities related to the project are developed by the Sobrarbe-Pirineos UGG. The participation of the National Park is also crucial to the succeed of the works. The rebuilding activities have been carried on by volunteers coming all along the Geopark territory led by a local expert in traditional architecture. This has permitted a high degree of involvement of the local people in the first year of the project that will continue during the second edition this year.

DIGITALLY BASED MONITORING PROCESS OF GEOSITES IN AZORES UNESCO GLOBAL GEOPARK: AN OPEN-SOURCE SOLUTION WITH ODK COLLECT, XLSFORM AND ENKETO FRAMEWORK

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Keywords: *monitoring, geosite management, Azores UNESCO Global Geopark, open-source, inventory*

Session: Conservation, science, research

The UNESCO Global Geoparks, as a concept and brand for the conservation of geological heritage with international significance and sustainable development policies with a holistic approach, require a constant effort from the geoparks and its operators to maintain and develop high standards for the preservation of geosites. The constant monitoring of sites is needed, examining visitors' impact, ongoing natural processes and several other factors in order to adjust and enhance its management. The methodology and the survey techniques used for monitoring is not standardized, also in connection with the great variety of management approaches, different geological features and their environments, but recommendations do exist. We propose a monitoring workflow, based on the framework of open-source applications and standards that could be used at the field to document the condition of geosites in form of a digital survey and with results being forwarded to a central database. The fieldwork is carried out with the mobile application "ODK Collect" that handles XLSForm standard, a simple, but powerful form-creating solution created by Columbia University. The points of the survey can be easily compiled in sheet editors such as Microsoft Excel, and then converted to an online survey with one of the XLSForm converters, available on the web. Before the usage on mobile devices, the form can be checked in Enketo, an open-source form handler which can also be used for data recording in case of notebooks. Besides collecting general answer-types (short answer, multiple choice, checkboxes), the app is also capable to add images about the site and geocode the location. After finishing a form, the results can be uploaded to a central database, a Google Sheet that functions as a repository of all monitoring occasions, and it is also possible to export part of its content for reports. The workflow named GAMG - "Geoparque Açores Monitorização de Geossítios" was developed for the Azores UNESCO Global Geopark, based on a paper form in usage for the monitoring of the Azorean geosites. The layout of the survey and the content of the questions is specific for this geopark (e.g. handling small, fragmented, distant areas on the islands), but the flexibility and the simple editing functions of the framework makes possible the usage at other UGGs as well. Based on the observations of the testing period, we intend to share the first results about the user experience and the outcomes of those tools and solutions in the management practices of geosites. Besides using it for the monitoring of well-defined geosites, the technical framework is also a good solution for the assessment of possible geosites that could make it a useful tool for aspiring geoparks, or for extension of existing geoheritage inventories.

*STUDYING SILICIFIED WOOD TAFONOMY IN PYROCLASTIC SEQUENCES.
THE KALLONI – SIGRI ROAD, LESVOS UNESCO GLOBAL GEOPARK , GREECE.*

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Keywords: *Pyroclastics, plant fossil findings, petrified forest, Lesvos, excavations*

Session: Conservation, science, research

Thick pyroclastic deposits produced by the gravitational fall and accumulation of fragmental material ejected by explosive volcanic eruptions in Lesvos island, Greece during Lower Miocene, host successive fossil plant rich horizons and provide valuable time layers useful in unraveling the eruptive history of the western Lesvos. The Kalloni - Sigri Highway on Lesvos island, which is 48.5 km in length runs through the protected area of the Petrified Forest. The construction of the Kalloni - Sigri Highway is funded by the Operational Programme "Improvement of Accessibility" NSRF 2014 - 2020. A Geo-conservation project aiming to the excavation and preservation of the fossils along the the Kalloni - Sigri Highway is implemented by the Natural History Museum Lesvos Petrified Forest. This project provided the opportunity of studying the silicified wood tafonomy in pyroclastic sequences. Work was carried out according to the approved study "Fossil Research" and included the following stages: A. monitoring the excavation works and conducting rescue excavations in the case of fossil discoveries, B. preserving and enhancing fossils remaining in original locations as well as transporting and installing movable fossils During the excavations, a great number of fossils were revealed all along the alignment. Specifically, dozens of fossilized tree trunks were discovered, standing or decumbent and in an excellent state of preservation. Horizons of leaves, branches and tree root systems were also identified. Large fossil concentrations have been observed in identified pyroclastic flow channels. Here the petrified trunks lie scattered, overlapping one another. The orientation of the petrified trunks coincides with the direction of the pyroclastic flow movement. In other places there are clusters of standing petrified trunks. Efforts have been made to preserve these fossils in their natural positions. There is no doubt that this rescue excavation of fossils is the largest of its kind so far in Greece, both in area and in terms of the number of findings. Accordingly, this is an area of particularly high scientific and technical value and of paramount importance for the study of plant fossils taphonomy. The project contributed significantly in raising community sensitivity regarding the geological heritage of Lesvos Island UNESCO Global Geopark.

BIODIVERSITY IS STRONGLY LINKED TO GEODIVERSITY: THE CASE STUDY OF ALPINE CHAMOIS IN CENTRAL-EASTERN ALPS.

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Keywords: *biodiversity, geodiversity, geomorphological diversity, life history, Rupicapra rupicapra*

Session: Conservation, science, research

In mammals, ecological factors such as environmental and climatic conditions can reveal key information on individual life histories and can have important evolutionary consequences. In analysing factors commonly thought to play a role in these processes, researches have so far neglected the possible influence of the geological features. Among ungulates, with special reference to species living in extreme environments, Alpine chamois (*Rupicapra rupicapra*) is an ideal case study to investigate how the geological substrate can promote different patterns of growth investment. We took into consideration a broad range of ecological factors that are expected to affect Alpine chamois body condition and analysed how the substrate (calcareous, siliceous or metamorphic) could modify the timing of body mass gain and the horn growth. We analysed biometric data from over 22,000 Alpine chamois legally culled during 8 consecutive hunting seasons (from 2010 to 2017, September-December period) in 28 hunting districts with different geological substrate in the province of Trento (6,212 km²; Central-Eastern Alps, Trento province, Italy). A special focus was given to the Adamello Brenta UNESCO Global Geopark (1,188 km²; West side of Trento province), an extremely diversified zone, with a remarkable geological and geomorphological diversity. The Eastern part of the Geopark presents a Mesozoic coverage of the Brenta Dolomites characterized by calcareous rock and the Western one is composed by the Adamello Batholite with a siliceous character. Interestingly, we found a key role of substrate (and related ecological conditions) in promoting body mass and horn length gain. Moreover, contrasting results in body mass gain in calcareous areas revealed a differential investment in body mass and horn length according to different geological features. Heavier animals lived on the siliceous substrate. Vegetation communities growing on siliceous substrates in the Italian Alps show a higher resistance to winter conditions than vegetation of higher quality growing on calcareous substrate, ensuring constant trophic level availability in different environmental conditions. Moreover, opal silica improves plant resistance to mechanical stress and pathogens. Available data confirmed that females experienced a later senescence than males, in accordance with a greater energy expenditure undergone by males in rut period. However, even in this case long-lived animals were related to calcareous areas, while siliceous substrate shortened life expectancy. In conclusion, we described a strong relation between geodiversity and biodiversity that can promote the use of alternative life history tactics in Alpine chamois. The achieved results could allow to operate an oriented conservation and management strategy for this species. More in general, improving knowledge on the link between biodiversity and geodiversity should be considered one of the priorities for geoparks and scientists could use geodiversity information to design conservation networks to promote environmental conservation.

GEOLOGICAL RESEARCH AND MAPPING IN THE APUAN ALPS UGGP (ITALY)

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Keywords: *brittle tectonics, Tuscan Nappe, exhumation, field research, Apuan Alps*

Session: Conservation, science, research

From the geological point of view, the Apuan Alps represent a large tectonic window where the deepest tectonic units, i.e. the roots of the Northern Apennines belt, are exposed. The Apuan Alps are, therefore, a natural laboratory for understanding the mechanisms and the processes responsible of the present-day architecture of the Northern Apennines. For this reason, the Apuan Alps tectonic window can be considered as a peculiar geological structure at international level in the field of Earth Sciences, and it was inventoried with the number 1 in the geosites' list of the Apuan Alps Geopark. The geosite includes the entire tectonic contact located between the lower Tuscan Metamorphic Units and the upper non-metamorphosed Tuscan Unit (i.e. Tuscan Nappe). The Apuan Alps tectonic window was created by the erosion of the upper part of the crustal "sandwich" structure resulting in a central core characterized by Alpine-type morphology, where the Tuscan Metamorphic Units are well exposed, and surrounding smooth and less high mountains, where the Tuscan Nappe crops out. The complex tectonic evolution of the Tuscan Units s.l. has been classically defined assuming two main deformation events (D1-D2). The first event (D1), occurred during the Europe-Adria collision, produced the NE-verging nappe stacking formed by ocean-derived units tectonically overlying the platform-type successions deposited on the Adria continental margin during Mesozoic, i.e. the Tuscan Units s.l. The second event (D2) led to the exhumation of the Tuscan Metamorphic Units at upper crustal levels. It was characterized by the activation of low-angle detachment faults mainly localized at the boundary between the metamorphosed and non-metamorphosed Tuscan Units and lately, by brittle high-angle faults that enhanced the uplift of the Apuan Alps metamorphic dome. Nevertheless, with the exception of the high-angle fault systems bordering the Apuan Alps, the mapping of the brittle structures has generally been neglected in the area. One of the main topics of the research collaboration developed between the Geopark, CNR and the Earth Sciences Department of Pisa was addressed to the geological mapping of the north-eastern sector of the Apuan Alps (Vianova area). The resulting detailed geological-structural map identified a polyphase faulting under brittle-ductile to brittle deformation regimes that severely dissected the original architecture of the Tuscan Nappe. We documented for the first time an east-dipping low-angle fault associated to a 1.5m-thick cataclasite affecting the Tuscan Nappe that produced tectonic delamination of cartographic importance. The fault is interpreted as conjugate to the low-angle fault marking the contact between metamorphic and non-metamorphic Tuscan Units outcropping south-east of Vianova. In addition, the a main NW-SE oriented high-angle fault system and two secondary fault systems oriented roughly N-S and NE-SW respectively, have been documented and mapped. This approach represents a good example of an open-air laboratory where university students can apply their knowledge and improve their skills on structural geology.

THE PALEONTOLOGY AFTER ARARIPE GEOPARK

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Keywords: *paleontological research, Araripe Basin, paleontological heritage, Territorial Identity, Fossils*
Session: Conservation, science, research

The Araripe Sedimentary Basin is worldwide known for the quantity, diversity and excellent state of preservation of its fossils. In this basin, fossils of dinosaurs, pterosaurs, turtles, lizards, crocodylians, fish, echinoderms, arthropods, mollusks, plants of various groups and microfossils of protozoa and algae are commonly found. In 2007 the Geopark Araripe was created under the auspices of UNESCO, the first Geopark of the Americas, an idea that focuses on the preservation not only of non-renewable natural resources, but also the biodiversity. The Geopark Araripe had as main arguments for its creation the protection of the fossiliferous patrimony of the Araripe Sedimentary Basin. The Geopark Araripe was an embryo generated as an extension project within the Regional University of Cariri (URCA) and is managed by teachers, students and community partners. This fact implies that the scientific production of Geopark Araripe is outstanding in the world scenario. However, until the creation of this Geopark no fossil species have been described by local researchers, and all scientific production was carried out by researchers from universities in the South-Southeast axis of Brazil or, mostly foreign. With the creation of the Geopark Araripe there was the formation of research centers oriented or related to the Geopark theme. Since then, there was several articles been published by local researchers in main specialized journals describing new species of plants and animals. In this way, the impacts caused by the creation of the Geopark Araripe throughout its 10 years of existence are reflected in the profile of the works and researchers related to the paleontology of the region. Associated with the scientific discoveries, practices of environmental education and scientific divulgation made in the communities of the local territories make the paleontology part of these communities' lives. In this sense, the Geopark Araripe has influenced the reduction of the international traffic of fossils, which had been withdrawn from this basin for more than a century. Far beyond the fossils, Cariri is a region rich in immaterial goods such as festivals, music, and religiosity, paleontology added to its intrinsic wealth that brought better conditions for the people close to the areas of geosites that have come to preserve and value material and immaterial goods. The Geopark Araripe, despite being a project under construction, made possible to advance, to guarantee and to value the traditions of the Cariri people.

THE EIDSBORG WHETSTONE - EXPORTED FROM GEA NORVEGICA UNESCO GLOBAL GEOPARK SINCE VIKLINGS RULED THE SEAS!

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Keywords: *ancient quarries, whetstone production, whetstone trade, Viking history, geotourism*

Session: Conservation, science, research

The Eidsborg whetstone was quarried in the Telemark County, right outside the border of Gea Norvegica UNESCO Global Geopark, for more than 1000 years. The first quarrying is dated back to 700-800 AC and the last quarries were closed in 1956. The raw material was an important trade item through the late Iron Age, the Viking Age and Medieval times and these recognizable whetstones are found in archaeological sites along the Norwegian coast, in the North Sea area, in Iceland, in the Baltic area and probably also further south in Europe. An ongoing project is exploring the history of the whetstone: the idea is to use the history to create a dynamic tourism asset in a geotouristic frame. Gea Norvegica Geopark is associated with the project for several reasons. One is to be the geological expertise, in close connections with the Geological Survey of Norway. The other reason is the big impact the transport and trade of the raw material had for the Geopark area. From the quarries down to the sea, the stones were transported along the waterways, for a distance of about 130 km. The transport was done by boats, horse carriages or just carried by men and a lot of place names in the area are connected with their transport. Also, many ship wrecks have been found along the waterways and the coastline, loaded with grinding stones from Eidsborg. These special rocks are also connected to the Viking history of Norway. The rock itself, a Precambrian quartz-mica schist, is not so peculiar when we look at mineral content but very recognizable by the look of it and by analysis. In the quarries the rock is affected by erosion and break into elongated specimens naturally formed as grinding rocks. Probably these elongated rocks were very useful as dead weight (ballast) on the Viking ships, easy to stack in a stable way in the bottom of the ships. Since they were already in the boat – if more weapons were needed during a battle – the long rods of rocks could be the perfect projectile for throwing – and a very deadly one. Marine archaeologists have found the Eidsborg whetstones on the bottom of the sea at the locations of famous Viking battles – a perfect example of history and geology connections!

DEPOSITIONAL PERIOD AND PROVENANCE OF THE CRETACEOUS NEUNGJU BASIN, IN THE MUDEUNGSAN AREA GEOPARK, KOREA

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Keywords: *Mudeungsan Area Geopark, Neungju Basin, provenance, depositional period, detrital zircon*
Session: Conservation, science, research

Depositional period and provenance of the Neungju Basin in southwestern Korea were studied using petrography and detrital zircon geochronology. The Neungju Basin is a Cretaceous nonmarine basin including dinosaur track-bearing deposits and belongs to the Mudeungsan Area Geopark in Korea, which was designated as a global geopark by UNESCO in 2018. The Neungju Basin is filled by the Neungju Group, which consists mainly of siliciclastic and pyroclastic sedimentary rocks with volcanic rocks. However, sedimentological characteristics of the Neungju Basin such as depositional period, provenance, and sedimentary environment have not been studied yet except for those of the Jangdong Tuff, the dinosaur track-bearing formation. The depositional environment of the Jangdong Tuff is known to be a lake margin. Thus, we carried out petrography and detrital zircon geochronology analyses on the Neungju Basin sedimentary rocks to constrain their depositional period and provenance. Basinfill of the Neungju Basin consists mainly of conglomerate, sandstone, siltstone, and tuff. Tuff content increases southwestwards. The conglomerates are generally matrix-supported and contain angular clasts such as quartzite, schist, granite, and tuff. Sandstones and matrix of the conglomerates are comprised mainly by angular grains of quartz, feldspar, and metasedimentary and volcanic rock fragments. The amount of rock fragments increases up sequence. Sedimentary environments of the Neungju Basin sediments are interpreted to be alluvial fan, fluvial, and lacustrine environments. Modal composition of the Neungju Basin indicates that siliciclastic sediments were supplied from the adjacent basement rocks such as Paleozoic sedimentary rocks and Jurassic granites in the northern part, while the southern part were mainly provided volcanic material. Detrital zircon age spectra of the Neungju Basin sediments reveal that the deposition of the basin began since 96-94 Ma, prior to the eruption of the Mt. Mudeung (86-84 Ma). The youngest zircon ages in the clastic sediments and the youngest zircon age peaks in the tuffs are well consistent with their stratigraphy. Interestingly, the clastic sediments in the Neungju Basin includes mainly Jurassic, Triassic, and Paleoproterozoic zircon grains but no Cretaceous ones. This means that the source of the tuffs was located in different regions from those of the clastic rocks. Comparison between the petrography and detrital zircon geochronology the the Neungju Basin indicates that the clastic sediments were mainly supplied from adjacent basement rocks consisting of Jurassic granites, Paleozoic metasedimentary rocks, and Paleoproterozoic metamorphic rocks.

GEO-EDUCATION PROGRAMS OF MUDEUNGSAN AREA UNESCO GLOBAL GEOPARK

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Keywords: *geoeducation, kindergarten, geoschool, sustainable, public*
Session: Education, public awareness and communication

The Mudeungsan Area Global Geopark has rich history, culture and ecology resources based on various geological resources centering on Mt. Mudeung, which includes Gwangju Metropolitan City, Damyang-gun County and Hwasun-gun County areas in the southwestern part of Korea. The geopark project has been approved by the National Geopark in 2014 and has been actively promoted with the recent certification of the UNESCO Global Geopark in April 2018. Among the various projects promoted in the Mudeungsan Area Geopark, the geoeducation program was the most outstanding in the National Geoparks of Korea. The management team and guide of the geopark participated in the program for the first time in Korea. The program was developed to combine indoor and outdoor classes in conjunction with geosites and currently has four programs after 2015. For kindergartners in the programs is called “Let’s make my own fold” we are experimenting with infants who have difficulties in geology by approaching the solid earth with the notion that they can bend, making the fold and fault structures by rubber clay. In addition, after the indoor class, we take a walk along the Gwangjuho lake ecopark where the visitor center is located, and we teach them that human are also a part of nature like flowers and trees. In addition to the regular programs, there is also a program called 'Geo School', which is run only during the vacation. In summer and winter vacation, 24 students are limited in advance, and the content of middle school earth science course is taught to elementary school students as athletic learning. What is unique here is that we have arranged our experiments as much as possible so that the experiment is less interesting to earth science subjects, and we can also proud of our region because it teaches in connection with the geological attractions of the geopark. These geoeducation programs are becoming increasingly popular in the way that parents of student recommend to each other or are recommended by teachers rather than advertising by posters, leaflets and other promotional materials. In this process, geopark guides feel a great deal of pride in their activities as a form of talent donation, and in the case of beneficiaries receiving education, they feel satisfied with the quality education services provided by the teachers. In the case of geopark managers, the popularity of geoeducation programs has increased, and the publicity has been promoted and the awareness of geoparks has been increased. Thus, the geoparks as demanded by local residents, will become a model for sustainable geoparks.

FOURGEOPARKS (2016-2018): AN ERASMUS + GEOPARKS PROJECT INVOLVING FRANCE, GREECE, PORTUGAL AND SPAIN

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Keywords: *Partnership, Heritage, students' horizons, sustainable development, teaching-learning*

Session: Education, public awareness and communication

This project takes place within the programme Erasmus+ Action 2 Strategic Partnerships. Our partnership is formed by four schools from 4 European geoparks (Lesbos Petrified Forest, Haute Provence, Arouca and Las Loras Geoparks). Geology is a highly unknown part of our culture and for that reason we intend to make the school community and population aware of what a Geopark is, their Geopark, its heritage and the need to preserve it as well as offer them the opportunity to know other European ones as possible models of exploitation and preservation. Under this pretext, our centers have opened their doors to other European schools as well as local and international institutions to expand our students' horizons and improve their results in competences. Consequently, we are using innovative tools and methodologies, working on real issues with real institutions and organizations, promoting the use and the update in new technologies and foreign languages, as well as the personal initiative and entrepreneurial skills of our students, by working in transnational teams in cross-curricula activities. We are getting to know our Geopark through a comparative analysis and promoting it through the design of guided routes, the creation of maps, leaflets and geotales and disseminating all these results through digital platforms and publications. We are also reflecting on their exploitation by observing other European geoparks and the design and study of possible businesses and products in the area, such as free time activities, restoration, tourism and handicrafts. Therefore, we expect to update the teaching-learning process to improve results and motivate students to continue to study and to work in the area, reducing school failure. With the dissemination of the project we intend to promote tourism, a tool for the sustainable development of the area and make the local population aware of the value of their Geopark and the need to preserve it. The results are and will be available for geoparks organizations, institutions, visitors, specialists in geology and teachers all over Europe on the digital platforms. As a result of all this work we will promote the empowerment of geoparks. All the activities and final products can be seen on the project webpage <http://lyk-peir-mytil.les.sch.gr/fourgeoparks/>. Each school has done presentations about their Geoparks, related to geology, flora and fauna and cultural heritage. They have presented them on the meetings that have taken place in the different Geoparks in the framework of the partnership. During these meetings students and teachers have visited other Geoparks, participated in workshops, known different cultures and created links. In every school there is an Erasmus+ place with information about the project. Also a sign for our project can be seen on the facade of the schools and students have designed a logo to represent it. At the moment we are all working on two types of activities. First, those designed to promote our Geopark, Secondly, we are promoting the entrepreneurial attitudes in our students. All this work will be presented in the meeting above mentioned, which will take place in Las Loras Geopark in April 2018.

THE ART OF COMMUNICATING A GEOPARK'S GEOLOGY

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Keywords: *geoscience, communication, writing, public, interpretation*

Session: Education, public awareness and communication

Communicating a geopark's geological story is fundamental to a geopark's success. It is possible – and essential - to write accurately of a geopark's geology without the barriers of specialist scientific lingo. And yet, communicating effectively with the general public is not something that comes automatically to geoscientists, who are trained to gain acceptance of their peers with their command of technical words and concepts. If, as a non-specialist, you do not understand what the geologist is saying, it is not your fault, it is theirs. In the course of applying for Global Geopark status, there is a need for 'hard' geoscientific writing for the IUGS evaluation of international significance but also the accessible writing required to deliver your storyline and to convey the significance and interesting features of geosites. The first, technical, approach to geoscientific writing is required to be granted Geopark status, but the second, publically oriented approach is required if you are to engage the visitor in a positive experience. It is this accessible manner of communicating that is elusive for most geoscientists. From experience in the interpretation of geoheritage, geoparks and World Heritage sites, it is helpful: a) to explain ideas visually to avoid falling back on scientific words (e.g. "A dragonfly flying high over the ancient landscape ..."); b) to tell stories of people, not just of rocks (e.g. "to Charles Lyell and Charles Darwin, Joggins was their 'Coal Age Galápagos'"); and c) to consider that the evolution of ideas is as compelling as the evolution of the Earth itself (e.g. "before the theory of plate tectonics, as recently as the 1960s, geologists did not know how mountain ranges formed, and why violent earthquakes and explosive volcanic eruptions occur where they do"). Specific mention needs to be made with respect to the telling of indigenous storylines: geology is one way of interpreting the Earth, but it is not 'truth': indigenous stories do not owe geology an apology, and do not need to be 'explained'. This concept is one that western societies need to learn if we are to reconcile with indigenous peoples, who were in truth, the first geologists.

POPULAR GEOSCIENCE EDUCATION SYSTEM OF SHENNONGJIA UGGP

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Keywords: *popular geoscience, geoheritage, education, practices, experience*

Session: Geoparks, sustainable tourism and local sustainable development

Shennongjia UNESCO Global Geopark preserves a complete Neoproterozoic and Lower Paleozoic sequence, which represents a significant transformation of landform resulting from a variety of geological processes. The unique landform of Shennongjia as well as its unique vegetation and rich biodiversity make it a perfect place for popular geoscience education. In order to make reasonable use of its geoheritage and resources to fully play its role in science popularization, Shennongjia UGGp established a popular geoscience education system that integrates various approaches, such as museum exhibition, interpretation panels at geoheritage sites, popular science galleries in tourist service centers, transportation nodes, community and school, geoscience classes, books, brochures and leaflets etc., which can introduce to the public the geomorphologic features of scientific significance in an active way. Its purpose is to help the public learn some basics of geology and provide them with a chance to know more about how the landforms were formed from a scientific perspective. Through sharing its practices and experience in popular geoscience education, Shennongjia Geopark wishes to contribute to the healthy development of all geoparks and help them better play their role in resource protection, science popularization and local economy promotion.

THE “ECHAPPÉE EN BAUGES”, A SPECIAL EVENT FOR EGN WEEK TO LINK MEETINGS, HERITAGE AND SOFT MOBILITY

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Keywords: *EGN week, meetings, round trip, cycling, Heritage*
Session: Education, public awareness and communication

In 2018 the Massif des Bauges UGG initiates an event to connect the 3 axis of our action, as part of the European Geopark Network week. 1 To increase awareness about heritage and geoheritage and more globally, actions engaged by the Geopark. 2 To improve the inhabitants participation and appropriation as well as to develop new practices for tourists, 3 To encourage soft travelling and mindfulness practices. This event is made of an eight-days slow tour, where every stage is the opportunity to organize meetings on special sites. These stages were chosen according to the sites and to the geopark actuality. The route includes a meeting point in an ecomuseum, on a fortified place (Fort de Tamié), at geosites, and in places of high architectural value (Ferme de Gy, Duingt castles). This provides a diversified approach of heritage in the most attractive way. This tourleas on an easy cycling route, to allow a large participation, either for a short time or for the eight-days trip. A bike with electric generator is part of a caravan and can perform video projected interventions, on the way, in unusual places. Inhabitants and visitors are invited to join the caravan for a short moment or for several days. Possibilities of bivouacs are also organized for people interested by several-days trips. Each stage of the tour is punctuated by short stopovers to observe landscape from beautiful points of view, wildlife (bird broods), heritage or geoheritage, cultural actions. The tour is also the occasion to visit sites where particular projects are in progress (geosite planning and arrangement, like the Bout du Lac reserve and nautic base, on Lake Annecy). This event is also an opportunity to promote a new discovery booklet about Lake Annecy dedicated to heritage discovery through soft mobility (by bike, on foot or by boat). This particular moment will therefore involve all partners of the project (contributors, and financier) and all partners who will be involved in its promotion and distribution . A special cruising on the lake is also planned including landscape interpretation times. The trip will also be filmed to promote the event and valorize partners; it will help to prepare possible future round trips in the coming years, with maybe a wider ambition.

A DIGITAL MAPPING ECOSYSTEM FOR GEOTOURISM DISCLOSURE

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Keywords: *web-mapp, app mobile, geotourism, geotrails, geocms*

Session: Education, public awareness and communication

Geoparks are an effective and efficient program that aims to familiarize societies and tourists regarding Earth Sciences and the protection of its valuable resources. Increased awareness can be acquired by employing innovative methods to tell and widespread the the experiences related to geological and cultural heritage of the territory. The innovative solution addressed in the presentation is a digital mapping ecosystem, with many components and features. The main idea is to give to a Geopark the power to publish with ease a cartographic website, a cartographic web-application and a cartographic native application. All of this from a single geo-CMS. The geo-CMS is the back-end part of the system, which allows to insert and manage geo-content: Points of interest, Tracks and Routes, with all the text, images and other technical information needed to describe geological and cultural features and experiences. The cartographic web-site is the first of the output channels, featuring all the content inserted in the ge-CMS. All POIs, Tracks and Routes are organized in the website according to custom categories and are shown in their natural geographical context. E.g. the end user can find all POIs or Tracks related to a geological theme (Tectonics, Geomorphology...), or view on the map where a specific Track and related POIs are located. The cartographic web-app is a HTML5 web map featuring the same geographical content, coming from the same geo-CMS. All custom categories are translated here into geographical layers on top of a high quality base-map. All features on the map are interactive and the end user can easily have access to all the information related to a POI, a Track or a Route. Before coming for a visit the tourist can have at home a comprehensive idea of what he would find in the territory of the Geopark and therefore plan his trip. The last main output channel is the native App (developed for Android and iOS), in which all the content is organized according to geopackages or geotrips, containing all the information for a field experience in the Geopark. All content of a single geopackage can be downloaded on the device and thus is available in offline mode. With the help of the geolocation the user will find his way along the chosen track and will discover all the diverse related geological attractions on the field. Recently, the digital mapping ecosystem described above has been used by some public authorities, and the following case studies are addressed in the presentation: Adamello Brenta Unesco Global Geopark, Italy Apuan Alps Unesco Global Geopark, Italy Parco Minerario del Lagorai, aspiring Geopark, Italy Tectask, the Commission on Tectonics and Structural Geology of the IUGS

ENVIRONMENTAL BOARD GAME : AN INTERACTIVE GEOPARK INTERPRETATION TOOL TO EDUCATE CHILDREN

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Keywords: *board games, interpretation tool, geopark, environment, education*

Session: Education, public awareness and communication

As a new sustainable development concept in Indonesia, Geopark has not known widely by its people. An area being a Geopark means local people has to keep their environment sustainable. But Indonesian people tend to know Geopark just as another tourism destination. So, it's important to socialize the concept of Geopark as soon as possible to local people. Starting earlier is the key to have great foundation of people understanding, especially about environmental issues of their surrounding. This means environmental education should begin in the earliest years of life, which childhood level play an important role here. Environmental education at the early childhood level will help to shaping life-long behaviour and gaining deep awareness toward natural environment. Children nowadays have no clue at all in such a great responsibility of taking care of their environment. Approaching method to educate children will be totally different with adult. Children will need an interactive interpretation tools to help them easily understand and make it fun to learn everything about Geopark. Playing games are the most easiest way to get children attention and attachment in this case. But the question later is which games that are fit perfectly as interpretation tool for children? Through years board games have shown its strong existence in the world of games. Research has already revealed that simply playing board games it helps brain development, building social skill and self esteem. Despite the fact that this phenomenon has spread over the world, this method is rare to used as an environmental interpretation tools for children. The content of the board games could be improved based on pillars of Geopark and environment issues. This concept will educate children as the player to be more eco friendly and more responsible with their environment. The game material will be made of recycled waste which is safe for children. Trough this board game which based on environmental issues surround Geopark area, children can see the important of sustainable environment. They can relevance the concept of Geopark with fun ways. Preparing children to be good environmental citizens is the most important work. to do as the first step of people empowerment surround Tambora Geopark area. They are the seeds that need strong root to grow healthy and gives values to the generation yet to come.

GEOSITES, GEO-ITINERARIES AND GEOLOGICAL TOURISTIC MAPS: A CHALLENGE FOR THE PARKS OF THE ABRUZZO REGION

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Keywords: *Geotourism, Education, Landscape and hazard awareness, Parks, Abruzzo*

Session: Education, public awareness and communication

The National and Regional Parks of Abruzzo incorporates the highest mountains of the Central Apennines as “old guardians” of the landscape from the Tyrrhenian to the Adriatic side of Central Italy, “Candide cime, grandi nel cielo forme solenni ...” (Snow white peaks, big in the sky majestic landforms... as defined by the poet G. d’Annunzio in 1903). They are spectacular landmarks showing the variety and complexity of processes and morphogenetic events in Italy. They tell the story of a >200 Ma long geological evolution, which created the landscape and is also responsible for the present natural hazard (i.e., landslide, flood, seismic, etc.). Complex Meso-Cenozoic marine palaeogeographies are still reflected by the main mountain ridges and offer, to scientists and tourists, imaginary journeys through ancient, now vanished, coral atolls and blue deep seas. The present geological setting of the ridges is related to the Neogene NE-verging thrust belt of the Apennines, a segment of the large Alpine-Himalayan orogenic system. The geomorphological features, such as tectonic basins and fault scarps, valleys (of glacial or tectonic origin), glacial cirques, alluvial fans and river terraces, landslides and karst landforms, preserve the memory of the landscape evolution over the Quaternary. Moreover, the fair knowledge of these features is the base for the comprehension of the natural hazards and for increase the awareness into the general public. For this reason, in Abruzzo, once defined the ‘region of parks’ and a “green lung” of Europe, the enhancement of geological and geomorphological heritage has been pursued, with > 20 years of activities, starting from the definition of geosites and geomorphosites, passing to the realization of geological touristic maps and leading to geological itineraries and information panels. This work illustrates methods, initiatives and activities realized so far and planned for the future. Different types of geosites are defined (i.e., geosites, geomorphosites, paleontological sites, hydrogeological sites, archeogeosites). Geological trails and information panels are mostly based on different types of tools such as: 3D reconstructions, aimed to provide a three-dimensional perception of geologic processes and elements; landforms highlights, aimed at increasing the perception and identification of landforms and processes, as well as their impact on the landscape; palaeo-geographic reconstructions and cartoons, aimed at showing the evidence of landscape evolution. These tools, in our opinion, are a challenge for the Parks of the Abruzzo Region to define a connection between the observation of the landscape, through the geological-geomorphological heritage, to the awareness of the long term geological evolution and short term natural hazards. Here, the landscape can be deciphered by earth scientists and results from an intricate geomorphological history. Nevertheless, the same landscape can be discovered and comprehended by everyone. And finally, this approach is aimed at increasing the people awareness on the geological processes and hazards (e.g. seismic, geomorphological), which are something to understand and live with, through a fair knowledge and a proper land management.

ART AND GEOLOGY IN A CULTURAL LANDSCAPE

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Keywords: *Art, Community, Audiences, Cultural Landscape*

Session: Education, public awareness and communication

Despite how remote and natural some of our Geoparks can seem they are often cultural landscapes, the product of thousands of years of human interaction with the environment. The dominant influences on the post-glacial landscape of the North Pennines, for instance, have been forest clearance, the evolution of farming, the development of settlements, mineral mining and in relatively recent times the management of the high fells as grouse moors. But the story of this landscape is underpinned by changes wrought by geological processes and climate that have been going on forever.

Landscape is of course, so much more than just the view. Our understanding of landscape is bound-up with how the land has been used over time, how it has evolved, and the stories often hidden within it. When the stories of a landscape are known to us, our appreciation of it (and crucially our desire to look after it) can be so much greater than when faced with a beautiful view without the time-depth of stories that may go with it. To understand it properly it is important to see the human stories alongside, and as part of, those of nature. An approach based purely on the sciences of geology and ecology can miss a vital element in the area's long-term conservation and risks pushing local communities – past, present and future - to the side of their own story.

There are, of course, many ways of telling those stories and many different audiences that respond to different approaches. The North Pennines UGG team collaborates with artists to help more people, and new audiences, engage with their landscape and geological heritage. This includes outdoor installations, craft works, writing, drama and film-making, supported by work to interpret the geological and other natural heritage behind the art. In this presentation, we'll look at work with schools and the wider public and at new commissions that reach thousands of people. We'll look at work done, and work to come and we'll consider the benefits of using art and artists to reach audiences that other approaches cannot reach.

LANGKAWI UNESCO GLOBAL GFEOPARK: NEW INITIATIVES ON THE DEVELOPMENT OF PUBLIC EDUCATION AND GEOTURISM ACTIVITIES

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Keywords: *Island Geopark, Community Engagement, Business Partnership, Heritage Conservation, Public Education*

Session: Education, public awareness and communication

Langkawi UNESCO Global Geopark (UGGp) was recognized as a Global Geopark in 2007 and since then, it has successfully undergone two revalidation missions in 2011 and 2015. As a UGGp, Langkawi has embarked on various public education and geotourism activities. Most of these activities are initiated based on Research & Development (R&D), advisory and consultancy services and University-business partnership. The R&D activities concentrate on fundamental and multi-disciplinary research, and public education about Langkawi UGGp.

Consultancy services were provided for businesses, local authorities, and local community on the development of geotourism products, such as the biogeotrail at Kubang Badak Village. Partnership between the University and businesses are forged to develop a public gallery.

This paper highlights how university researchers work in partnership with Langkawi UGGp stakeholders to devise and implement pragmatic strategies and plans that aim to educate the public, develop geotourism, while combining economic and sustainable conservation development for the island and its community.

THE #FOSSILSEACHALLENGE: AN INSPIRING INITIATIVE FOR HIGH-SCHOOL STUDENTS WITHIN THE DOLOMITES UNESCO WORLD HERITAGE SITE

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Keywords: *scientific knowledge, educational disclosure, high-school students, geology, Dolomites*

Session: Education, public awareness and communication

Workshop: Geo-education

An increased knowledge of geology, primarily intended as characteristic properties, building mechanisms and geological history of the Earth, makes people aware of the world where they live and the impact of Earth Sciences on their life and society. This is especially needed for young people and students, in order to establish a solid scientific and cultural basis for a better tomorrow's world.

A geology-based project for high-school students from territories belonging to the Dolomites World Heritage Site in north-eastern Italy is presented here. It concerns free-access yearly-based challenges, aimed to promote involvement of student groups on broad geological themes. Projects regarding technical and scientific researches, as well as scientific and educational disclosures are encouraged. The 2017-2018 announcement has concerned the theme of water, as element involved in dolomite rock formation and also as natural factor actively shaping valley morphology due to erosion and karst dissolution. Projects from eight high-schools within the Dolomites region were received and evaluated.

All of them face the proposed theme starting from original and greatly differentiated points of view, by means of creative and often unconventional tools. From explaining posters and videos, to murals and fantastic stories; from organisation of imagined thematic conferences, to laboratory experiments, video games and gadget creation.

All the participants extensively used information technologies and multimedia, employing also different languages and emphasizing the role of geosites and thematic geotrails. The amazing karst morphologies of the Pian della Nana in the northern Brenta Dolomites, within the Adamello Brenta UNESCO Global Geopark, were described and presented. Water was also analysed by students as an essential natural resource for human life, in relation with pollution and climatic changes. Following an actualistic perspective, the Great Pacific garbage patch was provocatively compared to atolls and coral reefs of Triassic age, the natural environment where dolomite rocks originally formed.

The #FossilSeaChallenge initiative is not concluded and it will continue in the next years. Fire, being a major endogenic force that originates and incessantly recreates the geological matter, is the theme announced for the 2018-2019 challenge. The #FossilSeaChallenge is a new and inspiring opportunity which can be a good practice example for regional and local institutions (e.g., geoparks) to actively involve students and people, to increase their knowledge of all geological aspects and to permit their active participation in environmental and cultural dissemination.

HYDROTHERMAL SYSTEMS, GEOTOURISM AND UNDERGROUND PHYSICS LABORATORY AT COMARCA MINERA, MEXICO

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Keywords: *Interdisciplinary research, Sustainability, Underground experiment, Ore geology, Mexico*

Session: Education, public awareness and communication

Ore deposit research and particle physics converge in an inactive underground mine. An interdisciplinary study is being carried out at the Río el Milagro historical mine workings, a geosite located in El Chico municipality, Comarca Minera UNESCO Global Geopark, Mexico. Combining these two scientific initiatives at the same geosite, with the geoeducation and geotourism content, provides an original offer to locals, students and visitors, and is in accordance with the holistic vision of Geoparks.

It is thought that during the Miocene, powered by magmatic heat located deep in the crust, aqueous solutions circulated upwards through the shallowest portion (<1.5 km) of the crust in what is now Comarca Minera, producing one of the largest silver concentrations in the World. The product of this hydrothermal activity were precious metals deposited in the form of veins, stockworks and disseminations in the host rocks. When discovered during the mid-XVI Century, these extraordinary mineral deposits fostered the settlement of mining towns like El Chico, which preserves a mix of Spanish, Cornish, North American and Mexican industrial legacy. But telling this story to the required scientific detail needs: (a) systematic sampling of veins and the alteration mineralogy; (b) petrographic analysis of both rocks and fluid inclusion assemblages; and (c) geologic modeling.

The fossil geothermal print recorded in these rocks is today being bombarded with energy particles coming from the sun and the ionosphere; they are attenuated through the rocks and fall like an invisible rain. This is where geology meets with particle physics. Two mines of Río el Milagro are currently used for tourist visits: San Antonio and Guadalupe. In both mines we are carrying out an underground topographic study in order to install a high-purity germanium detector, in which will be the first underground physics facility in Mexico. This project has in the first place a didactic purpose. Therefore, future guided mine tours could include geology and particle physics, as well as mining history and traditions, so that our visitors will appreciate that an inactive mine brings the possibility for increasing the knowledge of our planet and the understanding of the cosmos.

FROM REAL TO VIRTUAL: NEW APPROACHES FOR SCIENTIFIC MEDIATION AND THE PROMOTION OF GEOLOGICAL HERITAGE.

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Keywords: *geologic heritage, scientific mediation, digital technologies, valorization*

Session: Education, public awareness and communication

“Geology is difficult”. This hermetical consideration summarises the common opinion of the large audience on Earth Sciences. “Difficult” can bear different meanings: the complexity of geological phenomena, the difficulty of visualising and representing them in a mind map, the time-dimension, far from human scale, the suspicion for an extremely technical and specific terminology. To overcome these obstacles and promote a spontaneous encounter between geology and the large audience, Muse – Museo delle Scienze in Trento and Museo Geologico delle Dolomiti in Predazzo are involved in researching and developing new and alternative ways of interpreting the subject in indoor and outdoor contexts.

An attentive reconsideration and update of the traditional communication methodologies in a ludic-educational perspective and the development of contents conveyed through modern digital technologies, allowed the implementation of effective mediation and interpretation tools for geological knowledge, also able to emphasise the emotional and aesthetic components distinctive of geology and paleontology. The multimedia guides available at the Muse were implemented with new features in augmented reality (A.R.) and virtual reality (V.R.). These devices allow the visitor to view contents and details placed “virtually” in correspondence with the objects to which they are related to. Reconstructions and 3D animations of animals materialise when framing the displayed skeletons of prehistorical reptiles and dinosaurs with a smartphone. Outdoor projects include the Dos Capel Geotrail e Col Margherita Park, two new at-altitude installations which narrate the UNESCO WHS Dolomites with complementary approach. The project adopted a multidisciplinary approach with the engagement of professionals with scientific, educational, artistic and communicative backgrounds. The result is a first-hand experience which involves the visitor totally. Observing, exploring, discovering and experimenting through game is what the visitor does individually, in group, or under the guide of an expert. To offer an even more involving experience and to provide guides and experts with modern educational tools, a new project is currently being developed to devise immersive digital instruments for outdoor environments, which will allow to dynamically visualise extinct life forms, paleoenvironments, paleogeographies, complex geological processes and phenomena, currently investigated by researchers of the Muse and other institutions.

All this in the firm belief that promoting the geological heritage of unique areas such as the Adamello-Brenta Geopark and the Dolomiti UNESCO WHS, can crucially contribute to a higher and better general awareness on the subjects of geology, training citizens toward a higher understanding of the value and vulnerability of their territory, therefore more sensitive to actions in favour of prevention, care and protection of environment and landscape.

GEOPARK KARAVANKE/KARAWANKEN: HOW AN IDEA BECOMES A GEOPARK LOCALITY

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Keywords: *Geopark Karavanke-Karawanken, geo locality, interpretation, interpretive planing*

Session: Education, public awareness and communication

The Karavanke-Karawanken UNESCO Global Geopark (Geopark Karavanke) rised from two important regional initiatives: the cross-border cooperation of the 14 municipalities and the touristic development of the two touristical mines. Yet this was not enough to highlight the border areas potentials, which were found in the rich geology. Apart of the two mines the geological treasures of the area were not known to the general public, nor to the locals. That is why the first Geopark Karavanke project was aimed to research the geology and the geosites of the area and to choose the appropriate ones to become geopark localities, which would further on form the identity of the region. Based on the geological groundwork, the management plan and the interpretive strategy since 2010 the Geopark highlighted 24 geopark localities – build and equiped 2 visitor centres, 7 interpretational polygons, 4 interpretational points and 9 theme paths, 2 geological exhibitions and published several publications. Additionally some of the existing visitor centres, museums and other touristic infrastructure were enriched with interpretational approaches and geological contents. But before a geosite becomes a geopark locality a specific process of interpretational planning has to be carried out. The aim of the presentation is to explain this process and to discuss how it can be improved. At the beginning of the process we have to ask ourselves the following key questions: Why are we doing this and what do we want to achieve? What will we interpret? Who is it for? How will we do it? How will it be managed? The draft idea coming from the answers is the basis for setting up a team, who will prepare an interpretive plan for the geopark locality. The interpretative plan starts with the theme or the message, that we want to give to our visitors with this geopark locality. After we have chosen the theme, the idea starts to grows into reality. The planning process continues with gathering information, analysis of the information, finding appropriate interpretational approaches and options and evolve them into actions. Here the technical part starts: documentation, public orders, consensus, permissions ... After that the architects and designers come into action and set up an animation plan. The animation plan is revised by the team and finally the building and setting up the animations starts. When the work is finished, we have to evaluate and monitor the new interpretation settings, to find out, if it is working, if it is achieving our aims and how we might to improve it. We are aware that this process can be affected by different factors, which can be predicted or force us to be even more inventive. The experiences and the respond of the local community motivated the Geopark Karavanke to continue this work. It will be realised in the upcoming projects, which will enable the establishment of 23 new geo localities and strengthen the geo identity of the region even more.

GEOEDUCATION FROM TRAINEES TO LOCAL INTERPRETERS (GUIDES): THE CASE STUDY OF AROUCA GEOPARK

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Keywords: *geoeducation, geotourism, training, Local guides, Arouca Geopark*

Session: Education, public awareness and communication

Tourism activities are strongly based on the direct relationship between the service provider and the customer. Attending to an increasing demanding demand and a necessarily more qualified offer in the Arouca Geopark it was fundamental to create a training course for local guides (Interpreters of the Arouca Geopark) and the service of interpreted visits recognized as a quality service. In this sense it was justified to perform a training course of «Interpreter of Arouca Geopark», which had 50 hours long, with theoretical classes and fieldtrips, in the areas of Geology, Biology, Cultural Heritage and Tourism. At the present moment it was attended by 80 trainees, during the four editions promoted in 2011, 2012, 2016 and 2018. Thus, a set of norms and requirements were defined with the purpose of ensuring the excellence of the service of interpreted visits and at the same time promoting the organization and protection of the professional «Interpreter of the Arouca Geopark». To ensure the excellence of the service of interpreted visits to the Arouca Geopark and at the same time to promote the organization and protection of the professional «Interpreter of the Arouca Geopark» was also defined a set of norms and requirements («Bolsa Ativa»). The «Interpreter of the Arouca Geopark» is considered the guide who accompanies visitors on trips and visits to places of tourist interest, integrated in the Arouca Geopark, providing information about natural and cultural heritage and whose activity is exclusively exercised in the classified territory. The service of interpreted visits ensure that visitors understand and value the existing heritage through the interpretation and personalization of the visited places, with the purpose of adding value and enriching their experience. Deserves particular highlight the annual program of interpreted visits to the «Route of geosites of Arouca Geopark», a tourist entertainment program of reference in our territory, whose inscriptions exhaust all times. The service of interpreted visits has high socio-economic potential being an incoming for several families in our territory. The promotion of interpreted visits to the Arouca Geopark combine territorial development with markets of special interest, whose concern is the knowledge and preservation of the local heritage, thus ensuring the conservation of its integrity - this fact reinforces the Arouca Geopark as a territory over (and for) the people who live there, these being its greatest asset. It must be considered that the Arouca Geopark deals with the people who live there and their interaction with visitors to their territory. The success of interpreted visits to the Arouca Geopark depends on the active participation of the local population and, above all, the performance and capacity of its ambassadors - the Interpreters (Local Guides) of the Arouca Geopark.

AN ATLAS ABOUT SOILS IN THE UNESCO GLOBAL GEOPARK TERRA.VITA

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Keywords: *Soils, Atlas, Agriculture, secondary schools, European Land and Soil Alliance*

Session: Education, public awareness and communication

An atlas about soils in the UNESCO Global Geopark TERRA.vita. Our soils, an underestimated treasure 95% of our food cannot be produced without soils. What kind do we find in TERRA.vita, Germany. What kind of results do soils produce? Many of these questions find answers, written down in the new soil atlas of TERRA.vita. Soils play a very significant role, located as a very thin and vulnerable skin between rocks and biosphere. Soil degradation is very evident in many places of the world, but soils still lack the same esteem and recognition as water or air get. TERRA.vita is located on the brink of northern Germany's flatlands and the first ridges of the mountainous area; therefore we find all different kinds of soils. Agriculture plays a very important economic role and therefore puts high, sometimes too high demands on our soils. The new atlas provides first-hand information and is written in a popular but scientific based and proven language. The first pages offer a short introduction into basic soil knowledge and continue with a presentation of the 17 most significant soil types of TERRA.vita. Every type is presented on four pages, following a standardized structure. The content offers information about the soil profile, soil building processes, chemical, physical and general core characteristics, the spreading in TERRA.vita, usage potentials and usage risks. The atlas is illustrated with a huge number of pictures, graphics and anecdotes. The core target groups are the secondary schools and we are addressing all schools in TERRA.vita and provide free copies for those who express a real interest. The atlas is added to our 10 TERRA-boxes and two soil boxes we are renting to educational institutions and schools. But the atlas also addresses the communities, their politicians and planning departments. Here the decisions are taken how the soils will be used for housing and construction, causing sealing and therefore a destruction of soils. In Germany still 90 ha of soils are sealed daily. Why has this unique atlas been produced in the TERRA.vita area? It all started in the year 2000, when the project "Fascination Soil" was acknowledged as an external project of the Expo Hannover. One lasting result is the TERRA.park, a two ha landscape park, informing about TERRA.vita's soils. In 2000 also the ELSA association was founded in Osnabrück, the capital of TERRA.vita. The European Land and Soil Alliance tries to raise soil awareness, addresses communities and cities and acts as a lobbyist for soils. From TERRA.vita's perspective, soils are a suitable issue to be addressed by Geoparks. Geoparks can offer core information about the evolution of soils, they can deliver deep inside views into the fascinating world below our feet. Soils are no dirt. Soils are crucial for the existence of mankind. They are a linking part between the lithosphere and biosphere. Soils need the attention of local people, children, farmers, politicians and all decision making and land absorbing planners. The atlas is available at bookstores for 12.90 € or www.geopark-terra.vita.de.

A YOUNG MEMBER OF THE GGN- ARXAN UNESCO GLOBAL GEOPARK

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Keywords: *Arxan UNESCO Global Geopark, Global Geoparks Network, Japanese Geoparks Network, Networking, contribution*

Session: Regional and International UNESCO collaborations

Arxan UNESCO Global Geopark (Arxan UGGp) is located in the jurisdiction of Xing'an League, Inner Mongolia Autonomous Region, the People's Republic of China. The total area is 3,653.21 km². It was officially designated as the UNESCO Global Geopark and the member of the Global Geoparks Network (GGN) in May, 2017. Arxan UGGp has abundant geoheritage of significant national and global value. The great variety of volcanic landforms, volcanogenic lakes and natural spring groups is highlight attraction. As we known, UNESCO Global Geoparks are about cooperation with local people and local stakeholders within the area, but also internationally through regional and global networks. By working together, across borders, different communities share expertise, knowledge and best practices, and increase mutual understanding. Arxan UGGp recognizes the important roles and functions of networking and partnership in the geopark networks. In the past year, Axan UGGp has actively facilitated knowledge exchange and experience sharing with other GGN members through participating in and organizing networking activities, including (1) the 7th International Conference on UNESCO Global Geoparks held in the English Riviera UGGp in 2017; (2) the 5th APGN Symposium hosted by Zhijindong Cave UGGp in China in 2017; (3) the 1st, 2nd and 3rd International Geoparks Management and Development Training Course where the Arxan UGGp representative had meaningful exchange of experience with other GGN peers; (4) A geopark staff exchange programme was launched with Yanqing UGGp for 2017-2018. With the aim of learning more about each other and developing a closer relationship, a representative of Arxan UGGp was invited to attend the first ever visit and exchange programme between the Chinese Geoparks Network (CGN) and the Japanese Geoparks Network (JGN) from 12 to 19 April, 2017. This programme aspired to establish a starting-point for future networking and exchange among geoparks in China and Japan. As a follow up of the first visit of CGN representatives to the JGN in April, 2017, representatives from the JGN, Itoigawa, Muroto, San'in Kaigan, Unzen Volcanic Area and Oki Islands UGGps, Izu Peninsula, Mine-Akiyoshidai Karst Pleateau and Nanki Kumano National Geoparks of the JGN visited Arxan UGGp from 12 to 17 September, 2017. This exchange activity was part of an on-going effort by the CGN and JGN to promote mutual understanding and a partnership culture. Although Arxan UGGp has obtained some achievements on networking. As a young member of the GGN, we think it is just our beginning. In the future, Arxan UGGp will focus on strengthening the participation in activities related to GGN, the communication between network members, learning domestic and foreign successful experience on geopark management and making more contribution to the GGN family.

UNESCO NETWORKING IN THE SURROUNDING OF MUSKAU ARCH UNESCO GLOBAL GEOPARK (GERMANY/POLAND)

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Keywords: *UNESCO Global Geopark, co-operation, UNESCO destinations, education, sustainable development*

Session: Regional and International UNESCO collaborations

Based on a long-term co-operation between the two German-Polish UNESCO destinations Muskau Arch UNESCO Global Geopark (UGG) and the Prince Pückler Park World Heritage Site a more extensive co-operation project was created in 2017/2018. It is a triannual project from 2018-2020 being led by Muskau Arch UNESCO Global Geopark named as “Lusatian network of UNESCO destinations (Lusatia is a natural cross border German-Polish landscape).

The project comprises Muskau Arch UGG, Prince Pückler Park World Heritage Site, Biosphere Reserve Spreewald and Biosphere Reserve Oberlausitzer Heide- und Teichlandschaft. A further partner is a national intangible heritage (ethnic minority of the Sorbes). In the past, the different destinations developed and executed their own concepts. The idea of the project is to knot the single approaches to a holistic network of sustainable education. The World Heritage Site brings aspects of culture. The Man & Biosphere Reserves yield facets of nature and nature protection. The UGG places the issues of geology and landscape development as well as the use of raw material. Last but not least, the Sorbes contribute their regional language and folk art.

With respect to the UN Sustainable Development Goals, the project’s aim is to build up a network of education for sustainable development. So we want to enable the people for future-compliant health and well-being activities and environmentally responsible behavior.

For networking, an advisory board consisting of state administrations, universities and high schools, chambers of commerce and agriculture, employers as well as education authorities have been included. Altogether, there are network participants from two federal states of Germany (Brandenburg and Saxony) as well as one Voivodship of Poland (Voivodship Lubuskie).

The target audience are tourists and the general public, professors and scientists, teachers, pupils and preschoolers, agricultural and forest firms, handcrafters and owners of several small businesses.

APUAN ALPS UGGP AND TUNISIAN NATIONAL OFFICE OF MINES COOPERATION FOR THE GEOPARK PROJECT IN SOUTHEASTERN TUNISIA

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Keywords: *geological heritage, best practices, territorial management, sustainable local development, southeastern Tunisia*

Session: Geoparks, sustainable tourism and local sustainable development

Since 2014 the Tunisian National Office of Mines (ONM) signed a cooperation agreement with the Apuan Alps UGGp (Italy), in order to increase the knowledge of its staff and undertake the correct pathway to achieve the UNESCO Global Geopark label. The aspiring geopark area corresponds to the southeastern Tunisia region where the geological heritage has an universal value thanks to the unique outcrop of Permian marine deposits in Africa (Djebel Tebaga) in addition to other geosites having geomorphological and paleontological interest. The heritage of southeastern Tunisia is also enriched by several features linked with its history and architecture: the ksour, and its unique architecture designed to stay cool during the arid season near the Sahara desert, are an impressive example of human works integrated in landscape and of sustainable use of georesources; the “tabias” and “jassours”, hydraulic works for harvesting floodwater within a streambed, are 900 years old and are an integral part of the countryside. The ONM improved the inventory of the main geosites, filling several cards where the sites are identified according their geological value and level of interest and described by a geological and environmental explanation. In 2017 a new joint project between the Apuan Alps UGGp and the ONM funded by Tuscany region, started. The specific aim of the project is the promotion of an economical-territorial system based on the UGGps’ philosophy, able to favor democratic processes and sustainable local development. The involvement of the Apuan Alps UGGp was finalized to show the possible democratic management of the area and its valorization as possible solution to social and financial issues in depressed areas. In particular, the project has cofunded the workshop “Geoparks: protection and valorization of the geological heritage and engine of development of an alternative tourism” with the participation of specialists and stakeholders coming from Tunisia and other Arabian countries. It was an occasion to analyze the state of the art on the territorial management and to promote new geotouristic routes by a guidebook having a popularization approach. In addition, several exchanges of personnel, stakeholders and representatives of local authorities were established with the aim of sharing best practices and reaching a better involvement of all the different components needed for a successful Geopark project. The project ended in April 2018 with the organization of a workshop hosted by Apuan Alps UGGp with several different activities including lectures on geoheritage, geosites, geodiversity, GIS capabilities and about the UNESCO Global Geoparks application procedures. The workshop also included field trips, meeting with Geopark guides, stakeholders and local authorities and the participation to the last forum of the ongoing procedure to get the European Chart for Sustainable Tourism by the Apuan Alps UGGp.

INTERNATIONAL GEOSCIENCE PROGRAMME, IN THE SERVICE OF THE SOCIETY SINCE 1972

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Keywords: *UNESCO, IGCP, IUGS, Capacity building, Geology*

Session: Regional and International UNESCO Collaboration

UNESCO is the only United Nations organization with a mandate to support research and capacity building in geology and geophysics, and the International Geoscience and Geoparks Programme (IGGP) is our flagship with its two pillars: the International Geoscience Programme (IGCP) and UNESCO Global Geoparks (UGGp).

IGGP functions to serve as a knowledge hub of UNESCO to facilitate international scientific cooperation in the geosciences and sustainable use of natural resources, and to advance new initiatives related to geo-diversity and geo-heritage as well as geohazards risk mitigation.

The IGCP is the oldest and most successful example of scientific cooperation between a non-governmental organization – the International Union of Geological Sciences (IUGS) – and an intergovernmental organization – UNESCO.

Over the past 45 years, for thousands of scientists who participated in IGCP projects the Programme has been the gateway to a successful career in and beyond geoscience. IGCP has also been responsible for some major geoscientific programmes of ground-breaking international standards.

In 2015, the 38th general Conference of UNESCO endorsed the creation of the new UNESCO Global Geoparks (UGGp) designation-areas where we celebrate our Earth heritage to promote the sustainable economic development of local communities while demonstrating geological heritage of international significance.

The IGGP, with its two pillar, IGCP and UNESCO Global Geoparks, aims to enable UNESCO Member States to use the UNESCO-designated sites as learning sites for inclusive and comprehensive approaches to environmental, economic and social aspects of sustainable development. IGCP' five main themes provide an opportunity for geoscientists in the understanding of the transformation of nature within the territories of the UNESCO Global Geoparks: Earth Resources (sustaining our society), Global Change (evidence from the geological record), Geohazards (mitigating the risks), Hydrogeology (geoscience of the water cycle), and Geodynamics (control of our environment).

By offering young scientists from developing countries the opportunity to participate in IGCP projects and field trips organized by leading academic bodies, within the territories of UNESCO Global Geoparks, IGCP aims to foster and increase:

- global distribution of project areas, participants and leaders,
- participation and leadership by women and young scientists,
- interdisciplinary proposals, approaches and techniques.

UNESCO GLOBAL GEOPARKS FOR ENHANCED MULTIDIMENSIONAL SUSTAINABILITY (GEMS) IN ASIA AND THE PACIFIC REGION

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Keywords: *Capacity building, Asia and the Pacific region, National Commission for UNESCO*

Session: Regional and International UNESCO collaborations

With the financial support of the Japanese Funds-In-Trust from the Ministry of Education, Culture, Sports, Science and Technology MEXT, UNESCO Regional Science Bureau for Asia and the Pacific in Jakarta started the project "UNESCO Global Geoparks for Enhanced Multidimensional Sustainability (GEMS) in Asia and the Pacific Region" aiming to strengthen the better understanding of member states in the region about the benefits of UNESCO Global Geoparks, member states further interest in establishing UNESCO Global Geoparks. This will help local capacities to take the necessary action to establish new and improve existing UNESCO Global Geoparks in the region.

As part of this project, UNESCO office Jakarta, in collaboration with Japanese Geoparks Network (JGN), the Japanese Geoparks Committee (JGC) and Oki Islands UNESCO Global Geopark, developed an online introduction course to UNESCO Global Geopark (<http://connect-asia.org/courses/introduction-package-to-unesco-global-geoparks/>). This introductory package to UNESCO Global Geopark was made available on 1 March 2018 and the "Regional Training Course on UNESCO Global Geopark – Perspectives for National Commissions for UNESCO in Asia and the Pacific Region" was organised in Oki from 27-30 May 2018. Twenty-four international participants from 13 countries (Cambodia, Indonesia, Kyrgyzstan, Lao PDR, Malaysia, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Timor-Leste and Vietnam) and three UNESCO Field Offices from the region (Apia, Bangkok and Hanoi Offices) got the opportunity to learn, discuss and reflect on what were the main challenges faced in their own context to establish a first or a new UNESCO Global Geopark and presented at the end of the training course a roadmap on the next actions to be taken. The international participants were guided by Prof Zouros, President of the Global Geoparks Network, Dr Yuang Zheng from the Chinese Geoparks Network, Prof Mc Keever from UNESCO Headquarters and more than 30 participants from the nine Japanese UNESCO Global Geoparks, Japan Geoparks Network and Japanese National Commission for UNESCO who shared best practices and experiences.

This paper will present the overall objective and the preliminary outputs of the GEMS project and reflections on how regional training course could be further improved to raise the capacity of the Asia and the Pacific region. In particular, discussions during the training course made clear the need for local champions and an institutional framework enabling strategic planning for both the establishment of new and improvement of existing UNESCO Global Geoparks as model for local sustainable development and supporting the delivery of 2030 Agenda in the region.

THE LINK BETWEEN UNESCO, THE GOVERNMENT AND THE GEOPARKS -- ACTIVITIES & EVENTS OF CHINESE GEOPARKS NETWORK IN 2017-2018

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Keywords: link, activities and events, Chinese Geoparks Network

Session: Regional and International UNESCO collaborations

Based on the protection and celebration of geological heritage, the National Geopark program in China began in 1999. Chinese Geoparks Network (CGN), as a promotion and research center, has played an important role in the recent ten years. CGN organizes workshops, annual meeting, capacity training and activities on geoconservation, education and geotourism every year. These activities and events have become a link between UNESCO, governments and geoparks.

In accordance with the guidelines of the UNESCO Global Geopark, the rules on China's domestic recommendations and requirements for an aspiring Global Geopark have been drafted and revised to better connect with IGGP. For the nomination of national label, it has formed the draft "National Geopark Criteria" to standardize the national geoparks planning and building, to meet the requirements of natural resources management from the government. The Criteria will be used as an industry standard in the near future.

CGN coordinates and supports UGGs in China to participate actively in International Conference on UGGs, capacity training, case studying, Sister Geoparks, communicating and sharing best practice. As the communication tools, CGN cooperated with GGN run a GGN website (www.globalgeopark.org) and publish "GGN Newsletter". The special issue of this magazine has been presented the ITB Berlin this March.

CGN assisted greatly Zhijindong Cave UGGp in organizing the 5th Asia Pacific Geoparks Network Symposium, with the theme of UNESCO Global Geoparks Promote the Sustainable Development of Local Economics held from September 19 – 22, 2017 in Guizhou, southeastern China. There are more than 700 delegates from 27 countries. The host funded 10 delegates from developing countries in order to promote the development of UGGp in developing countries.

CGN held Annual Conference of China's UGGs, Popular Science Week, World Earth Day, Exhibition Tour of All China's Global Geoparks, and training courses for geopark managers and tour guides cooperating with professional institutions.

Workshops and Seminars focused on regulation, management, integration of geological landscape and local culture, popular science and geotourism. Occasional forums included volcanic group, granites and Danxia Landform, cave protection and disaster prevention.

The 17 geopark and UGGp entries have compiled for the third edition of China Encyclopedia. This contributes to the promotion and awareness of UGGp.

A TALE OF TWO OCEANS: DEVELOPING A NEW UNESCO GLOBAL GEOPARK IN MOURNE, GULLION AND STRANGFORD, NORTHERN IRELAND.

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Keywords: *Northern Ireland, communication, communities, education, engagement*

Session: Aspiring Geoparks

Newry Mourne and Down District Council with assistance from the Geological Survey of Northern Ireland are moving forward with plans to establish the second UNESCO Global Geopark in Northern Ireland, focused on the Mourne, Gullion and Strangford areas of Counties Down and Armagh. The proposed UNESCO Global Geopark area covers an area of 954 sq km and takes in the three designated Areas of Outstanding Natural Beauty (AONBs) that exist within the District Council area. It is a region well-known amongst tourists; the spectacular Mourne Mountains are a haven for walkers; the rugged Ring of Gullion is famous for its myths and legends; and the beautiful area around Strangford Lough is known for its maritime heritage and associations with St Patrick. Work on developing a UNESCO Global Geopark began in 2012 when funding was received through INTERREG IVA to develop geotourism in the region including education resources, marketing material, site infrastructure development, and the training of a number of geo-ambassadors from the local communities. Since then, Newry Mourne and Down District Council has identified the development of a UNESCO Global Geopark as one of the main catalyst projects for economic growth within its Tourism Strategy from 2017-2021. Achieving UNESCO Global Geopark status will help to consolidate what is already there and allow for the promotion of the area as one single sustainable tourism destination. This will help to improve the experience for domestic tourists by providing added value to existing well-known attractions and help to promote lesser-known ones and will encourage more international visitors, by raising awareness of the region as a whole. Since 2017, a detailed 'roadmap' has been compiled to identify key requirements and milestones necessary to achieve UNESCO Global Geopark status including a comprehensive communication plan to maximise on community engagement. Communication activities have included the establishment of a Geopark website and social media, delivery of ten media briefings to local and specialist newspapers, meetings with key stakeholders, a series of community drop-in sessions in towns and villages in the area, a Geopark Open Day during European Geopark Week, attendance at Farmers Marts due to the rural nature of the area, presence at high profile events both within and outside the district and the publication of numerous articles in specialist magazines. The area plans to be operating as a de facto UNESCO Global Geopark by Autumn 2018 and it is hoped that an application will be ready to be submitted to UNESCO by November 2019.

A GEOPARK IN AN ANTARCTIC GATEWAY CITY? THE CASE FOR A WELLINGTON GEOPARK IN TASMANIA, AUSTRALIA

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Keywords: *Dolerite, Periglacial, Gondwana, Australia, Geotourism*

Session: Aspiring Geoparks

Tasmania is an Australian island state with incredible geodiversity, second only to Scotland. State geoheritage conservation frameworks recognise over 1100 geosites of from sub-regional through to international significance. Tasmania is famous for hosting the world's largest exposure of dolerite, providing substantial evidence of continental drift and plate tectonics through its occurrence in the former Gondwanan supercontinent. Mount Wellington and the encompassing Wellington Park (250 km²) is a well expressed and accessible representation of a significant doleritic landscape typical of the Tasmanian landscape, and lies on the edge of Tasmania's largest city, Hobart. It provides the most extensive and well developed high altitude periglacial terrain in Tasmania unaffected by glaciation. The landscape evolution of the park has resulted in numerous dolerite boulder fields, talus slopes and rock columns including the well-illustrated columnar-jointed "Organ Pipes" sill immediately below the summit of Mount Wellington. Additionally, the Wellington Park features string bogs, extensive Jurassic sandstone cliffs and outcrops, Permian mudstones with extensive fossil deposition, all within relatively accessible locations relative to the Mount Wellington summit drive. Additionally, the geodiversity of the Wellington Park supports the most biologically diverse area in Tasmania due to marked variation in climate and soils. Despite the educational deficit of Tasmania's 500,000 citizens relative to the rest of Australia, Tasmanians have a strong sense of place and very good awareness and understanding of the value of the landscape, and particularly strong environmental intelligence. For instance, Tasmanians in general are aware of the broad geology of the Wellington Park as a 'Dolerite landform' and can identify significant features with ease. Tasmanians have a strong connection to the outdoors, and spend substantially more time in natural and remote places than other Australians. Thus - the notion of a Geopark in Tasmania is one that is expected to be embraced by the public at large, and can be used to provide meaningful context to the surrounding landscape. A successful UNESCO Geopark designation would provide significant social and economic benefits for Tasmanians through educational and tourism opportunities. Notably, a Tasmanian Geopark would be the only Geopark in Australia. Currently, over 300,000 people visit the Wellington Park each year and this is managed by a state management body of rangers and scientists. Local indigenous people are actively involved in the management of the park to ensure that culturally significant sites are interpreted and appreciated. The annexation of a Geopark would involve a network of trails, both new and existing, to access a number of geosites that provide educational and recreational experiences for a wide range of people while conserving the landscape for future generations. This would have flow on effects to local communities surrounding the park, presenting additional opportunities for 'natural tourism' which currently attracts 2 million tourists per year. Here we outline a suitability analysis for the Wellington Park using geoheritage, geospatial and vulnerability assessment as well as stakeholder analyses so as to present a case for admission to the Asia Pacific Geoparks Network and as a UNESCO Global Geopark.

MOUNT POPA GEOPARK AND SUSTAINABLE DEVELOPMENT IN MYANMAR

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Keywords: *petrified forest, paleoclimate, Irrawaddy Formation, biodiversity, geotourism*

Session: Aspiring Geoparks

Myanmar Geosciences Society has been endeavoring to establish a UNESCO Global Geopark in Mount Popa area, Central Myanmar. Mount Popa forms a conspicuous landmark in the heart of the dry belt of central Myanmar forming the largest and southernmost volcano of the group of Lower Chindwin volcanic belt. The area occupies about 1964 square kilometers and lies between 20° 40' and 21° 3' N Latitude and 95° 6' and 95° 22' E Longitude. There are two volcanic rocks in the Popa area. The older volcanic unit covers southern part of the Mount Popa volcano. Small flows occur locally in the topmost beds of the Miocene, but the majority occur within the Pliocene Irrawaddy Formation. The Popa Mountain Park has been established by the aid of UNDP in 1993. In 2007, the Forestry Department formed National Institute of Biological Resources and International Cooperation Unit for the Biodiversity and Environmental Conservation so as to carry out research works. The Mount Popa Global Geopark Development committee was formed in December 2016 and discovered the petrified forests in the sandstone of Irrawaddy Formation mainly west and southwest of Mount Popa around Thanbo Village. Some fossils of mammals especially jaws and bones of ancient elephants, deers, crocodiles etc. were found. The petrified forest and mammalian fossils reveals the palaeogeography, palaeoecology and palaeoclimate of the Mount Popa Geopark area and significant potential areas for young researchers in local and abroad. Conservation activities for natural spring water, which is used by the local people, forest, landscape and sustainable development of economic activities including geotourism, research and training programmes for geology, palaeobotany, palaeozoology, biodiversity and management of Geopark are currently being carried out in collaboration with neighbouring countries, Forestry Department, local NGOs and UNESCO.

THE UNESCO GEOPARK CANDIDACY OF THE ARMORIK NATURE PARK (FRANCE)

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**Keywords: Armorik, Nature park, Geopark application, Brittany, geodiversity
Session: Aspiring Geoparks**

The Armorik Nature Park, located on the western part of Brittany (France), is a candidate for the prestigious Geopark UNESCO label and intends to apply for the territory by 2019. Local geology has left its marks throughout the territory, shaping the identity of the Armorik nature Park and hiding real treasures. Because of its geological history and natural wealth, this area has an exceptional geological heritage and is a witness of the strong links that unite man and his environment. The recent creation of a Geological Nature Reserve on the Crozon Peninsula and the Minerals House highlight these spectacular geological features and landscape diversity. It is precisely to enhance this remarkable heritage that the Armorik nature park intends to apply to the prestigious UNESCO Geopark label and could thus become the first Geopark of the French Atlantic area. An INTERREG European project call, whose Park is a laureate alongside partners from England, Ireland, Portugal and Spain, will support this application for the Geopark label. The Park is also surrounded by municipality communities, the Brittany Region and the Minerals House to carry out this important work for the territory. The renown of the "global Geopark UNESCO" label will therefore be a real asset for the Armorik nature park by enhancing its attractiveness and reputation and highlighting its geological features through the values and image of UNESCO. The will thus have the following objectives: (i) present the territory of the Armorik nature park from the angle of its geological, cultural and natural heritages; (ii) report on the work done so far in relation to the global Geopark UNESCO application; and (iii) demonstrate that this exceptional territory could find its place within the UNESCO Global Geoparks network.

MADRA GEOPARK – A PROPOSAL FROM TURKEY

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Keywords: Madra Mountain, Ida Mountain Balıkesir, İzmir, Tor

Session: Aspiring Geoparks

Geopark concept is the new nature protection paradigm of the 21st century. Geopark concept come up to existence with the establishment of the European Geoparks Network in 2000 and adopted to UNESCO IGGP program in 2015 gaining worldwide recognition.

Turkey hosts a rich geological and geomorphological diversity however Kula Geopark is the only Geopark in Turkey which obviously shows that Turkey hasn't used much of its Geopark potential yet.

The proposed Mount Madra potential Geopark area is located within Balıkesir and İzmir provinces of Aegean Region of Turkey. Mount Madra is a horst structure reaching to 1344m and surrounded by Altınova depression in the northwest, Dikili depression in the southwest and Bergama graben in the south. The Madra volcanic complex is characterized by volcanic intrusion in to Paleozoic age metamorphic and non-metamorphic basement. The Miocene age (20myo) Kozak granite dominates the territory.

The tor topography is the flagship geological heritage which was formed on the granite parent rock. Tor topography was formed due to the exfoliation of granite blocks. The smooth-edged spheroidal and ellipsoidal boulders are outstanding geological/geomorphological monuments. The complex interaction between granite tor topography with archology, culture, natural landscape and rural architecture made Mount Madra a unique and outstanding destination. Similar tor topography structures like the Arouca UNESCO Global Geopark in Portugal and the Dartmoor National Park in England are recognized as protected monument attracting many visitors annually.

Mount Madra is threatened by mining and quarrying. Recognition of this area as a Geopark will enable local people to benefit from their natural resources in a sustainable way based on Geotourism oriented socio-economic development activities. In this manner the preliminary field research for the Geopark potential of the territory was carried out in 2012 by Dr. Erdal Gumus with the support of the Balıkesir Municipality and the Forest Agency. In 2016 another attempt was made by Izmir Metropolitan Municipality organizing a workshop on the Geopark potential of the Mount Madra. An inter-municipal Geopark meeting is planned by Izmir and Balıkesir provinces where the final decision will be made to startup the Geopark project officially. The proposed Geopark territory has also the potential to include neighboring Mount Ida in the north. In Greek mythology, Mount Ida is one of the sacred mountains namely "Mountain of the Goddess" which was also known as the Phrygian Ida in classical antiquities.

MAJELLA NATIONAL PARK ASPIRING GEOPARK: GEOSITES, GEODIVERSITY AND STRONG POINTS FOR VALORISATION

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Keywords: *Majella, Central Apennine, Geosites, Carbonate platform, Karst*

Session: Aspiring Geoparks

Majella National Park is located in Central Italy and includes the second highest peak of the whole Apennine Chain (Mt. Amaro, 2,793 m a.s.l.). The most part of its territory is constituted of carbonate reliefs, mainly limestone, often rich in fossils, which date back to the interval Lias-Upper Miocene. In the interposed depressions other lithologies are present such as gypsum, marls, clays, conglomerates, detritus, alluvial and lacustrine deposits. The Pliocene orogeny makes the Majella Massif one of the youngest relief of the Chain. It ensues that several Quaternary normal faults define the current seismotectonic setting of the Park and are responsible for the recent and historical seismicity of the area. Unique landforms resultant principally from the combination of karst, glacial and fluvial geomorphic phenomenon, together with structural assets and differences in lithology, increase the geodiversity of the Park. Besides, the Maiella hydrogeological system is one of the most important of the Italian peninsula. The flow rate of its karst springs is copious and rather constant all along the year. Geology is also deeply fused with cultural inheritance: the first human presence in the area date back to the Lower Paleolithic layers of Valle Giumentina (about 600,000 years ago), one of the oldest archeogeosite in Europe. Humans frequented many caves since the Prehistoric Era, while steep rocky slopes and deep gorges hosted monasteries and hermitages during Middle Ages. In the last centuries pastoral, agricultural and mining activities left evident signs on the landscape. In this framework numerous are the geosites currently identified, 95, some of which boast dozens of publications even international. The most part are geomorphosites, the majority of which consists in karst and glacio-karst landforms. Over two tens are the geosites with a stratigraphic or a structural-tectonic interest; almost the half part of them has an international relevance and the most prominent is the Decontra key section which allows to correlate Mediterranean shallow water deposits with global Oligocene-Miocene stratigraphy. Last, but not least, archeological, paleontological and hydrogeological geosites are to be mentioned. Among them, the fossil field of Capo di Fiume can be visited since 2001. The geosite patrimony of the Park satisfies people at any level of interest from scholars and schools, to simply geology lovers. In fact, other than the accepted scientific and educational value of its heritage, the aspiring Geopark can count on other strong points: - less than two hours from Rome; - many villages inside or just outside Park's boundaries, well connected by roads; - a wide altitude range (about 2,600 m), where impervious but fascinating zones alternate to gentle more accessible ones; - trails for hikers, MTBs and horse riders and other visitors' facilities (info point, museums, environmental education centers etc.) already operating for decades.

THE DIGITAL OUTDOOR GUIDE TO GEOPARK VESTJYLLAND

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Keywords: *Online visitors guide, Awareness, Communication, Map service, Volunteers*

Session: Aspiring Geoparks

The aspiring Geopark Vestjylland (DK) applied to become a UNESCO Global Geopark in November 2016 and was evaluated in 2017. The UNESCO Global Geoparks Council decided in September 2017 that Geopark Vestjylland in order to be accepted as a UGGp should implement a number of recommendations including improving visibility of the geopark features and establish more trails with associated educational packages. A key instrument in the work to implement the recommendations from the UNESCO Global Geoparks is the use of the Digital Outdoor Guide - an online map and digital guide. Geopark Vestjylland is using the guide as its key digital map providing online information on geosites and non-geological sites, recreational facilities and transport services.

In 2018 the following information will also be made available to users of a new Geopark Vestjylland App:

- maps for the geopark homepage which can also be used by partners
- the basis for printed maps
- a booking platform for outdoor facilities – i.e. shelters
- a platform for storing information on geosites
- a possibility for local volunteer partners to upload information on “their sites”

Information in the Digital Outdoor Guide can be made available in German, English and Danish. It is possible to upload text, pictures and video for the various routes and locations/geosites.

The geopark cooperates with Parks'n and Trails – the company behind the guide – and other stakeholders to further develop the service. If one or more of the stakeholders suggest a new feature, other members of the network behind the Digital Outdoor Guide will be asked for their interest and possible financial contribution. When sufficient funding is obtained the new feature will be developed and implemented and made available to all members of the network.

Geopark Vestjylland has contributed to the development of a booking facility for shelters and a logbook feature to assist in storing information on land owners, maintenance, contact person and other useful information for managing a particular site, trail or route.

The Digital Outdoor Guide is published and developed by the Network for Outdoor Activities and Parks'n Trails which includes several Danish municipalities and organisations including Geopark Vestjylland. The guide also includes recreational information on UNESCO Global Geopark Odsherred – the first and only UNESCO Global Geopark in Denmark.

ORIENTATION OF PRESERVATION ON SPACE OF GONG CULTURE IN KRONG NO – DAK NONG VOLCANO GEOPARK

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Keywords: *Culture heritage, Space of Gong Culture, indigenous minorities, Krong No – Dak Nong Volcano Geo, intangible cultural heritage*

Session: Aspiring Geoparks

The Krong No – Dak Nong Volcano Geopark extends over 5 districts and 1 town in Dak Nong Province of Vietnam Central Highlands. It is home to three indigenous ethnic minorities: M'ngong, Ma and Ede who own many unique cultural heritages such as folk festivals, epics (Ot N'drông), especially Gongs Culture heritage which was recognized as the Masterpiece of the Oral and Intangible Heritage of Humanity by UNESCO in 2005. Gongs of indigenous minorities in The Krong No – Dak Nong Volcano Geopark are a musical form with special outstanding position as it contains various cultural values associated with natural environment and community-bonding activities. However, due to historical circumstance and contemporary socio-cultural change, Gongs are facing the risk of losing their value. Over the past 10 years, the National UNESCO Office in Hanoi City, the Ministry of Culture, Sports and Tourism and Dak Nong Province have coordinated to implement several projects to preserve this intangible cultural heritage according to the UNESCO 2003 Convention and the Cultural Heritage Law of Vietnam. Despite initial achievements, the preservation of the Space of Gong Culture – the World Cultural Heritage of Vietnam has some limitations due to various reasons. Dak Nong Province is preparing a dossier submitted to UNESCO for Krong No Volcano Geopark designation as a UNESCO Global Geopark. This is especially important not only for the Space of Gong Culture but also for all other heritages in the geopark area. Once landscape environment and biodiversity are protected and restored, it will create the best condition to revive the performance environment of Gongs. Throughout the UNESCO-oriented tourism activities, cultural values will be preserved and promoted effectively, which create favourable conditions for the Space of Gong Culture to remain and develop in a sustainable way in the Krong No – Dak Nong Volcano Geopark.

LOCAL COMMUNITY PERSPECTIVE ON GEOTOURISM DEVELOPMENT : CASE STUDY CILETUH GEOPARK INDONESIA

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Keywords: *community decision making, community participation, community-based tourism, strategy formulation, sustainable development*

Session: Aspiring Geoparks

In order to promote sustainable development and improve local community's welfare through preservation and responsible use of its geological, cultural and bio diversities, Ciletuh began its Geopark initiative in 2013. Since then, Ciletuh has become a member of National Geopark Networks and nominated as UNESCO Geopark Global Networks's new member. As a geopark, Ciletuh has thriven to address conservation, community development, public education and other Geopark requirements, however, there is also urgent needs to assess how well the community understand and engage in Geopark development, as well as to involve them in decision making process. Therefore, the objectives of this paper is to identify community understanding on Geopark concept, to determine local community's expectation on the development of Geopark, and to integrate their aspirations in the formulation and implementation of Geopark development strategies. The research is conducted by using qualitative method with open ended questionnaire to obtain current awareness level and public aspiration, and was circulated to 67 respondents from 11 villages in Ciemas sub district. The data then grouped, weighed, and analyzed in order to gain appropriate strategies for future community development. The result shows that most people consider themselves understand Geopark and its values, however further investigation revealed only small amount fully understand, several begin to understand while more than half admit to know little or do not understand Geopark concept at all. From the perspective of local people, the expected outcome of Geopark development is to increase welfare, to achieve significant regional economic growth, holistic conservation and global recognition while the local communities believe that to achieve the desired outcome, they must focus on exploring and promoting natural and cultural resources through geotourism activities, improving quality of tourist infrastructure and services, and enforcing the law in geotourism practices especially in environment and ecological preservation, waste management, and the application of custom law (hukum adat). Based on the result, there are several aspects that have to take into consideration as geotourism development strategy from the perspective of local community, such as infrastructure improvement, integrated human resource development through orientation and training program, and access to financial institution.

INDIGENOUS KNOWLEDGE ON GEOHERITAGE - SOME PRELIMINARY STUDIES IN ASPIRING GIA LAI GEOPARK (GIA LAI PROVINCE)

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Keywords: *indigenous knowledge, local people, archaeological, Geoheritage, Geo-cultural*

Session: Education, public awareness and communication

The intended area of Gia Lai Geopark includes several districts e.g. Dak Doa, Kong Chro, K'Bang, Mang Yang, Chu Pah, Ia Grai, An Khe Town, Pleiku City. The area has many types of landforms such as hilly landforms with the Eastern and Western Truong Son mountain ranges (with the Kon Ka Kinh peak at 1,748m asl); plateau landforms with Pleiku and Kon Ha Nung plateaus; and the An Khe intra-mountainous lowland. Since ancient times this is the settlement area of indigenous peoples e.g. Bahnar people of the South Asian linguistic family and Jarai people of the Malayo-Polynesian linguistic family. Since the 17th century, the Viets from the central coastal deltas started to settle in the An Khe area. This land also nourished the famous Tay Son peasant movement in the 18th century, with relics such as Hon Binh, Hon Nhac, Hon Tao, Sa Khong Lo, Ong Nhac Lake or Co Hau Field etc. These contain the sacred spirit, preserving forever the image of the heroes and decorated with such legends as the “three brave men”, “sacred seal and silver sword”, “magic stone” etc. Moreover, results of recent archaeological excavations and researches show that An Khe could be one of the cradles of the early Paleolithic people (c. 800,000 years ago). Regarding geology and geoheritage, the area is part of the ancient Gondwana continent, with a history of geological evolution up to 2.5 billion years long. This is reflected by the continuous presence of many types of ultra-high metamorphic rocks up to the recent basaltic eruptions of about 12-1.2-0.5 million years ago, with many volcanic craters, waterfalls, columnar pillars etc. It is certain that the relationship between indigenous knowledge and geology and geoheritage in the area must be very rich and diversified. This paper will introduce some indigenous understanding of Nature, how local people behave and adapt to the natural environment etc., which are well reflected in the local traditional folklore.

GEOHERITAGE IDENTIFICATION BASED ON GEODIVERSITY ANALYSIS: CASE STUDY AT NORTH KALIMANTAN AND SANGKULIRANG-MANGKALIHAT

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Keywords: *Geoheritage, Geodiversity, Geopark, North Kalimantan, Sangkulirang-Mangkalihat*

Session: Aspiring Geoparks

The study is about an inventory of pre geopark phase on North Kalimantan and Sangkulirang-Mangkalihat geodiversity. The objective is to describe the characteristic of the geosites relevant with the geological evolution that takes place millions of years ago in Borneo and it will determine the conservation activities. Kalimantan is known as the Heart of Borneo and its rich earth geoheritage. There are complex geological mintakat, rich geological history, have diverse types of rocks and beautiful natural landscape. The method used in the study. By applying methods for large areas, literature studies and remote sensory observations. Geological data are collected, quantified and qualified based on Ruban (2010), Gutierrez and Martinez (2010), Neches (2016). The management includes the study, description, selection, and evaluation of each legacy site. Based on its intrinsic value, geosites are grouped within geological hotspots into various value areas (geoareas). The study have found an inventory where 16 of 21 geosites were based on types and 10 geological frameworks. Some geological heritage sites hold valuable evidence of Kenozoic obduction and magmatism, modern carbonate spans and atolls, typical hydrological features. It also found meaningful geological records that is key to understanding the relevant period of earth's history. Structural landscapes and its geology affect cultural customs. The geological heritage site of Kaltara-Sangkulihat is valuable in the region.

WESTRALIA GRANITE WAY – ASPIRING GLOBAL GEOPARK

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Keywords: Australia, granite, aspiring Geopark, community, indigenous, Aboriginal
Session: Aspiring Geoparks

This paper is based on research for a doctorate degree at Murdoch University in Western Australia to assess the potential for establishing a Geopark in the Wheatbelt of Western Australia. Stakeholder perceptions about establishing a Geopark prior to implementation was considered key to a successful community-based Geopark being accepted by the rural community.

The Wheatbelt region is situated on the Yilgarn Craton, one of the world's oldest landforms, and is remarkable in its geological heritage, endemic flora and fauna, Indigenous cultural heritage, and early European pioneering and settlement and contemporary land use. Vertical downwards weathering has exposed granite monoliths (inselbergs) of earth-forming tectonic plates which have not been exposed to recent, in geological terms, glacial activity or sedimentary sequences.

The isolation of Australia as an island through tectonic plates shifts has resulted in these ageless granite outcrops giving rise to endemic forms of flora (including orchids and Eucalyptus species) and fauna (*Ctenophurus ornatus* (ornate dragon lizard) and *Petrogale lateralis lateralis* (black flanked rock wallaby)).

The First Australians arrived between 40,000 to 60,000 years and through time have established deep cultural connections with granite outcrops where areas of ceremony, birthing (woman's business) and other secret rituals such as initiations (men's business). Granite outcrops were also valued as meeting places, protection from the elements and as water sources with many outcrops now bearing gnamma holes created as water holes.

Following European settlement in Western Australia the granite outcrops served as navigation beacons and survey points for early explorers and surveyors. Later the granite outcrops became water sources for gold rush migrants heading east to the goldfields of Kalgoorlie and steam driven trains on the Perth to Kalgoorlie railway. Communities sprang up to deliver services and to support agricultural development.

These rural communities are experiencing decline as work environment changes and people migrate to the city of Perth. Tourism is viewed as an opportunity to assist in reversing rural decline and Geotourism is a key aspect related to the unique landforms of the Wheatbelt.

Establishing a Geopark is also considered to be an important component of uniting the Wheatbelt region under a common association, promoting geotourism, attracting international tourists and creating business and employment opportunities. Engaging local Aboriginal communities to share their ancient culture is a key component for success in the aspiring Westralia Granite Way Global Geopark.

POTENTIAL VALUES OF KRONGNO VOLCANIC GEOPARK

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Keywords: *Volcano, Lava Tube, Aspiring Geopark, Bio-diversity, Rich Cultural*
Session: Aspiring Geoparks

Located in the South of the Central Highlands of Vietnam, with favorable geographical position, Dak Nong province has a lot of potentials to impulse the socio-economic development, especially for tourism development thanks to its strength of Krongno Volcanic Geopark. The outstanding features in Krongno Volcanic Geopark are valuable geological heritages for the Earth science, showing tectonic history and geological structure, including lava caves which were recorded as one of the longest lava cave system in the Southeast Asia. The lava caves in Krongno Volcanic Geopark contain archaeological sites of great cultural and historical values. Through excavation, traces of prehistoric cave dwellers are found in the lava caves (such as human bones, stone hand-axes, etc). In the near future, this cave system is mainly used for research, education and tourism development. This is the highlight of Krongno Volcanic Geopark. With its natural features as an intersection between the northern and southern forests, the geopark is of high biodiversity with rare flora in the world. This is also the home to many fauna species in the World's Red Book, which are now being protected in national parks and nature reserves. Additionally, Krongno Volcanic Geopark is also home to a wide variety of minerals, including precious stones and semi-precious stones such as sapphire, opal, and especially the world's largest bauxite reserves. In this geopark, there are more than 40 ethnic groups living together, creating the traditional culture exchange and diversity, particularly the Space of Gong Culture of the Central Highlands which was recognized as a Masterpiece of Oral and Intangible Heritage of Humanity by UNESCO in 2005. Thus, the conservation and promotion of traditional culture is essential in the process of development and integration of Krongno Volcanic Geopark. The geological, natural and cultural values of Krongno Volcanic Geopark are the potentials and foundation to develop into a Global Geopark. Participation in the Global Geopark Network contributes to promote socio-economic development in the region, as well as preserve and promote the values of natural landscape and traditional culture in Krongno Volcanic Geopark.

VIANA DO CASTELO LITTORAL GEOPARK - UNESCO ASPIRING GEOPARK

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Keywords: *Education, Geopark, Geoconservation, Geosciences, Sustainable Development*

Session: Education, public awareness and communication

The Viana do Castelo Littoral Geopark (VCLG) – UNESCO Aspiring Geopark corresponds to the territorial area of the county of Viana do Castelo, an area of 320 km² with about 90 thousand inhabitants. The first phase of the inventory of geosites and geodiversity sites was carried out between 2005 and 2012, within the scope of a PhD's work developed at the Earth Sciences Centre of the University of Minho, and identified four themes on geoscience communication, namely Rheic-An Ancient Paleozoic Ocean; The Installation and Evolution of the Coastal Mountains; The Environments and The Climate of the Pleistocene and the Human Being in the Geological Space. As a result of the 2nd geodiversity inventory phase (2014-2016), the VCLG currently has 2900 ha of classified geological heritage areas as 13 Natural Monuments, with relevant scientific value that are the focus of the tourist and educational dynamism of the territory, and the pillars for the transmission of geodiversity interests and other patrimonial values. The geopark is a legally constituted association, managed by 17 representative entities of the territory in the social organs and supported by 5 Official Partners for Development, 57 personalities in the Advisory Board, 13 researchers of the Scientific Board and 36 Associated Founding Institutions (Local Councils and Schools). This organization demonstrates the consolidation of the bottom-up perspective that assists the development of this geopark. The necessary approximation between Schools and Science (the scientific equipment, the scientists and their problems, and methodologies in Science) has been achieved by the creation of the School Network of Science and Scientific Research, under the scope of the Viana do Castelo School Participatory Budgeting, installed on each public host school node. The School Network of Science and Scientific Research, whose aim is to motivate teachers to develop curricular projects with an integrative and transdisciplinary matrix at school, is intended to reinforce the knowledge of the territory and constitute an alternative to the school textbooks, in the medium / long term. This network comprises: The Sediment Sampling and Processing Lab, the Mechanical and Geophysical Survey Lab, the Science Communication Lab, the Petrology Sample Processing Lab, the Microscopy and Petrography Lab, the Photogrammetry Laboratory and the Municipal Geological Collection. These decentralized research units of the Viana do Castelo Littoral Geopark, installed in school clusters, define the crucial role of educational institutions on its full development. In addition to shared use by the school community, researchers are intended to use the labs, which will bring them closer to the students and to pedagogical activity. This network aims supporting the development and implementation of the work project methodology as the background option, and the central focus of curricular development. For the school year 2017-2018 the VCLG revised and approved 19 global curricular projects presented by host schools, corresponding up to 45% of flexibilization of the curricular management, from the 1st to High School education grade. An investment of 130 thousand euros by the municipality in this network is expected to reinforce the knowledge of the territory and constitute an alternative to the school textbooks, in the medium / long term.

ASPIRING GEOPARK LAUHANVUORI–HÄMEENKANGAS: BOTTOM-UP APPROACH TO GEOEDUCATION

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Keywords: *Aspiring Geopark, Geoeducation, Environment education, AR Sandbox, Geology*

Session: Aspiring Geoparks

Aspiring Geopark Lauhanvuori–Hämeenkanas: Bottom-up approach to Geoeducation The aspiring Geopark Lauhanvuori–Hämeenkanas is located in Western Finland: Satakunta, South Ostrobothnia and Pirkanmaa counties' marchland. Large part of the area is dominated by wetlands, and it gives the Geopark the main theme: mire. In addition to the mires the area has e.g. a few low hills, eskers, tor formations, large Paleobeaches, welling springs and meandering creeks. Versatile geological heritage offer an endless platform for children and students of different ages to explore and study. The ten municipalities inside the aspiring Geopark boundaries have chosen their schools for piloting different kinds of geoeducation activities. Besides the excursions and lectures offered by the geologist and other experts of the aspiring Geopark, children from both primary and secondary schools take part in interdisciplinary courses where they study their own environment by taking samples e.g. of peat layers, water and micro-organisms. E.g. Kankaanpää Secondary School has recorded data from a mire located in the aspiring Geopark area for several years. The aspiring Geopark Lauhanvuori–Hämeenkanas provided a local Visitor Center with an Augmented Reality Sandbox that can be used by school groups and camp-schools. AR Sandbox is a real sandbox with 3D visualization application. It allows to create topography models by shaping the sand. After molding the sand is augmented simultaneously by an elevation color map and topographic contour lines. The rain can be simulated, also. AR Sandbox is a tool for learning geographic, geologic and hydrologic concepts. It has been used regularly by local school children and adults who find it very interesting, as well. There is a rewarding interaction between aspiring Geopark and local schools: not only Geopark distributes the knowledge but also the schools gather data from the environment for Geopark's use.

YIMENGSHAN ASPIRING GEOAPARK

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Keywords: *Yimengshan, Aspiring, sustainable development, Geoconservation, Geotourism*

Session: Aspiring Geoparks

Yimengshan Geopark is situated in Linyi city, the southeast part of Shandong Province, covering a total area of 1804.76 km². Preserved within are typical geological landscapes including the Archaean komatiite, intrusive rocks of various stages in Archaean-Paleoproterozoic era, Cambrian stratigraphic section, kimberlite-type primary diamond ore deposits, Daigu landforms and tectonic sites, etc. Besides the various types of geological heritage, Yimengshan Geopark has fascinating natural resources and a long history as well. The geopark is well-known for Mount Mengshan, diamond and Daigu landforms, attracting an endless stream of visitors all over the world. The geopark has brought good economic and social benefits since opened, and it is gradually becoming a new growth point of local tourism development. As a single, unified geographical area, it is comprised of five scenic areas: Mengshan Area, Daigu Area, Diamond Area, Menglianggu Area and Yunmeng Lake Area. Mount Mengshan, an ancient mountain, is a broad and profound geological history book as well as a rich natural geological museum that recorded the geological evolution of the earth since 2.8 billion years ago. In 2013, Yimengshan Geopark was assessed as national AAAAAA tourism district by National Tourism Bureau of China, which has brought prosperity and new life to the local area. Daigu Area, also known as Daigu Provincial Geopark, features Daigu landscapes and unique stratigraphic section, which includes various geoheritages like typical unconformities, small and medium-sized structures, and the landscapes of mountain collapse. Diamond Area is the first locality of kimberlite primary diamonds in China, the largest diamond open-mining site in China even in Asia. Since 1970, a total of 1.8 million karats of diamond has been yielded, which made a great contribution to the development of high-technical industry and won the name—the capital of diamond in China. Menglianggu Area is located at the northwest slope of Mount Mengshan. The Menglianggu area is composed of monzonitic granite formed in Neoproterozoic up to 2.52 billion years ago. Memorial Hall and monument have been built to commemorate the Menglianggu Campaign. The geoheritage, combined with natural landscape and red culture make the area a natural classroom for geosciences popularization and education base for revolutionary heroism. Yunmeng Lake is the second largest reservoir in Shandong Province, located at the intersection of Dongwen River and Zihé River in Mengyin County. It was built in April 1960 with a total capacity of 749 million cubic meters. Yunmeng Lake is of rich and high quality water resources, where is the important water supply for local people. With clear water and beautiful scenery, Yunmeng Lake Area is an important place for relaxation and sightseeing. Embracing a principle to preserve geoheritage, further popularization of geoscience knowledge, and promote the economic and social development of geopark communities, we are looking forward to join GGN family and make contributions in the near future!

SOME HERITAGE VALUES OF THE GIA LAI ASPIRING GEOPARK, GIA LAI PROVINCE, VIETNAM

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Keywords: *Gondwana, National park, Nature reserve, Waterfall, Volcanoes*

Session: Aspiring Geoparks

Located in the Northern part of Gia Lai Province in Vietnam's Central Highlands, the potential area for geopark occupies an area of ca. 4,500-5,000km², including, to the east, the whole Kon Ka Kinh National Park on the Pleiku Plateau, the Kon Chu Rang Nature Reserve on the Kon Ha Nung Plateau along with the Ba River valley in their between, and to the west, the whole Pleiku City and its vicinity. In addition to the bio-diversity value, which makes Kon Ka Kinh one of the six ASEAN Heritage Parks of Vietnam, the area is home mostly to the Bahnar and Jarai 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 super-continent, has long and complicated history of development of ca. 2,500 m.y., including lots of mafic, ultra-mafic, acidic intrusions, high and ultra-high metamorphic rocks, Mesozoic intrusions and eruptions, active faulting, Neogenic-Quaternary lacustrine and basalt eruptions as well as Pleistocene-Holocene riverine formations. The area also features interesting geomorphological landforms including waterfalls, 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 in the nearest future.

FOSTERING GEOTOURISM AND OUTDOOR ACTIVITIES IN ESTONIA VIA GEOPARKS

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Keywords: *Estonia, Saarte Geopark, Vooremaa Geopark, Viru Geopark, kukersite oil shale*

Session: Geoparks, sustainable tourism and local sustainable development

Estonia – one of the smallest EU member countries on the eastern side of the Baltic Sea could be regarded as an ultimate destination for nature tourists with about half of the territory covered by woodlands. Based on forest coverage Estonia holds the 5th position in Europe after Finland, Sweden, Slovenia and Latvia. This makes Estonia a great place for outdoor activities and provides a perfect opportunity for exploring a thriving wildlife. The Estonian landscapes are surprisingly diverse – this is the country where the land meets the sea and where large mires are interspersed with virgin forests. In addition to exploring the nature values, the travellers can learn about the unique local cultural heritage, including the Seto ethnic and linguistic minority in SE Estonia as well as to visit settlements of Russian Old Believers on the coast of Lake Peipsi in eastern Estonia. The major geological highlights of Estonia are: 1) the diverse Post Ice Age landscapes with numerous eskers, kames, drumlin and sandur fields as well as large mire areas, 2) the extended river bank outcrops of the colourful Devonian sandy delta and shallow sea deposits, resembling to the world-renowned Old Red Sandstone in the UK, 3) the steep limestone cliff running almost 200 kilometres along the coast of the Gulf of Finland and exposing over 460 Ma old Ordovician sedimentary rocks, 4) the football stadium-sized Kaali iron meteorite impact crater, and 5) a large deposit of unique, extraordinarily fossiliferous kukersite oil shale of algal origin. All these regionally distinctive and internationally attractive geoheritage values make a solid foundation to foster geotourism in Estonia through geoparks. At present, the two geopark projects in Estonia are in their initial development stage. The aspiring Saarte Geopark on the Island of Saaremaa in western Estonia exposes to geotourists a number of Silurian age geoheritage sites while the prospective Vooremaa Geopark in eastern Estonia allows to get acquainted with vast Endla, Alam-Pedja and Emajõe-Suursoo mire areas, surrounding the central Vooremaa drumlin field. The educational hub of the Vooremaa Geopark is the unique Ice Age Centre at Äksi with life-sized woolly mammoth and her cub exhibited. However, the magnificent views from the steep coastal cliffs, bordering the southern coast of the Gulf of Finland as well as trekking in the pristine Alutaguse coniferous forests and peatlands could make the northeastern part of Estonia an enjoyable destination for outdoor activities. Therefore this region of Estonia could be considered as a high potential prospective Viru geopark site to be developed in the near future.

BEYOND GEOLOGICAL INVENTORY: GEOPARK PROJECT MORRO DO CHAPÉU (BAHIA - BRAZIL)

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Keywords: *Project Geopark, Cultural Heritage, Geodiversity, Sustainable development, Local identities*

Session: Geoparks, sustainable tourism and local sustainable development

Located in the northeast of Brazil, in the State of Bahia, the municipality of Morro do Chapéu in the region of Chapada Diamantina, exhibits rocky structures originating in the Mesoproterozoic and Neoproterozoic Ages. Strong epeirogenic processes were later responsible for the emergence of the old sedimentary deposits consolidating a differentiated area, with multiple landscapes, environmental, and climatic aspects. The geodiversity inherent in local geological features has always directly and indirectly influenced the economic development of the region (especially in mining, agriculture and tourism), in keeping with a very peculiar cultural identity that has always involved its more than 35,000 inhabitants. The potential for a geopark, geodiversity development and transformation process is great. The dynamics and integration of the territorial requirements are being explored and defined currently based on the UNESCO proposal. In this perspective of integrated understanding, through the cooperation with the Araripe UNESCO Global Geopark, the proposal for the Morro do Chapéu Geopark has been consolidated. An example of this understanding for the establishment of a UNESCO Global Geopark in the Morro do Chapéu region can be visualized in the proposition modus operandi for geosites, as in the case of Ventura Waterfall Geosite. This geosite corresponds to a case where the cultural aspects materialize in a stage consolidated by the geology. It is an area of ancient settlement that emerged in the 19th century due to diamond mining, which today is an area of very low population density and full of historic buildings in rustic colonial architecture, closely linked to the history of the city of Morro do Chapéu. At the same time, in the locality, the Waterfall of the Ventura appears like landscape element that reveals peculiarities of the Geological Formation Morro do Chapéu. This deposition composed of conglomerates, sandstones and argillites, is associated with the old fluvial deposits, with eventual occurrences of storms, until finer deposits that characterize the existence of a tidal plain. It is an unparalleled possibility of redeeming the identity of the people of Morro do Chapéu, at the same time as a territorial development proposal based on geotourism. The work, from this perspective, can be extended to all geosites that have importance or viability for development and sustainable and responsible tourism. It thus becomes an unparalleled possibility to rescue the identity of the Morrense people, at the same time as a territorial development proposal based on a geotourism is carried out. In this perspective, the Morro do Chapéu Geopark project begins already proposing to consolidate a practice of the direct association between the impressions in the rocks and the expression of a people, having as a premise the cultural construction and identity of the place as the main differentiator and guarantor of the needs of the population of the municipality.

ASPIRING GEOPARK SCHELDT DELTA AS “CLIMATE LIVING LAB”

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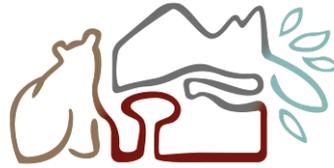
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Keywords: *Climate Change, Flooding, Climate Adaptation, Human Geology, Climate Living Lab*

Session: Geoparks, climate change and geo-hazards

Climate change has had an enormous impact on the landscape for billions of years. During ice ages the sea level was worldwide on average 120m lower than today. At the end of an ice age, ice sheets melted and the sea level rose rapidly. Particularly in low-lying deltas, such as the Scheldt Delta (on the southwestern border of The Netherlands and Flanders), the consequences of climate change are the first to be noticed. Deltas are sensitive to flooding due to their low position relative to sea level. In the past many large pieces of land have been drowned and lost in this way. There are few areas in the world where the changes in the natural landscape and the human history of habitation are as closely connected as in the Scheldt Delta. In the Scheldt Delta, the landscape has changed dramatically since the last Ice Age. Within a few thousand years, the coastline retreated a few hundred kilometers. The sandy landscape from the Weichsel Ice Age changed quickly into a relatively flat landscape with dunes, tidal muds, and marshland where peat could be formed. Many human interventions (e.g. construction of drainage channels, peat extraction) resulted in subsidence of soil. Especially these grounds were sensitive to flooding. To protect themselves against flooding people started building dikes (1000 A.D.). In history, dikes collapsed several times during storm surges by deferred maintenance and cities drowned. More recently, the storm surges of 1953 (North Sea Flood) and 1976 caused major floodings in both The Netherlands and Flanders. During the storm surge of 1953 over 1800 people drowned and tens of thousands of animals were killed. These events led to the “Delta Programme” (The Netherlands) and “Sigmoplan” (Belgium) to prevent future floodings. As a result the Scheldt Delta became the best protected delta in the world and both countries gained an international position in the field of “Water management”. The world famous Oosterscheldt Storm Surge Barrier (Netherlands), as part of the Delta Works and the “overflow polder” of Kruikeke (Belgium) are one of the results. New measures are needed to deal with climate change and an expected sea level rise of 1 meter in 2100. Geopark Scheldt Delta is in fact a “Climate Living Lab” where people have been dealing with climate change for centuries and the consequences of their own intervention. The Geopark teaches residents and visitors on the basis of various sites from both past and present to reflect on future consequences and necessary intervention in the landscape. Sites like “Drowned Land of Saeftinghe” show how the Scheldt Delta would be without embankments. The Geopark offers an opportunity for residents, recreationalists and policymakers to look at the consequences of climate change and climate adaptation from a geological perspective.



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SUSTAINABLE DEVELOPMENT: ADVANTAGES AND CHALLENGES OF UNESCO GLOBAL GEOPARKS IN CHINA

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Key words: Sustainable development, Global Geoparks, China

Workshop : SUSTAINABLE DEVELOPMENT GOALS

Sustainable development can be classified as development that meet the needs of the present without compromising the ability of future generations. The desired result is a state of society where living conditions and resource use continue to meet human needs without undermining the integrity and stability of the natural system.

The Sustainable Development Goals (SDGs) are a collection of 17 global goals set by the United Nations Development Programme, covering social and economic development issues including poverty, hunger, health, education, global warming, gender equality, water, sanitation, energy, urbanization, environment and social justice.

Implementation of sustainable development is described as "Localizing the SDGs" to highlight the role of local institutions and local actors. The idea is clear. The ways of sustainable development, however, may vary from place to place, and different from case to case. The most important thing is to find out and/or develop a way/pattern/paradigm which best fit the local situation. In this regards, I analyze the advantages and challenges of UNESCO Global Geoparks in China, in order to help understand the present situations of them, and meanwhile to provide a reference for geoparks elsewhere.

UNESCO Global Geoparks in China are scattered in a wide range of the country. However, they share some common features. They have some clear advantages in sustainable development. 1) They are strongly supported by government. This is mainly manifested as personnel and policy support. The administration and management bodies of Global Geoparks are run by governmental or institutional employees. This is very helpful in policy making and implementation. 2) Global Geoparks in China normally have good financial balance. Rather sufficient budget give geoparks more room and possibility to exercise more sustainable policies and to reduce unsustainable measures and deeds.

Meanwhile Global Geoparks in China face many challenges, which may hinder the implementation of sustainable development. 1) Insufficient participation of local communities is a shortcoming of many Global Geoparks in China. The importance of local community participation is frequently less estimated or even overlooked. This is on one hand a side effect of relying heavily on governmental activities, and on the other hand is a manifestation of inappropriate understanding of the philosophy of UNESCO Global Geoparks. 2) Lacking of strong motive to make long-term, strategic plans and measures for sustainable development is another symptom. This is closely related to the frequent change of geopark chiefs and/or managers. This shortcoming is difficult to be overcome in a foreseeable future. 3) Lacking of good professional team of sustainable development is another challenge, although Global Geoparks in China usually have a large number of employees. 4) Global Geoparks in China often focus on the areas where entrance fee is charged, and pay much less attention to the sustainable development areas.

As the motto "Celebrating earth heritage; sustaining local economy" goes, UNESCO Global Geoparks seek balanced, sustainable development paradigms.

IMPLEMENTATION OF THE SDG 2030 BY COMMUNICATION, EDUCATION, AND REGIONAL NETWORKING IN BERGSTRASSE-ODENWALD UNESCO GLOBAL GEOPARK (GERMANY)

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Keywords: *SDG's 2030, education, regional networking, awareness-building, on the spot implementation*
Workshop : SUSTAINABLE DEVELOPMENT GOALS

After decades of negotiations, the United Nations have agreed on 17 Sustainable Development Goals (SDG) in September 2015. This agenda is aimed at ending poverty and hunger, protecting the planet and opening the way for environmentally-friendly progress. All member states of the United Nations have committed themselves to implement these goals by 2030 – including the Federal Republic of Germany. The big challenge now is to communicate the message from the federal level down to the smallest community, in the form of events, actions and activities. It is in all of our interest to work towards ensuring the long-term stability of the conditions, which enable us humans to live on Earth. For far more than a decade, and all over the world, UNESCO Global Geoparks have campaigned for the holistic understanding of our planet and its evolution. Their environmental education and awareness programmes place a special emphasis on conveying these natural interrelationships and the impact humans have on these. The Geoparks create their initiatives and projects together with the people of the region. Their international activities are an opportunity for exchanging ideas with partners around the world. Thus the Geoparks provide an ideal platform for implementing the SDG 2030. In accordance with this holistic philosophy, Bergstrasse Odenwald UNESCO Global Geopark has been actively pursuing these goals for a number of years and implementing a framework of projects, activities and communication strategies for the benefit of the region, nature and the people. In this context, sustainable environmental education, biodiversity protection, awareness building, regional networks and international cooperation with Geoparks as well as World Heritage Sites are of particular importance. Developing new Geopark projects and programmes always take into account relevant SDG's. Regional products, preservation of local traditions, old crafts or excursions into the landscape are all important facets that contribute towards creating a regional identity. This helps to discover the multifaceted diversity of our planet, the individual landscapes, their evolution and their significance for us humans, leading to a greater appreciation of our nature and environment and an awareness of the need for their protection. The biggest strongpoint of UNESCO Global Geoparks in this context, is the ability to transform the rather abstract international SDG's into hands-on activities and projects, which help raise the awareness of the local populace about these goals in a clear and understandable manner. Thus the Geopark forms the decisive interface between international declarations of intent and concrete on-the-spot implementation. UNESCO considers the UNESCO Global Geoparks worldwide as key regions for explaining and implementing the Sustainable Development Goals 2030, which is on the federal level also underlined and documented by the Ministry of Foreign Affairs and the German UNESCO Commission.

EUROPEAN GLOBAL GEOPARKS: EFFECTIVE CONTRIBUTION FOR THE ACHIEVEMENT OF THE SDGS

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Key words: Agenda 2030, Sustainable Development Goals, European UNESCO Global Geoparks
Workshop : SUSTAINABLE DEVELOPMENT GOALS

When the concept of Geoparks took shape, sustainable development was always present in its holistic vision. Nowadays, with the new UNESCO designation approved by Member States, the UNESCO Global Geoparks (UGGps) go further in that vision. In fact, the UGGps assume their active role in the framework of the Agenda 2030 and its 17 Sustainable Development Goals (SDGs). In this framework, during the 14th European Geoparks Conference, held in Azores UGGp, September 2017, it was discussed the pertinence of creating a Working Group (WG) for the Agenda 2030, to develop strategies inside the European Geoparks Network (EGN) regarding this global issue. In March 2018, at the 41st Coordination Committee Meeting of the EGN, held in Karavanke/Karawanken UGGp, the approved WG for the Agenda 2030 decided to ask for the collaboration of all members of EGN, in the fulfilment of a questionnaire regarding the SDGs. In this questionnaire, each SDG could be related to relevant UGGp projects, and when possible illustrated with photographs. From a total of 71 European UGGps at that stage, 33 UGGps replied to this challenge. This meant 46% of positive replies. Although the results of the analysis done to this important data will be presented in a formal document, produced by the Catalysts of the WG it is possible, however, to have a brief overview, using a quantitative methodology. As a preliminary result, it is possible to know which are the “ten most voted SDGs” and highlight the three main positions. Almost with 100% is SDG 4 “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”, followed by SDG 3 “Ensure healthy lives and promote well-being for all at all ages”, and in third place, SDG 8 “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”.

From a qualitative perspective, the replies to this questionnaire will for sure bring a new light to what is perceived by the managers teams of the UGGps, when dealing with the 17 SDGs and the correlation with their correspondent targets.

LATIN AMERICA UNESCO GLOBAL GEOPARKS CONTRIBUTION TO SDGS: A METHODOLOGICAL APPROACH

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Keywords: *Geoparks, Latin America, Agenda 2030 SDGs, Methodology, Sustainable Development*
Workshop : SUSTAINABLE DEVELOPMENT GOALS

In 2015 United Nations established the Agenda 2030 and their 17 Sustainable Development Goals (SDGs). In the same year was approved the International Geoscience and Geoparks Programme. In this sense UNESCO Global Geoparks (UGGp) established a strong commitment in order to support the SDGs implementation through good and innovative practices of sustainable development on the labeled territories. Taking this reality into account, how can we identify if this commitment is effective or sterile? This work presents a proposal for a methodological approach on how we can measure the Geoparks contribution to SDGs. Furthermore, expose preliminary results of their application on the four Latin America UGGp (Araripe UGG in Brazil, Grutas del Palacio UGG in Uruguay, Comarca Minera UGG and Mixteca Alta UGG in Mexico) to discuss how they are effectively contributing to fulfil the SDGs. An intense field work was carried on the referred territories, in order to collect and analyze primary data about the perception of the inhabitants on how the UGGp and their management plan strategies on geoconservation, geoeducation and geotourism are contributing to the SDGs. To acquire this, was developed a set of indicators, based on the 169 targets of the 17 SDGs, used to create a questionnaire and develop workshops to be applied on field. In each the present Latin America UGGp was applied this methodology, that has a quantitative and a qualitative component. The methodology consists on: i) application of questionnaires to general population; ii) participative cartography workshop; and iii) SWOT workshop. With these tasks was possible to obtain concrete results about the perception of the inhabitants on how the UGGp are working to achieve the SDGs. This also allowed to identify potential strategies for their implementation in the territories, in order to improve a Sustainable Development according to the needs of the local population. The importance of this work lies in one hand in its contribution for the state of art analysis about UGGp in Latin America, namely their particularities, differences and challenges. On the other hand, is setting basis on how we can effectively analyze the UGGp contribution for Sustainable Development and their five pillars: Planet, People, Peace, Prosperity and Partnerships.

REGIONAL DEVELOPMENT THROUGH INTERNATIONAL COLLABORATION

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Keywords: *working group, island geoparks, regional development, exchange*
Workshop: ISLANDS - Networking against ISLEtion

The newly established Island Geoparks Working Group is an exchange platform for UNESCO Global Geoparks which include in their territories at least one whole island. A unique geographic environment, such as a remote island, affects various fields of the geopark's activities and management issues. There are also many challenges that the island areas face due to their location, e.g. raising a united sense of awareness among local inhabitants, promotion of geotourism, attracting visitors from overseas as well as facilitating exchange of the local residents, especially children, with communities from other regions. The members of this working group hope to contribute to the regional development of the geoparks' areas and human resource development through information exchange, sharing their best practices, and participation in other joint activities. During this presentation we will introduce the Group's goals in more detail and present some specific case studies.

CONSERVATION AND ENHANCEMENT OF THE LESVOS PETRIFIED FOREST - AREA KYRIA APOLITHOMENI

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Keywords: *conservation, preservation, Lesvos, Petrified Forest, park*

Workshop: ISLANDS - Networking against ISLEtion

The Petrified Forest of Lesvos within the Lesvos UNESCO Global Geopark is one of the finest and rarest monuments of geological heritage worldwide. Created 20 million years ago, when volcanic materials covered and petrified the forest that was covering the area at that time. The Greek state, recognizing the great environmental, geological and paleontological value of the Petrified Forest of Lesvos, declared the area “a Protected Natural Monument” (PD 433/1985). The historic site of the Lesvos Petrified Forest, known since the 17th century as “Kyria Apolithomeni” has been operating since 1995 as the main visiting park.

The Natural History Museum of the Lesvos Petrified Forest is implementing a major geo-conservation project in the park funded by the Regional Operational Programme of North Aegean Region (ESFR2014-2020). The preservation and documentation of the fossilized logs at the site of Kyria Apolithomeni (Bali Alonia) requires combined and simultaneous targeted actions both for the mobile and fragile fragments of the fossilized trees or plant organs and for the fossilized trees that remain in situ. All fossils in which maintenance work is being carried out require immediate protection, as they have never been conserved in the past. In addition, the work is also about finding fossilized strata through geochemical works and radiodating, as well as mapping of fossil sites so that further specimens will come to light in the future.

The execution of the above works is necessary for the complete exhibition of the findings of the Lesvos Petrified Forest, which is the main purpose of the Natural History Museum of the Lesvos Petrified Forest. The implementation of this program will make a major contribution to the conservation of the fossiliferous sites that have been exposed so far and are subject to particularly intense pressures, both from natural processes (rain, wind erosion, solar radiation, etc.) and from humans.

RESIDENTS' PERCEPTIONS OF GEOTOURISM IN QESHM ISLAND, IRAN

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Keywords: *Geopark, Geotourism development, Geotourism impacts, Residents' attitudes, Qeshm Geopark*

Workshop: ISLANDS - Networking against ISLEtion

While much attention has been made to investigate the impacts of tourism behavior on a destination, little is known about the effects of geotourism activities on host communities. This study expands the understanding of residents' perceptions about the impacts of geotourism development in Qeshm Island in the Persian Gulf in Iran. The Qeshm geopark has been assigned as a UNESCO Global Geoparks in May 2017. The island of Qeshm has a sensitive environment as well as a strict traditional culture and it receives about 2,000,000 visitors annually. The objectives of this study are threefold. They are to enrich the geotourism literature with an analysis of residents' attitudes; to determine the extent of the relationship between geotourism development in Qeshm Geopark and their impacts on the local residents, and to see if the locals' attitudes toward geotourism development in Qeshm Island change over a time. A quantitative method is used to achieve this goal with a sample of 266 residents of Qeshm Island. The data is analysed using a confirmatory factor analysis and structural equation modeling (SEM) techniques. This study is identified four geotourism impact domains and examines the effect of each domain on the total residents' perceptions of geotourism development in Qeshm Island. Results indicated that the level of residents' happiness towards geotourism are closely associated with their perceptions of positive cultural impacts in Qeshm Island. Although, the negative socio-cultural and environmental impacts have positive significant effects on increasing annoyance among residents in Qeshm Island. However, the residents' positive perception is much greater than the negative one. The results of this study enhance the knowledge of residents' attitudes towards future geotourism development in Qeshm Island. It should also assist planners in the establishment of tourism development policies and strategies which are informed by residents' concerns and issues. In addition, it should help them minimise any adverse impacts whilst enhancing the overall benefits associated with geotourism development.

THE VOICE OF THE CUSTOMER IN LANZAROTE AND CHINIJO ISLANDS UNESCO GLOBAL GEOPARK.

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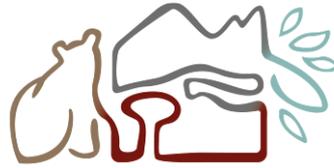
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Keywords: *customer experience, listen, feelings, recommendation, centers of art, culture and tourism*

Workshop: ISLANDS - Networking against ISLEtion

In Lanzarote and Chinijo Islands UGG, among the most important Geosites are included in Centers of Art, Culture and Tourism of Lanzarote. They are a good examples of Geotourism worldwide and were awarded by the GGN in 2016 for best practices. We received in 2017 in all the Centers 2,873,997 visitors, being its maximum exponent the Timanfaya National Park with 922,906 visitors. This center is the one we will take as an example to explain our management about developing a Customer Experience Management project in the following phases: 1. Definition of the Customer journey map (CJM). 2. Realization of the semantic analysis of the client's voice by analyzing the main social networks such as Trip Advisor, to know in depth what customers say about us. 3. Analysis of the client's voice through survey and claim systems. 4. Configuration of the CX manuals of the different experiences. It is designed as it should be the service provided through improvement teams, taking into account the discourse of the client. 5. Resolution of problems that impact on the client's experience through methodology, up to the application and implementation of solutions. 6. Start-up process audits, quality control and mystery shopping. As we have mentioned, we analyzed the most important tourist social network Trip Advisor, to know what customers think and what they think about us. During the year 2017 we analyzed 1,702 comments, where 43 are comments with a score lower than 2, out of a total of 5. The most repeated comments have to do with lack of information in other languages such as Italian and French. Also we listen to our customers through a system of surveys through a tablet in the visiting areas, in which we ask items as if their expectations have been met in their visit to the center, if the price-quality ratio it seemed appropriate, opinion on different quality factors such as the valuation of the natural environment, the conservation of the landscape, the cleanliness, the tranquility, the facilitated information, the kindness of the personnel, the waiting times and experience during the geothermal demonstrations. The results in general in the center exceed in many cases 80%, giving rise to a percentage of recommendation of our clients in a 56.64%. Taking into account the opinion and needs of our customers, the Centers have developed an App to not only provide information to the client during their visit, but also with the use of the latest technology of IBM Watson, it serves of virtual assistant during it. This is that the client at any time can ask any question about the center, which will be answered. In conclusion, we have opted to work with the client in mind as a reference, listening to their opinions and feelings, in order to guarantee that they have the best possible experience in our Geopark.



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YOUTH ROLE IN SUPPORTING BELITONG NATIONAL GEOPARK. CASE STUDY: YOUTH VOLUNTEERING IN THE 2ND BELITONG GEOPARK FESTIVAL 2017

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Keywords: *Youth, Volunteer, Belitong, Geopark, Awareness*

Session: Education, public awareness and communication

In 2016 Aspiring Belitong Geopark was initiated by Regency of Belitong and Regency of East Belitong. A promotional event namely Belitong Geopark Festival was held for the first time in the same year. Due to government regulation related to budgeting, the organizer got limited funding support from local government. In 2017, the festival was held in a bigger scale with various activities. One of the agendas was seminar for granting the status of Aspiring Belitong Geopark as Belitong National Geopark (BNG). However, one of the challenges was still related to budgeting and financially support to human resources. One of the strategies to overcome this challenge was recruiting volunteers to be part of the organizing committee. The purpose of this study is to report the observation and qualitative assessment regarding to local youth awareness and contribution to BNG, particularly 50 youth volunteers in Belitong Geopark Festival in 2017. We obtained some results and recommendations including: 1) the motivation of youth volunteering was influenced by local community engagement and willingness to develop tourism sector in Belitong Island; 2) during the festival over 50 youth volunteers aged between 20-32 years old were involved and more than 90% committed to continue their contribution in other BNG's programs; 3) youth volunteering gave a significant role to BNG; 4) BNG committee should develop youth volunteering in a certain platform to sustain youth contribution in BNG; 5) supporting from local government is necessary to provide trainings for the volunteers in order to optimize their contribution in BNG.

THE ROLE OF INTERNET MASS MEDIA IN THE IMPROVEMENT OF PUBLIC AWARENESS IN CILETUH-PALABUHRATU GEOPARK

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Keywords: *public awareness, internet mass media, education, aspiring geopark, ciletuh_palabuhanratugeopark*

Session: Education, public awareness and communication

Along with its development, Geopark Ciletuh-Palabuhanratu always seek various innovations in introducing the area and increasing the level of visit, one of them with the internet mass media. Supported by the diversity and uniqueness of existing geosites, Geopark Ciletuh-Palabuhanratu is able to combine these two aspects, information via the internet and regional advantages. Total population of Indonesia is 265.4 million people, as many as 132.7 million souls use the internet. On average they use the internet is 9 hours per day, with google.id as platform seeker information is often sought with the achievement of visits up to 2.9 million times / month. The large number of internet users, and the level of community enthusiasm for this region, Geopark Ciletuh-Palabuhanratu can more easily share news information or promote content. Generally, audiences are considered only a group of homogeneous and easily influenced people. Thus, messages delivered to them will always be accepted. Using qualitative methods, hypodermic needle theory, reveals that this model is a one-way communication, based on the assumption that mass media has a direct, immediate and decisive influence on the audience. Evidenced by the large number of fanpage Ciletuh-Palabuhanratu Geopark on Facebook, and Instagram. According to histat.com data for evident increasing of visit in Geopark Ciletuh-Palabuhanratu official website from time to time with various domicile of diverse visitors and from various regions of Indonesia and the World.

GEOPARK ACTIVITIES BY LOCAL HIGH SCHOOL STUDENTS IN UNZEN VOLCANIC AREA UNESCO GLOBAL GEOPARK

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Keywords: *Unzen Volcanic Area UGGp, high school students, design of Geopark shirt, Koka high school, local research*

Session: Education, public awareness and communication

Introduction It is necessary that younger generation realize values of geological, natural, cultural and historical heritages in their hometown in order to maintain local societies with sustainable manner. This poster introduces cases of geopark activities that local high school students (16 – 18 years old) are working. Case 1: Holding “Unzen UGGp Research Presentation Seminar” for local high school students The Research Presentation Seminar for local high school students has been held since 2012. In this seminar, research groups of high school students in the territory of Unzen UGGp carried out about the results of their research as to the nature and earth scientific observations, agricultural procedures, marketing research for inhabitants and so on. These presentations were judged by several experts in the Council and awarded 3 prizes; First Prize, Second Prize and the Research Encouragement Award. The research groups obtained First and Second Prizes have opportunities visiting other geoparks in Japan so that their works will be developed more and more. Case 2: Contest of an original design of Geopark shirt It is common that members of a geopark’s office wear shirts with same design as a uniform to promote their geopark in Japan. In 2017, Unzen UGGp held for high school students the contest of an original design expressing features of our Geopark. 22 designs from three high schools presented were judged by local painters, high school teachers of art course and professional designers and decided First and Second Prizes. A museum shop in Mt. Unzen Disaster Memorial Hall (core facility of Unzen UGGp) is preparing to sell new polo-shirts using this design obtained the First Prize. Case 3: Local research program by Koka high school Koka high school in Unzen UGGp sets “Glocal Course”; word of “Glocal” is a coined word combining “Global” into “Local”. The course is aimed for growth of students who have both global point of view and understanding their hometown, which is matched to those of geopark concept. A staff of Unzen UGGp has supported their local research since 2017. Students are divided into 4 groups and have start their research on the basis of their subjects; research of actual condition of natural environment of a seacoast, making green curtains using passionflowers and their effectiveness, considering of business model for utilizing local heritages and, analyses and improvement of explanation panels at geosites. These themes will be inherited by lower-grade students. Significance and effect that participation in local activities brings high school students Local understanding of high school students as to not only geology but also natural, cultural and historical fields has deepened markedly by carrying out researches and the seminar since 2012. If they realize significance of sustainable development of their hometown by participating in geopark activities, they will become local leaders who promote their hometown with sustainable manner. Continuous support of local research by high school students is necessary.

A NATURE ACADEMY IN DANXIASHAN UGGP

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Keywords: *Danxiashan Nature Academy, environment protection, public education, outdoor, learning courses*

Session: Education, public awareness and communication

Danxiashan Nature Academy is a program to educate public especially the young to love nature and protect environment. In December 2016, Danxiashan Nature Academy was established to discover and display more geoscientific, ecological, aesthetic and cultural values. Education lessons is given not only in the geopark museum, but also tour and hiking routes in Danxiashan UGGp. Guangdong Environmental Protection Department supported and funded Danxiashan Nature Academy to design lectures and activities, train teachers, launch the pilot scheme and recruit students to run the academy. There are five levels of teachers include experts and scholars, Geo-guides, popular science volunteers, nature instructors and teaching assistants. Nature instructors are geopark staffs who directly operate the courses and organize the activities for the academy. Two full-time staff have been hired and two other young graduates from Shaoguan University are recruited to provide professional science course. The Danxiashan Nature Academy has developed and offered over 200 science popularization courses. These courses are designed according to the available natural resources of Danxiashan. These include geology, landscape, ecology, water bodies, astronomy, meteorology, local culture and religion. The languages used in both teaching materials and in the field are in easy understandable format to meet the needs of different ages, education background and learning abilities. Ministry of Education has made attendance of outdoor learning in every school term compulsory for students of Grade 1-12 to attend outdoor courses and practices since 2018. Danxiashan UGGp is one of the first 204 learning centers being chosen to implement this new regulation. Now Danxiashan Nature Academy is designing courses according to the syllabus of primary and secondary schools, to fulfill particularly the needs of their science curriculum and practicum out of the classroom. The courses encourage more students to learn outdoor through non-conventional teaching methods such as field-trips, experiments, group discussion for sharing knowledge and inspiring every student through the learning process. The courses target mainly at primary and secondary schools in their subjects such as geography, biology, science, social studies and history. Just in 2017, Danxiashan Nature Academy has served more than 10,000 people accepting the environment protection education and provided more than 100 science popularized public benefit activities in Danxiashan UGGp. Everybody who participate the lessons would be asked to obey three rules: first, take your trash with you; second, speak in a low voice; third, influence 5 other people.

THE WAY OF THE DOLOMITE: THE JOURNEY OF THE ROCK IN THE DOLOMITIC ALPS

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Keywords: *Dolomite stone, geoheritage, geotourism, education, valorization*

Session: Education, public awareness and communication

The project has been designed to enhance the Dolomite material by promoting its knowledge and shared and conscious use through the identification and linkage of geosites present in the project area, the geological analysis of this rocks, the mapping of quarries, the past and present methods of extraction and processing, conducting a census of the sites of interest where it was used, the identification of sites where pilot projects of analysis and analysis of restorative conservation of artefacts made with Dolomite stone, its present day's utilization, the creation of an ecosustainable interregional geo-tourism path, the cross-border exchange of good practices of analysis and sustainable exploitation of the good stone. The project is closely linked to the area of the province of Belluno where the Dolomites are declared in 2009 as UNESCO World Heritage Site and the area of Tyrol, of Dolomitic rocks of Belluno. The valorization of this common environmental and cultural heritage intends to be the key for sustainable regional development, also at tourist level, which considers mountains as the natural link between the two areas and as a moment of encounter between the way of high education and the world of stone professionals. The creation of a close relationship between the highly professional realities of the two territories, to create new human assets through knowledge shared, will maintain high levels of quality of life in the border area, increasing economic competitiveness. The presence of a highly specialized human capital contributes to fighting the threat of mountain depopulation, especially regarding new generations. This project will give the opportunity to the territory, between the Dolomites UNESCO World Heritage Site and the area of the Tyrolean Alps, to be rediscovered by its inhabitants and will allow tourists to explore it in a guided and ecologically sustainable way, discovering its history from the formation of the area from a geological viewpoint, through the anthropic use of the territory, with reference to the Dolomite stone material. We want to bring to light a close connection that has united the two territories for millions of years, making clear that the mountains are not an element of separation, but of union. Therefore, not a problematic area but as a particularly rich and heterogeneous area that we want to enhance through the creation of a paths network, which connects the points of interest linked to the "Dolomite" theme of the two territories.

ANALYSIS OF THE NUMBER OF “OUTDOOR LEARNING TEXTBOOK” DOWNLOADS AND FURTHER UTILIZATION PROMOTION STRATEGY IN TOYA- USU UNESCO GLOBAL GEOPARK

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Keywords: *Disaster reduction education, Textbook, School excursion, Usu volcano, Volcanic hazard*

Session: Education, public awareness and communication

Toya-Usu UGGp is a geopark where many schools visit for educational travel from inside and outside the region. Since 2011, we have set the learning theme provided by this region to 'Disaster reduction education using geopark'. We propose a disaster education guided tour to schools and travel agencies that combines Volcano Meister, a disaster reduction education guide in this area, and the "Outdoor Learning Textbook Series". The number of requests for this guided tour is increasing every year. This "Outdoor Learning Textbook Series" is a useful text for school teachers because it corresponds to the Course of Study in Japan. Volcano Edition / Cultural and History Edition / Vegetation around Usu Volcano Edition are available. We distribute it to local schools and PDF data is also published on our web page. Analyzing the number of downloads, you can see that the number is not constant throughout the year. Especially many downloads from May to June and August. From this result, you can see that downloads are increasing during the preparatory season of school excursion from June to July and September in Japan. The total number of downloads so far is about 5,000 times. This text is intended to be copied and distributed by teachers and travel agencies, so it is considered to be used many times the number of downloads.

THE ENDANGERED SAIMAA RINGED SEAL IN LAKE SAIMAA

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Keywords: *Saimaa Geopark project, Saimaa ringed seal, Lake Saimaa, endangered species, climate change*

Session: Geoparks, climate change and geo-hazards

When Saimaa separated into a freshwater basin more than 9,000 years ago, the ringed seal (*Phoca hispida*) became isolated from its original population. These marine mammals had to adapt to the labyrinthine waters of Lake Saimaa. Those individuals, who knew how to nest on the shore of the lake, survived and passed on their features to their offspring. In aspiring Saimaa Geoparks area lives around 400 Saimaa ringed seals. Only three years back amount was 320. Species is still extremely endangered and needs protection from inhabitants, tourists and local industry. To geopark project it is very crucial to give right information to visitors and local people how to respect Saimaa ringed seals living conditions. Also geopark tells what kind of actions supports mammalians living in great Lake Saimaa. Basic information is given by signpost project. Around 20 signposts around the area tells story about Saimaa ringed seals. In information boards are written Saimaa ringed seals greatest threats. Major threats to seal population are climate change, fishing-net fatalities, loss of habitat, small population, and disturbances during the breeding season. With effective conservation measures, such as spring-time fishing restrictions and the creation of artificial snow drifts, the size of the population has been increased in recent years. has basic information about Saimaa ringed seal and information about actions which protect rare mammal.

TOOLS SUPPORTING RISK MANAGEMENT AND MITIGATION POLICIES IN THE PERSPECTIVE OF CLIMATE CHANGE: CASE STUDY OF THE CILENTO NATIONAL PARK AND VALLO DI DIANO

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Keywords: *Cultural heritage, conservation, risk management, Cilento Geopark, Unesco*

Session: Geoparks, climate change and geo-hazards

Cultural heritage tells the stories of the world's people. The material (tangible?) part of that heritage, objects and sites, tells us about their activities, their perceptions, their skills, and their ideas. It is unique, irreplaceable and unfortunately, vulnerable. Our heritage institutions bear the solemn responsibilities not only of prolonging their existence but also of making them accessible, so that we can learn our past. In practical terms, we must best plan how to reduce the risks to the heritage in our care, and then act on those plans" (A Guide to Risk Management of Cultural Heritage, ICCROM, 2016). The combination of Heritage Conservation - Risk Management and Mitigation is one of the main challenges recognized at international level and placed at the attention of the people as priorities, both in the general resolutions adopted by the United Nations (Agenda 2030 - SDGs, Res. A/RES /70/1, 2015) and in the resolutions concerning Heritage (Res. 39C/57, 2017, UNESCO). In this context the main International Organizations have outlined strategies and ways for achieving the objectives set by Agenda 2030 in the definition of the action program for people, the planet and posterity. Among the documents produced, the document approved in Sendai (Sendai Framework for Disaster Risk Reduction 2015-2030 - SFDRR), the addendum to the UNESCO Action Plan for the protection of culture and the promotion of cultural pluralism in the case of armed events and emergencies associated with disasters caused by natural phenomena or human actions (Res. 39C/57 UNESCO, 2017) and the ICOMOS action plan (ICOMOS Action Plan: Cultural Heritage and Localizing the UN Sustainable Development Goals, 2017) represent the references for the creation of tools aimed at analyzing, managing and mitigating risks. In the case of articulated territories in which the identity of a people is based on the interconnection of nature, culture and people themselves, determining the living heritage (ICOMOS, Delhi Declaration on Heritage and Democracy, 2017), it is necessary to adopt trans-disciplinary approaches capable to grasp the different degrees of reality, perception and knowledge that describe its complexity. With this approach, the territory of the Cilento National Park and Vallo di Diano was analyzed, relating the objectives (SDGs) of the Agenda 2030 (using the OECD welfare indicators (Better Life project, OECD, 2011) to the natural and cultural heritage that describes its landscape. Specifically, considering the vast heritage present in the area (natural, artistic, cultural, landscape, etc.) and its vulnerability to the actions and pressures produced both by natural phenomena and by human – induced actions, as well as by new sources of danger such as climate change, it is necessary to think of innovative management tools and guidelines, transversal to the different procedures established by the different inscriptions and recognitions enjoyed by this territory.

In the National Park of Cilento - UNESCO Global Geopark, as in many other parts of the Mediterranean eco-region (Blasi et al, 2014), climate change and the resulting situations provide scenarios for water scarcity.

This has imposed strategies that, at global level (UN, UNESCO, FAO, etc), account for a rationalization of the uses of water resources and adaptive management measures at national, regional and local level according to multifunctional criteria. Within these strategies and measures, the so-called "minor and widespread water resources" that in past were not considered as important since they are not very manageable in terms of regional and district water schemes, are of great importance for irrigation, hydroelectric, drinking water and industrial purposes. One of the major management issues posed by minor and local water resources is their poor economy in mono-functional terms, especially in protected areas or with specific destination where there are restrictions on use imposed by Community legislation, national and regional. In these territorial and environmental contexts, one of the proposed solutions is a multifunctional use of the minor and local water resources, starting from the re-engineering of traditional uses for the following purposes: restoration of functionalities of the captions, recovery and strengthening of local irrigation and drinking water schemes, reintroduction of storage, drainage and canalization practices useful for the mitigation of hydrogeological risk in abandoned areas, increase of the local ecological network supported by habitats supported by man, re-composition of the widespread rural cultural landscape; increase and maintenance of agricultural production with local varieties with high added value.

ASPIRING DANYANG GEOPARK, KOREA

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Keywords: *Danyang, geological heritage, Cultural heritage, limestone, doline*

Session: Geoparks, sustainable tourism and local sustainable development

The Danyang area is located in the middle part of the Korean peninsula and is characterized by the sutured zone formed by the collision between the North Korean land and South Korean land. Last year, Danyang county hosted over 10 million visitors. Danyang county is well known for its famous tourist attractions including the Eight Scenic Views of Danyang, cultural heritage, archeological heritage, ecological heritage and national park, etc. In addition, the Danyang area has many interesting geological heritage related to the collisions such as multi-layered thrust fault, overturned and/or vertical strata, superimposed old strata overlain by younger formations, epoch level unconformities and high ridgeline of metamorphic belts, etc. The Cambro-Ordovician limestones contain important fossils and show typical beautiful karst landscape including caves and dolines which add to the geodiversity of this area. The Danyang county will apply for a Korea National Geoparks registration, and prepare the procedure of certification. It is expected that Danyang county will make one of the world's popular tourist destinations (Geoparks).

PERMAFROST AND CLIMATE CHANGE IN THE ADAMELLO BRENTA GEOPARK

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Keywords: *Permafrost, Rock glacier, climate change, Adamello Brenta Geopark, cryosphere*

Session: Geoparks, climate change and geo-hazards

Permafrost is a component of the Alpine cryosphere and is defined as any type of ground that remains frozen for many consecutive years. In the Alps it is widespread at high elevations (above 2400-2600 m a.s.l.), and its presence and distribution is mainly conditioned by climate variables and local topographic features. Under the current climate warming, permafrost is seriously threatened and is subject to thawing and degradation. The Adamello Brenta Geopark is mostly located at medium and high elevations, and permafrost is expected to affect several slopes of its two main mountain groups (Adamello Presanella and Brenta). The distribution of permafrost in the area of the Adamello Brenta Geopark was recently mapped within the Alpine Space Permafrost project (2009-2011). According to this map, an area of about 38.6 km² (3% of the surface) is affected by permafrost, which, on average, is widespread above an elevation of about 2700 m a.s.l. In the last years, also the rock glaciers located in the area of the Geopark were mapped and described. Rock glaciers are the main landform related to the presence of permafrost in alpine environments and are characterized by a distinctive appearance. In the Geopark area, more than 142 rock glaciers have been mapped. Most of them (135) are located in the Adamello Presanella, the remaining are in the Brenta group. Several investigations on permafrost and rock glaciers are still in progress in the Geopark area, together with the collection of data on key climatic variables such as air temperature and snow depth. The surface displacement of two active rock glaciers located in the Presanella massif (Maroccaro and Amola rock glaciers) is under investigations since 2001 by means of topographic surveys. It is the longest series of displacement surveys carried out on rock glaciers in the Italian Alps. On the same landforms, we are continuously collecting ground surface temperature (GST) data since 2004 and air temperature and snow depth data since 2013. The average long-term (2001–2015) surface displacement of the two investigated landforms is rather low, with velocities of about 0.15 m/y for Maroccaro and 0.09 m/y for Amola. An overall acceleration can be observed for Maroccaro after the 2007-‘08 hydrological year, peaking in 2014-‘15. This acceleration was not observed for Amola. The GST series shows an overall increase, with maximum MAGST (Mean Annual Ground Surface Temperature) values reached in the 2014-‘15 hydrological year in both the landforms (2.8°C for AmLC and 1.2°C for MaRG). Over the whole period of observation (2004-2015), the MAGST increased of more than 1°C on both the landforms, moving from negative to positive values on Maroccaro. A permafrost monitoring site was established in 2014 on the slope where the famous alpine hut “Ai Caduti dell’Adamello” is located. Here, the subsurface temperature is measured in a 20m deep borehole previously drilled in bedrock to take inclinometric measurements. Close to the same site, the air temperature is also measured. The permafrost data retrieved at this site will help to interpret the stability conditions of the slope on which the alpine hut was built, which has been studied for a long time.

REGIONAL DEVELOPMENT BASE ON GEO HAZARDS POTENCY AT TAMBORA GEOPARK AREA

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Keywords: *Tambora, Regional Development, Satonda, Geopark, Geo-hazards*
Session: Geoparks, climate change and geo-hazards

Tambora Geopark is one of the national geoparks in Indonesia and legally recognized on 24 November 2017. Tambora Geopark is located on Sumbawa Island and covered by two regencies, which are Bima and Dompu with four sub-districts, namely Kempo Subdistrict, Pekat Subdistrict, Sanggar Subdistrict, and Tambora Subdistrict. The development of a Geopark aims to synergize between Geodiversity, Biodiversity, and Cultural Diversity base on conservation approach for elevating the community welfare. Therefore, the increasing number of visitors both for research, education, and tourism is also becoming an important goal. As an area with an active tectonic level, the Tambora Geopark is highly vulnerable to geological disaster. Based on the data retrieved from the Energy and Mineral Resources Office that the geological disasters recorded in Geopark Tambora area during 2017 were earthquake, landslide, flood, and tsunami. The analysis of regional development based on geological disaster potency is required. This is because the geological hazards are natural processes, so geological disaster can not be stopped, but losses caused both, in terms of physical and non physical conditions, can be prevented. The Analytical Hierarchy Process (AHP) method was used for a regional development analysis in Tambora Geopark. The result showed that the area development could be divided into three development areas: conservation area, education area, and commercial area. Each area has three category values namely low, medium, and high. The most suitable area for the regional development is the area, which has high value. The results of the analysis are expected to be able to provide an overview of the direction of developing Tambora Geopark in the Future.

EARTHQUAKE RISK PERCEPTION: A CASE STUDY IN THE POLLINO NATIONAL PARK AREA, SOUTHERN ITALY

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Keywords: *Pollino National Park, risk perception, geoethics.*

Session: Geoparks, climate change and geo-hazards

This research is based on the perception of seismic risk in the The Pollino UNESCO Global Geopark, southern Italy. Some questionnaires and educational material were administered to the students of primary and secondary education in some villages of the Pollino area (Calabria and Basilicata regions), in order to bring out the knowledge actually possessed and tied to age, experience, areas of origin and the perceptions that learners show that they have in relation to seismic phenomenon.

The last few years have seen the debate on the geoethics of environmental and climatic protection to grow resilience as a new discipline, which holds many similarities with geography. Resilience analysis often looks at the capacity to re-establish conditions of equilibrium within a system which has been hit by a serious shock, e.g. a natural or man-made disaster. Geoethics works, in tandem with geological analyses and the geography of risk, to inform a population and develop integrated risk management in such a way as to strengthen a community's resilience. In fact, the risk must be considered in its territorial nature, as a complex phenomenon which involves all aspects of the relations between man and environment. Assuming that the rupture of the dynamic equilibrium among population, environment and resources is the increasingly frequent causes of the outbreak of disasters, in the academic increasing attention has been paid to the concept of resilience, for its potential to evaluate a system in a state of equilibrium and adaptation in response to a shock.

Therefore, the aim of this work is to study some people's capacity to overcome what was potentially a disastrous event and, through a process of reconstruction, turn it into an occasion for growth. The experiment, carried out in some primary and middle schools in the area of *Pollino National Park/UNESCO Global Geopark*, was conducted on the basis of the belief that there is a close relationship between a population's having a realistic understanding of the risk of such an event, e.g. an earthquake, and high levels of resilience.

The data and opinions collected will be useful to design and build new Disaster Risk Reduction tools, more adapted to the needs of all citizens, compared to all the natural hazards and in particular to the seismic hazard, boosting the community's resilience.

GEOLOGICAL HAZARDS IN TRENTINO, NE ITALY: FROM THEIR IDENTIFICATION TO REGIONAL PLANNING AND CIVIL PROTECTION

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Keywords: Geological hazards, thematic maps, regional planning, civil protection, Trentino

Scientific session: Geoparks, climate change and geo-hazards

The Trentino region (NE Italy) covers about 6,200 square kilometres. Its territory is extremely rough and largely characterized by high mountains and steep slopes (more than 44% of Trentino has $>30^\circ$ slope steepness). Local morphology, together with other lithological, hydrological and climatic causes, is responsible for a huge amount of variably-extended hydrogeological instabilities, which affect both natural and anthropic areas (about 540,000 inhabitants in Trentino; 1 January 2018 census). In general, these hydrogeological instabilities are produced not only by gravitational forces, which remain the most common triggering factor, but also by heavy rainfalls and other aspects related to the climate change. In some cases, also earthquakes, which are relevant natural hazards themselves, can be relevant preparatory or triggering events for other types of local hazards. In Trentino and particularly within the area of the Adamello Brenta Geopark, common geological hazards are rock collapses and landslides; in the valleys, floods and debris flows are also recurrent. Snow avalanches often affect valley floors where touristic facilities are located. The Autonomous Province of Trento, thanks to its technical agencies and surveys, is actively involved into the study (i.e., identification, classification and delimitation) of geological hazards, in order to reduce risk and mitigate their potential damaging effects. For this purpose, thematic hazard maps have been performed. They summarize all the scientific and technical results obtained over many years, regarding hydrogeological (ex., landslides, rockfalls, floods, snow avalanches) and other natural hazards (ex., seismicity, forest fires). Some man-made hazards are also considered (ex., undetonated bombs, presence of dangerous substances). These hazard maps have been fused into a cartography which regulates urban and building codes, aimed to promote environment-friendly regional planning and to prevent potentially dangerous actions. Moreover, qualitative and/or quantitative modelled scenarios and predictions are extremely useful in order to interpret evidence of past disasters and to assess size and extent of possible future events.

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

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Keywords: *aspiring geopark, Donghaean, Kyeonsangbuk-do, diversity, columnar joint*

Session: Aspiring Geoparks

The Gyeongbuk Donghaean (refer to Donghaean) is the name of the region located along the east coast of the Gyeongsangbuk-do, Korea, that includes the four cities (Pohang, Kyeongju, Yeongdeok, and Uljin). There exists a variety of ecological, archaeological and cultural heritages as well as outstanding geological sites, 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, having diverse characteristics such as columnar joint, Mafic Magmatic Enclaves, limestone cave, fossils, unconformity, and so on. Of them, in particular the Yangnam columnar joint is a typical geosite since it has a distinct radiating pattern of the joint which is used as a motive of the logo for the Korea Geopark Network due to its global rarity and scientific importance. There are also ecologically protected river trails, traditional villages, old temples, and a royal tomb, and so on as non-geological sites spatially involved in the geosites. Because of the lack of integration and promotion of the attractions, the tourism in this region, however has not been developed sufficiently compared to the potential results expected from the heritage and sites. We therefore try to be endorsed as a UNESCO Global Geopark in order to maximize tourism, through which the local economy can be raised and the nature will be conserved well with the enhanced values of the heritages and sites.

GEOPARK AS A IMMERSIVE PLATFORM

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Keywords: *augmented reality (AR), virtual reality (VR), geopark*

Session: Aspiring Geoparks

Geopark as an immersive platform explores how augmented and virtual reality (AR/VR) can transform storytelling in UNESCO Global Geoparks (UGGp) and the way content is experienced. Geoparks could take a role as immersive time machine platforms enabling visitors to experience developments in time of abiotic, biotic and culture aspects of a geopark in an engaging manner. The team of Rhine Meuse delta aspiring UGGp is roadmapping an intensive interpretation portfolio based on augmented and virtual reality (AR/VR) technology and knowledge. Augmented reality (AR) and virtual reality (VR) are different points along a spectrum of immersive computing – the technology that blurs the lines between the physical and digital worlds. VR immerses a user in a computer-generated simulation of an entire environment. AR, on the other hand, layers computer-generated enhancements over an existing reality that is presented in a user's field of view, making the blended experience more meaningful or interactive. VR is delivered via a head-mounted display (HMD) and can incorporate additional sensory stimuli such as touch and smell. AR sometimes utilizes HMD technology, but increasingly is available via mobile devices such as smartphones and tablets. Augmented and virtual reality (AR/VR) can enhance the way content is experienced. AR and VR – immersive technologies – can dramatically alter the experience of content consumption. They have the capacity to promote new and meaningful feelings, skills and understanding, which can make content more powerful than when presented through traditional media. As the cost of immersive technology decreases, creators are enabled to redefine storytelling and narrative content in an entirely new medium. In the current environment, visitors of UGGp are spending an increasing amount of their leisure time using screen-based devices. Given that immersive technology has the potential to be more engaging and capture more intimate personal data from users, UGGp can develop in the direction of a immersive platform.

THE POTENTIAL OF GEOTOURISM IN BATU NYUSUN WATERFALL, SOUTH GARUT, WEST JAVA; THE ADVANTURE OF GEOVOLCANO WATERFALLS. INDONESIA

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Keywords: *Batu Nyusun Waterfall, Garut, Indonesia, Geotourism, Volcano*

Session: Aspiring Geoparks

Abstract— There are geotourism attractions region due to volcanoes area. These are caused by its diversity in the morphology landscape. In this context, the volcanoes area can form a columnar joint structure. If the formation of rock column is located in the area of the water flow movement, it can lead to the formation of waterfalls. This landscape can be a geotourism potential as waterfall caused by columnar joint. It can be found in Batu Nyusun waterfall which is administratively located in Kampung Cikuda, Pangrumasan Village, Peundeuy Subdistrict, Garut Regency, West Java, Indonesia. “Batu Nyusun” derived from native language, means the arranged of rock .The methods used in the analysis of geotourism potential include literature study, field observation and social observation. Based on field observation, there can be found four other waterfalls located in the same sub-district, namely Curug Koncrang, Curug Salawe, Curug Ermat, Curug Kiasantang. These waterfalls are located in the Undifferentiated Old Volcanic Formation; tuffs, tuff breccia, and lavas. With the waterfall in adjacent territory, geo-track planed named "The Advanture of Geovolcano Waterfalls". It is expected that this geotrack can be used as a geotourism area for community and natural laboratories to recognize the geology of the area.

THE ASPIRING COTENTIN GEOPARK IN NORMANDY (FRANCE)

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Keywords: Geoheritage, Cotentin, Normandy, geopark, Geotourism

Session: Aspiring Geoparks

The Cotentin aspiring geopark is located in the northwest part of Normandy (France) and covers about 1 400 square kilometers. This area mainly includes a part of the variscan mountains with Palaeoproterozoic and Paleozoic rocks which shape landscapes, contrasting with flat Mesozoic rocks from the Paris Basin. The coastline shows a large variety of geomorphologic forms, rocky coasts, dunes, estuaries and beaches. The geological story is translated by high variety of rocks, geological processes and ages. Dating back two billions 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 geology of Cotentin. Diverse earth resources have been exploited for a long time. Many of them served as building stones for many megaliths, castles, manors and farms that form an exceptional cultural heritage. Other useful substances such as kaolin were exploited, as well as iron ore within an original undersea mine. Man has lived in North Cotentin since very ancient times. In addition to the exceptional remains of Neanderthal habitat, traces of civilization from Prehistory and Celtic origins are everywhere. Their location made the early peoples prey to many invaders, perhaps explaining the smuggling activity observed more later between the Channel Islands and the continent. This rich history is at the origin of the great diversity of the cultural heritage: monuments, traditions, language, gastronomy, which tourism offices propose to discover through thematic routes, guided tours and different activity centers, supported by an offer of accommodation in development. The local authorities of Cotentin area took geotourism competence to organize the local tourist offer. Consequently, considering the attraction of this area depending on its exceptional geology and its authentic natural and cultural heritage, a territory project contributing to the economic, tourism and social progress of the Cotentin Peninsula is going to be developed. On the initiative of local people, relayed by public and private partnerships, new actions are gradually emerging. Taking into account these dispersed actions in a general project must allow this territory to apply for the geopark Unesco label in three or four years.

THE RHINE-MEUSE DELTA: A HOLOCENE-ANTHROPOCENE DELTA

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Keywords: *Pleistocene, Holocene and ‘Anthropocene’ geoheritage, young delta plain, land-reclamation, geopark, human occupation*

Session: Aspiring Geoparks

The Dutch delta plain has a long history of humans living with rivers, tides and coasts. The Netherlands – literally: lowlands – receives the rivers Rhine and Meuse. Helped by glaciations in the last million years, by sea level rise since the end of the last ice age, and by human activities of the last few millennia, have developed a rich and diverse Pleistocene, Holocene and ‘Anthropocene’ geoheritage of land built out into the sea. It makes the Rhine-Meuse delta a profound representative of a geologically young delta plain at the interface of land and sea, with a long intensive human occupation history. The Dutch reclamation and water management image is internationally renowned. Our geopark aspirations want to connect that position to the geological making of the delta. Surely, the success of human dwellings in this delta can be framed as humans steering nature with their ingenuity (and trial and error, recovering stamina, vigilance and determinism). But just as well – and at grander spatial scale and in 21st century transdisciplinary spirit – we can frame this success as spawned by the geological making of this delta and the time depth of the human impact history on the delta. In the Rhine-Meuse delta, as one story-line example, Medieval reclamation success creating extensive polder landscape with famous regular ditch networks that by now have functioned for almost 1,000 years (‘man made’) – can be connected to the cover of clay that these areas received in Roman and Early Medieval times owing to increased fine sediment delivery and new avulsed river branches (‘naturally laid’). In turn, the increased fine sediment delivery was due to increased erosion in the Rhine and Meuse catchments that were deforested by humans over there: an antropogenic increased flux of sediment that was naturally routed downstream. Areas of the delta plain that were too distal to river branches did not receive the blanket of hinterland eroded fines. Compared to the polders in the heart land of the delta, reclamations over there turned out to be far less sustainable and to need repeated adaptation, switch of land use, expensive engineering and increased maintenance attention. Establishing a Geopark that covers the Rhine-Meuse delta in its entirety allows to tell the de-framed, diversified success story of the geological functioning of the delta system over periods of time with abundant humans present, with various story lines. Hereto, we catalogued a rich selection of geoheritage features spread over the Geopark. These include landforms of the river valley (upstream), the fluvial delta plain (central parts), and the estuary/lagoon tidal zone and beach barrier (downstream in the Geopark). We use Pleistocene landforms from the last two glacial cycles as vantage points and to define the boundaries of the delta system. Inside the delta, the feature assemblage allows to highlight: (1) Lateglacial and Early Holocene: riverine responses to climate change; (2) Middle Holocene: deltaic responses to sea-level rise; (3) Late Holocene: sediment from upstream deforestation; (4) “Anthropocene”: human-managed delta environment.

COMMUNITY-BASED MANAGEMENT IN SATUN GEOPARK, THAILAND'S FIRST UNESCO GLOBAL GEOPARK

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Keywords: *Satun, UNESCO Global Geopark, community-based management, conservation, Satun Geopark*
Session: Geoparks, sustainable tourism and local sustainable development

Satun Geopark covers an area of 2,597 sq.km. including 4 districts: Thungwa, La-ngu, Manang, and Mueang (Tarutao National Park). The Satun Geopark management team have been working in harmony with local communities with support and collaboration from national parks as well as other government and non-government organizations. In order to improve management and sustainable conservation in Satun Geopark area, we follow the UNESCO Global Geopark holistic concept by using a bottom-up approach. We have been able to create more job opportunities for people who live in the Geopark and introduce them to geoconservation and geotourism by raising public awareness through geoeducation. We have organized different training programs and workshops for Geopark guides to empower local people to have a better understanding of the intrinsic value of their own natural resources and be able to proudly tell the stories of their homeland to visitors. We set up panels to explain our geoheritage at each of the geosites in a way that children and tourists, who are not geoscientists, can easily understand. Additionally, we also explain the history of our geopark through community products, e.g., making soap or batik painting in patterns of ammonite and trilobite, famous fossils found in Satun. We created menu entries related to our geopark with a variety of fossils found in Satun Geopark such as “Spicy stir-fried brachiopod.” These geotourism activities have successfully raised public interest in local products and increased income to local communities. We also have “A Song of Satun Geopark” composed by the staff of Phetra National Park telling the story of people in Satun Geopark, the Andaman sea, our traditions, cultures, and other tangible and intangible heritages. Satun Geopark also has a diverse culture and a variety of indigenous and ethnic groups such as the Maniq, a nomadic forest dwelling tribe thriving within mainland evergreen forests; Urak Lawoi or Sea Nomads, and local mainland people as Thai, Thai-Chinese, and Thai-Muslims. In terms of geological resources, the area contains stunning views of sea and land caves, sea arches, beautiful rock, and white sandy beaches next to shimmering turquoise seas, and waterfalls. We discovered various invertebrate fossils from all periods of the Palaeozoic Era and some mammal fossils from the Cenozoic. There are also abundant ecological resources and many archeological sites. Our ultimate goals are to maintain sustainable development and conservation from community-based management and maintaining a harmonious living environment within the geopark. Over the course of eight years, along with the effort in promoting and networking from local, national, and international collaboration, Satun Geopark has finally achieved its goal of becoming a member of the Global Geoparks Network (GGN) in 2018.

THE PRELIMINARY THEORY OF SUSTAINABLE DEVELOPMENT OF GEOPARKS ALONG THE YELLOW RIVER OF SHANXI AND SHAANXI PROVINCE

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Keywords: *Geopark, Sustainable Development, Yellow River, River Landscape, Loess Landform*
Session: Geoparks, sustainable tourism and local sustainable development

As the mother river of the Chinese nation, the Yellow River plays an important role in the historical cultural and geographical position of China. The middle reaches of it in Shaanxi and Shanxi provinces is more than 1600 kilometers, and on the vast Loess Plateau, there are more than 270° of "great bend" from north to south, which form a abundant river meander landscape in the Loess landform . The Wuding River Geopark in Qingjian, Shaanxi Province, Yellow River Meanders National Geopark in Yanchuan County, Shaanxi Province and Yellow River Meanders National Geopark in Yonghe County, Shanxi Province are all the geoparks that are built by river landscape and loess landform. This paper relies on the project of "Investigation of National Important Geoheritage". It based on the field investigation of the geoheritage and the field trip of construction and operation at the present stage of the above three geoparks, and gives some advices to the geopark sustainable development, which are in the different circumstances: If the water conservancy project built by the park in the Yellow River Basin, such as reservoirs and dams, it will affect the morphology of the Yellow River meanders. Some of the geoheritage on the upstream of river conservancy project will be submerged. However, at the same time, new geoheritage will be formed. Then, it takes measures to retain the image data of the water landscape cannot be restored, takes protective measures to rescue the ancient fossils of geoheritage, takes relocation measures to the important cultural landscape, and makes full use of the new generation of geological landscapes to replan the geopark and reestablish the tourism industry in a new system, so that it will effectively promotes the development of geological park; If the park valley does not have a great change of water in a short period of time, it should to strengthen the scientific research on the evolution of the Yellow River and the scientific popularization of related geoheritage, which is based on the existing parks construction, and it can also improve the diversity of cultural industry development promotion of the Yellow River, loess and red revolution. It makes full use of water resources to develop sustainable tourism facilities, and strictly prohibits sand production operations in the first level protected areas, so as to achieve the goal of sustainable development of ecological and economic development in geoparks.

THE GEOLOGICAL HERITAGE OF THE CENTRAL MOROCCAN MASSIF: ADVANTAGES FOR INTEGRATED GÉOTOURISM

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Keywords: *geoheritage, geotourism, central Morocco*

Session: Geoparks, sustainable tourism and sustainable local development

This work consists of an inventory of the geosites and geomorphosites of central Morocco: this area is characterized by a rich and varied geological heritage in a stunning natural setting. The purpose of this inventory is to strengthen knowledge of the geology and geomorphology of this region and serves as a basis for analyzing the uses and management of geomorphological sites, particularly in terms of protection and recovery.

Two main reasons motivated this work:

- (1) the existence of important gaps in the knowledge of the public in earth sciences as well as the lack of protection of the non-living nature found in the actual protection policies of nature and
- (2) the hypothesis that the geological and geomorphological heritage could be better exploited for the tourism.

To promote awareness of the various geological and geomorphological features of our study area and improve its consideration in the various public policies, it is necessary to proceed firstly to an inventory of the geoheritage.

For this, our approach was first to inventory our geosites among the many geological and geomorphological sites in our territory, then to classify and evaluate them according to a proven methodology, adopted in recent years by researchers of international level.

The research has identified 14 geosites in the region of Central Morocco. From a geomorphological point of view, they come from seven different morphogenetic processes (fluvial, lacustrine, volcanic, structural, magmatic, hydrothermal and palaeontological) which reflect both the diversity of the geomorphological characters of the region and the presence in the territory of many witnesses of past times; the geomorphosites document the Earth's history.

Most inventoried sites have a high scientific value as well as important integrative values that underline the rich geological and geomorphological heritage of our territory.

Most inventoried sites have a high scientific value as well as important integrative values that underline the rich geological and geomorphological heritage of our territory. Then, we proposed geotouristic itineraries aimed at the enhancement and protection of this heritage.

THE URBANIZATION IN THE CITIES OF ARARIPE UNESCO GEOPARK GLOBAL

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Keywords: *Urbanization, Cities, Araripe Global Geopark, Sustainable development, Preservation*

Session: Conservation, science and research

The Araripe UNESCO Global Geopark was recognized in 2006. It is made up of 6 (six) municipalities with different aspects: Santana do Cariri, Nova Olinda, Crato, Juazeiro do Norte, Barbalha and Missão Velha and currently has 9 (nine) Geosites which are considered its main points of visitation. In the agenda of activities required by a UNESCO natural heritage territory, as in the case of geoparks, there is the need to promote sustainable development with preservation of its tangible and intangible heritage. As Araripe UNESCO Global Geopark presents growing urbanization, one of the main concerns is to establish preservation strategies in the face of this growth. Thus it is necessary to map the pattern of the urbanization of the cities that are in that territory. The largest urban agglomeration is formed by the conurbation of the larger cities, which are Crato, Juazeiro do Norte and Barbalha. Cities are considered here the urban agglomerations that are the headquarters of the municipalities. Next to these sites are the geosites of Colina do Horto (Juazeiro do Norte), Rio Batateiras (Crato) and Riacho do Meio (Barbalha). The urban densification towards these geosites sets the challenge of maintaining its preservation due to the real estate speculation processes, the Batateiras River, and in the case of the other two geosites. The present conurbation has a population of 426,690 inhabitants, corresponding to 86.6% of the population of the territory of the Araripe UNESCO Global Geopark. Another fact that characterizes the urban aspects in this Geopark is the high urban population: adding all of its municipalities, the urbanization rate is 83.8% indicating a densely urbanized territory. However, while it has larger centers as highlighted above, the other municipalities (Santana do Cariri, Nova Olinda and Missão Velha) are small in size to the Brazilian standard and in some of them the rural population has an important weight. In these cases, the urban nuclei are a little more distant from the Geosites, giving greater conditions of care with the environment. One of the latent heritage is of immaterial character, relative to the identity of the people of the Araripe territory. The large urban densities of Juazeiro do Norte around the crafts and pilgrimages linked to the popular personality of Father Cicero, revive the values of the territory worshiped in the priest's teachings. These aspects are relevant to establish strategies that involve the preservation of natural heritage due to the need to reconcile urban growth with preservation and sustainability. In all these cities it was possible to: the quest for rationality given to urban growth, which juxtaposes itself with the dialogue with the preservation of geological, environmental, cultural, historical and economic heritage; the planning and execution of urban interventions promoting qualifications with qualitative aspects, with execution and monitoring accompanied by the public power; actions promoting sustainable tourism, the geotourism, avoiding the standards of policies to stimulate the sector. This set of factors, among others given by the Araripe Global Geopark, allows to realize that the properties of territorial identity characterize the cities of this territory

THE VALUE OF GEOSITES AND GEOLOGICAL HERITAGES IN THE BUSAN NATIONAL GEOPARK, REPUBLIC OF KOREA

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Keywords: *Busan National Geopark, geopark, geosite, geological heritage, geotrail*

Session: Geoparks, sustainable tourism and local sustainable development

The Busan National Geopark, composed of 12 geosites, was certificated by the Minister of Environment of South Korea in November, 2013. The Busan National Geopark's geosites located in ocean, mountain, and estuary have advantage of urban geopark in accessibility to geosites and well-equipped tourism infrastructures. In this study, we discussed value and significance of the park based on the study of some geoheritages, especially focused on geotrail courses including the Nakdonggang estuary, Songdo peninsula, Taejongdae, Oryukdo-Igidae, and Geumjeongsan. Various estuary landforms and sedimentary structures are scattered all over the Nakdonggang estuary geosite, which is the nation's largest present delta. The Songdo peninsula geosite, located in the Dadaepo Basin which is a pull-apart basin, provides a basis for the interpretation of tectonic setting, deformation history, sedimentary environment of the SE Korea in the Late Cretaceous. The Taejongdae geosite has a variety of coastal erosion and uplift landforms with a high tourism value. Furthermore, geological structures and sedimentary features with a high scientific and educational value are discovered in the site. The Oryukdo and Igidae geosites have a variety of geoheritages related to the Yucheon Volcanism in the Late Cretaceous with later coastal erosion landform. Lastly, the Geumjeongsan geosite located in mountain area has gorgeous granite weathering landforms. All the geosites show the geodiversities and have been posted on previous research papers or used in academic purposes, so that their academic values have been demonstrated. The Busan National Geopark also has a significant advantage of urban geopark in accessibility to the geosites through public transportation, well-equipped education system, and tourism infrastructures in Busan metropolitan city. The inhabitants can thus develop the local economy by preserving the geoheritages and nature resources and participating in the geopark operation. Consequently, the geopark will play a leading role in satisfying diverse demands of recent tourism as a successful urban geopark.

ASPIRING SAIMAA GEOPARK: SAILING IN THE PARK

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Keywords: *Sailing, Explore, Aspiring Saimaa Geopark, Common goal, Finland*

Session: Geoparks, sustainable tourism and local sustainable development

Would you like to go boating on drinking water? Like to enjoy silent evenings with pier, sauna and good food? Interested in world's oldest bedrock, calm nature or sandy beaches? Want to race with tough companions on a sunny day...? Area of aspiring Saimaa Geopark enables all that: Lake Saimaa is 4th biggest sweet water lake area in Europe and works as a basis for the new Geopark region in Finland. Aspiring Saimaa Geopark represents the old bedrock, post-glacial landforms like eskers – and shows how human activities like industry, transport and recreation both utilizes and lives in harmony with nature. This paper argues that aspiring Saimaa Geopark, based on Lake Saimaa and located in south-east Finland, gives totally new ways for enjoying Geopark. Sailing on Lake Saimaa is the best way to explore and to feel the hidden treasures of Lake Saimaa. The aspiring Saimaa Geopark has a common goal: it brings together different organizations in both geographical scales and functions. Local and regional authorities, local enterprises and different action groups that work for aspiring Saimaa Geopark are – in metaphorical speaking – in the same boat.

HYDROGEOLOGICAL MAPPING OF THE PALE DI SAN MARTINO CARBONATE AQUIFER (DOLOMITES, NORTHERN ITALY)

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Keywords: *hydrogeology, water resources, Pale di San Martino*

Session: Conservation, science and research

A 1:50,000 hydrogeological map of the Pale di San Martino mountain group (Dolomites UNESCO site system 3) was produced. The map presents the merge of various pre-existing data acquired by heterogeneous sources with new field data. Through the use of symbols and specific colours, the map shows various groundwater-related data such as the location and size of the main springs, the extension of the recharge areas and the hydrogeological boundaries. Given the absence of a uniform and comprehensive geological map of the area, a greater part of the work was dedicated to the elaboration and homogenization of geological data. The interpretation of the geological units in terms of their hydrodynamic attitude led to the identification of seven hydrogeological complexes. The complexes were represented in the map with different colours and were used as a base to elaborate the hydrogeological cross-sections. The map also covers information on groundwater and surface water usage, such as diversion dams and drinking supply facilities. The quantification of water withdrawals gives a picture of the anthropic impact on groundwater resources and thus highlights critical issues in water management. Given the absence of hydrogeological maps in the entire mountain range of the Dolomites, the approach followed in this study could be used as a guide for future representations in this region. At the local scale, the map could serve as a conceptual base for future research and for a sustainable management of water resources.

INTEGRATED AND EFFECTIVE PROTECTION OF SHILIN GLOBAL GEOPARK

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Keywords: *protection, integrated, effective, China Geopark, Karst*

Session: Conservation, science, research

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. Geopark is not only about geology heritage, it also concern about biodiversity, environment, culture and community involvement. The protection work should cover every aspect of geopark to achieve sustainable goals. For the past years, Shilin Global Geopark has changed the protection ideas from separated geology protection to integrated protection. Firstly, Regulations on the Protection of Shilin Scenic and Historic Area are effective as of July 1, 2008. Mater Plan of Shilin Global Geopark (revised) (2009) includes several protection plans refering to different fields like biodiversity, environment, cultural heritage, eco-service, and ecosystem, etc. Other action plans and projects such as Tourism Development Plan and Long-term Programme of Shilin County (2010), and Ecological Recovery Plan of Shilin County (2000), Convert Farmland to Forest and Grassland of Shilin County (2012) have received support and been observed. All these laws, regulations and plans are very solid foundation of geopark protection. Secondly, the Geopark has established Stone Forest Research Center, and 1% of the Geopark revenue is allocated to this center each year. So far several dozens of thematic research programs have been funded and conducted. These programs give us professional and scientific support. Thirdly, "Digital Stone Forest" management system and Geographic Information System (GIS) have been set up and provide data of geological heritage in protected areas. Quickbird satellite remote sensing map was collected, which provides a visual monitoring of geographic information. Video system was set up to provide real-time resources observation and monitoring. Fourthly, quite a proportion of tourism income has been allocated annually for ecological environment recovery, soil and water conservation, rural living condition improvement, infrastructure construction, etc. All these in turn helped greatly for the effective protection and sustainable development of the park.

DIVERSITY AND VALUATION OF THE TIMANFAYA LAVA FLOWS GEOSITE IN THE LANZAROTE AND CHINIJO ISLANDS UNESCO GLOBAL GEOPARK

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Keywords: *Lanzarote, Volcanic heritage, Timanfaya, Lava flow, Geosites*

Session: Conservation, science, research

The identification and characterization of the geological heritage and the geodiversity associated with a territory constitutes the basis on which to settle the strategies of sustainable development that are linked to a Geopark. The Lanzarote and Chinijo UGG inventory includes 82 geosites. One of these geosites is “Timanfaya lava flows”, which integrates the lava flows emitted during the Timanfaya eruption that took place between 1730 and 1736. This extensive 179 km² lava field is made up of numerous lava flows that extend from an eruptive fissure of 14 km. The lavas have maximum lengths of 22 km and visible thickness that ranges between 1 and 18 m. In some sectors the lavas form lava piles that reach between 30 and 50 m, although data from a borehole up to 2.7 km depth indicates higher values of the order of 100 m. Despite the chaotic and fragmented aspect of Timanfaya's lava surfaces, most of the territory actually corresponds to morphologies that move more or less gradually from the pahoehoe to the aa as they move towards the sea, being very abundant the aa lava flows in distal areas, near the littoral. The transit between pahoehoe and aa lavas can be accomplished over very short distances that often do not exceed hundreds of meters. In this lava field there are flows with the typical configurations of pahoehoe and aa lavas, although the morphotypes are also the result of the gradual transition between both categories: sheet pahoehoe, ropy, shelly, hummocky, slabby, rubbly-pahoehoe, platy, cauliflower, rubbly aa, lava ball aa, and blocky. Other elements of diversity are the different morphologies and structures such as lava tubes, lava channels, tumulus, hornitos, confluence and diffluence of lava flows and so on. In addition, different mantle and crustal rocks were transported by the magma as xenolites, increasing at a very local scale the diversity of lithologies and ages of the rocks in the area. These features give an idea of the intrinsic and extrinsic parameters of the site, the rheology and the behavior of the dominant flow, as well as their connection with other lava structures. Valuation of this geosite shows that it has a very high scientific interest, and a high public use value. Susceptibility to degradation due to natural and anthropic hazards is very low, mainly due to the high extension of the geosite and that it is under several nature protection legal figures. However, excess of loading capacity, uncontrolled hiking and the construction of several infrastructures have seriously affected part of this geosite. The Timanfaya lavas geosite is an excellent example to show that detailed studies should be carried out in extensive geosites in order to better characterized their diversity and valuation. These studies will serve to improve the management of these geosites in particular. This study highlights the importance of the diversity of the features in detail and the need of definition of local areas of high vulnerability in the “Timanfaya lava flows” geosite.

EARLY PLEISTOCENE PLANT MACROFOSSIL REMAINS FROM KALAVRYTA, A NEW ASSET FOR THE CHELMOS – VOURRAIKOS UNESCO GLOBAL GEOPARK

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Keywords: *Early Pleistocene, Kalavryta, fossil leaves, Glyptostrobus europaeus, fossiliferous geosites*

Session: Conservation, science, research

To date, Chelmos – Vouraikos Unesco Global Geopark has 29 designated geosites expanding all over its territory, such as the Cave of the Lakes, the Styx Waters and the Vouraikos Gorge. Most of the geosites represent the main geological rocks and structures found in the geopark, as well as important geomorphosites and geological features related with surface and underground water. Until now, there was practically no geosite hosting fossils except for the xylitic remains in the lignite beds of the Kalavryta basin. During the last year systematic fieldwork allowed us to discover numerous well preserved plant macrofossil remains (mostly leaves or leafy twigs) from three different localities in the Kalavryta basin. The fossiliferous marly beds are part of the sequences that contain the aforementioned lignite beds, consisting of early Pleistocene lacustrine deposits. The plant macroremains have been commonly preserved as compressions and less frequently as imprints characterized by high quality of preservation. Preliminary identifications of the fossil remains showed that the Kalavryta palaeofloras comprised of backswamp forest elements such as *Glyptostrobus europaeus*, as well as other forest elements such as *Acer*, *Populus*, *Zelkova* and different species of *Quercus*. The fossil plant material will provide information on the palaeoenvironment and the palaeoclimate of the Geopark area during the Pleistocene. It will also allow comparisons with the extant flora as the studied palaeofloras are characterised by taxa that are now extinct (eg. *Glyptostrobus europaeus* and *Zelkova*), deciphering the respective evolutionary trends of the vegetation during the Pleistocene. Moreover, after the fossils are properly studied, part of them will be placed in the exhibition room at the Geopark's information centre and will certainly comprise a central exhibit in a gallery of a future exhibition centre. Consequently, soon Chelmos – Vouraikos Unesco Global Geopark will be able to designate its first fossiliferous geosites.

BODOQUENA-PANTANAL GEOPARK (WESTBRASIL): GEOLOGICAL AND CULTURAL SITES AND THEIR THREATS

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Keywords: *Geopark, Sustainable Development, Research, sustainable tourism, threats*

Session: Geoparks, sustainable tourism and local sustainable development

Bodoquena-Pantanal Geopark (Westbrasil): Geological and cultural sites and their threats The Bodoquena-Pantanal Geopark exists since 2009 (State Decree), having a total extension of approximately 40 thousand square kilometers. In the area are geosites of diverse interests, highlighting, in particular, records of support scientific studies regarding the interpretation of the tectono-environmental evolution of the Paraguay Belt in the context of global climatic changes during the late Neoproterozoic, also the discussion about global glaciations and the hypothesis of Snowball Earth. In particular to understand how these glaciations influenced the transition of the life evolution among the earliest microbial forms (stromatolites) to more evolved forms, represented by fossils in the region, like *Cloudina* and *Corumbella*. In the region of the Geopark are important geological discoveries, such as the *Corumbella weneri* fossils of the Ediacarana Biota, by the German researcher Detlef Walde, found in the limestones along the Paraguay River in the Corumbá region. It is the oldest mineral-skeletonized fossils ever found in the Americas, dating to about 550 million years. Other paleontological geosites, such as the dinosaurs footprints found in Nioaque; cultural and environmental, such as fauna, flora and regional customs, paintings and ceramics of Indians (e.g. Terenas, Kadwéus), among others. Historical places where there are vestiges material of the War of Paraguay, like the monument of Nhandepá, also are found in the region. Also, the region includes two important and fragile ecosystems of broad interest of ecotourism: the swampy Pantanal of Mato Grosso do Sul with a rich wildlife and the karst terrains, environments of extraordinary beauty and extreme fragility against any form of use and occupancy that is not of nature conservation. In this sense, the establishment of a Geopark, besides being an initiative to preserve the rich geological and paleontological heritage, has also become an important tool for suitability of any form of, environmentally incorrect, occupation and use. Potential threats to Biodiversity, Landscape and Cultural Heritage in the region of the Geopark are due largely to the misguided tourist exploitation and to the improper management on the fronts of improvement of pastoral, agricultural and mining industries productivity. Other input greatly demanded by the global market has been the iron and manganese ore, whose production area of excellence is located around Corumbá, in the massive deposits of Urucum/Jacadigo. In non-metallic mining in the Bodoquena Mountain Range the practice of explosions can affect balance and karst geology, resulting in collapse of caves, burial sinks, irretrievable loss of paleontological material and referential landscape. The advance of agro pastoral frontier in the Pantanal can configure a threat to the archaeological sites, as well as the biodiversity. The effects of the huge river convoys that navigate the river Paraguay can also represent a threat to archaeological sites, e.g. caused by mudslides and water contamination. All these threats can only be

controlled through strict compliance with and control of existing legislation. References Geological Survey of Brasil/CPRM (2010): Dossier to Global Network of Nacional Geoparks

THE MODEL OF PARTNERSHIP DEVELOPMENT FOR FOREST MANAGEMENT TO IMPROVE THE COMMUNITY WELFARE AROUND FORESTS IN RINJANI LOMBOK GEOPARK AREA

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Keywords: *Partnership, forest management, community welfare, collaboration, conservation*

Session: Conservation, science, research

The Development of Rinjani Geopark can not be separated from the existence of Forest area in Lombok Island. In the forest area there are 80% geopark sites both geological sites and Bio Diversity sites. Currently The development of geopark site becomes difficult because of the government policy related to the protection of forest area. The condition of the people around the forest also has a high level of poverty The model of partnership development for forest management between Forestry Department and Community Group become solution so that geopark site management activity inside forest area does not violate applicable policy regulation. This model collaboration is designed to strengthen the function of the Forestry goals, which is to ensure the sustainability of forest areas as the regulator of life support system (water regulator, germplasm, biodiversity) through the management of plants and wildlife collection as well as the potential of Forest area and the benefit to optimization of forests for nature tourism , education, science, support cultivation for the welfare of society. This model also considers basic issues related to area conservation, management obligations in biological conservation, and sharing on management. Currently there are several joint cooperation and is expected to bring benefit in improving people's welfare. Some collaborations between the Forestry Department and community groups have succeeded in providing benefits to the community and some are still unsuccessful. Successful cooperation is in an area in which there are geopark sites. Geopark site helped boost the economy because branding and information is very interesting to make visitors of geopark site very enthusiastic and provide additional knowledge. This model of cooperation continues to be improved on other sites that are currently still not managed optimally. It is targeted that there will be an increase of 30% of total visits each year.

ORGANIZING AN INTERNATIONAL EVENTS TOWARD INTRODUCING CILETUH-PALABUHAN RATU UNESCO GLOBAL GEOPARK TO THE WORLD TRAVELERS

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Keywords: Amazing Ciletuh-Palabuhanratu, local community, world travelers

Session: *Geoparks, sustainable tourism and sustainable local development*

UNESCO Global Geopark was given to Ciletuh Palabuhanratu at the 204th session of the Unesco Executive Board in 17th April 2018. Beside as proudness to Sukabumi Regency as the host of Ciletuh Pelabuhan Ratu Unesco Global Geopark (CP UGG), but also the responsibility to Sukabumi regency which a local government of Sukabumi to organize and develop CP UGG into a world class tourism. The main concept in tourism destination arrangement as well as Geotourism which can be deployed in CP UGG area is to develop three supporting elements which are accessibility, amenity and attraction (3A). Currently 2 of the 3 elements will be gradually built by Sukabumi regency and Jawa Barat province government, related with accessibility and amenity. Infrastructure such as roadway to the core geopark area has been built starting in 2016 from Waluran to Palangpang beach, continued in 2017 from Loji to Palangpang beach and this year from Ciemas to Puncak Dharma. Amenity facilities also have been build 100 Toilet in 2017 and on 2018 the construction of Mosque and home stay in the geopark area also progressing.

Currently as an effort to attract traveller visiting CP UGG by organize international event on sports tourism in accordance with the potential of Nature Geopark region. We have planned three international events namely World Surfing League (WSL) will be held on October 2018, World Rafting Championship (WRC) will be held on December 2018, and World Paragliding Championship in March 2019. Through three International events are expected to attract traveler from Indonesia and over the world to visit CP UGG. All of these activities will be involved the local community to participate, according to the skills they have. This event is expected to be utilized by the community to develop their business in the term of culinary, souvenirs and lodging. CP UGG that was given by UNESCO Global Geoparks Council driven local government to arrange the area in order to increase the flow of tourist visits through the concept of 3A and also organizing a world class event. This concepts ultimately impact on improving the economy and welfare of local communities, in accordance to the Geopark motto which is "Celebrating Earth Heritage and Sustaining Local Communities".

GEOHERITAGE AND GEOTOURISM ROUTES OF SHENNONGJIA UGGP

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Keywords: *Shennongjia, geoheritage, geotourism routes, conservation, geoscience*

Session: Geoparks, sustainable tourism and local sustainable development

Geoheritage refers to various geological phenomena formed by endogenic and exogenic geological processes in the evolution history of the earth, and geoheritage is a non-renewable natural resource. Geopark is one of the important ways to protect geoheritage, spread geoscience knowledge, provide geotourism services and improve the local economy. This presentation introduces the general information of Shennongjia UNESCO Global Geopark and the classification of its geoheritage. Also, four typical routes for geotourism and geoscience research & education are introduced.

THE GEOSITE OF DIABASIC SILL OF VIGNALE, LET THE ANCIENT TETHYS BE ENJOYED

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Keywords: *Geoeducation, Geoscience, Fruition, Thetis, Rocca di Cerere UNESCO Global Geopark*

Session: Geoparks, sustainable tourism and local sustainable development

In the heart of the Rocca di Cerere UNESCO Global Geopark. Among the terrigenous deposits of the Numidian Flysch, what remains of a Diabasic Sill emerges, isolated and visible. The rock, gray and furrowed with crystals of albite, was used for centuries by the peasant civilization to build the wheel chocks used for the oil mills. Today, research (Grasso, Cirrincione) has shed light on the origin of this place and has put it in relation with the phenomena of oceanic backbone of Tethys. The Sicilian Region has accepted the cataloging of the site made by the Geopark and has officially decreed not only the registration in the register of Geosites but also its "world" value. Now we need to work to create the conditions for a scientific and informative fruition of the interesting geosite. At the project works not only the Geopark but also, by virtue of a protocol of intent, Legambiente, the largest Italian environmental association, a member of the IUCN. The poster presents in broad terms the geosite and the hypothesis of fruition of the same.

MARKETING STRATEGY FOR TERRAS DE CAVALEIROS GEOPARK - CASE-STUDY

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Keywords: *Territorial Marketing, regional development, strategic planning, brand, geopark*

Session: Geoparks, sustainable tourism and local sustainable development

Nowadays rural regions are fighting against the challenges resulting from the reform of traditional economic activities and new markets demands. These challenges lead to the need of promoting new local development politics that redesign the local resources and the rural activities. In this context, the tourism is considered, in many cases, a key sector for the economic growth of these territories. Currently we are witnessing a growing competition between the territories for attracting resources that encourage their own development. Strategic planning is assumed in this context like a crucial tool for mastering the qualification of the territories. In the attempt to strengthen the competitiveness and promote the potential of a territory to attract resources, the territorial marketing emerges as an auxiliary of strategic planning. Their contribution passes by organizing local resources and conveys an attractive and innovative image to persuade the market and investors to invest in the territories. The case study presents the strategic marketing plan to promote the development of Macedo de Cavaleiros, a Portuguese peripheral rural territory. The tourism was explored as a strategic vector for the development of Terras de Cavaleiros UNESCO Global Geopark, by promoting and optimizing the local potential resources. The study presents several actions to develop the tourism sector and to break some endogenous weaknesses.

GEO-STORIES OF UNESCO GLOBAL GEOPARK

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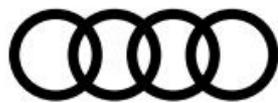
Keywords: *Papuk UNESCO Global Geopark, interpretation, education, sustainable development, visitor centre*

Session: Geoparks, sustainable tourism and local sustainable development

Papuk is located in the southern part of Pannonian Basin, between two large rivers – Sava and Drava – in northeastern Croatia. This area covers 524 km², with altitudes ranging from 180 to 953 meters and shows exceptional geological diversity and complex evolution. In its central parts Mt. Papuk is composed of pre-Variscan, Variscan and Alpine metamorphic and igneous rocks, considered to be the lithospheric fragment (called Tisia Megaunit) broken off from the southern margin of the European plate during its evolution. The Mesozoic of Mt. Papuk is represented by Lower Triassic clastic and Middle Triassic carbonate sedimentation. Middle Triassic carbonate sediments are characterized by numerous karst phenomena like sinkholes, caves, speleothems, caverns, springs etc. Carbonate deposits represent the most important aquifer of the wider Slavonia region. Cenozoic development of Papuk is closely connected to the Pannonian Basin System evolution, tectonics, volcanism and sedimentation. As an UNESCO Global Geopark, one of our main duties is to transfer the links between rich geological heritage and all other aspects of the area's natural and cultural values. To fulfill this Papuk Geopark started to implement Project "Geo-stories of UNESCO Geopark" „Geo-stories of UNESCO Geopark“ project refers to improving the infrastructure for visitors in terms of better interpretation, education but also accessibility of valuable parts of the protected area. The core of the project is the construction and equipping of a "Geo-Information Centre Vocin" which will be the largest multimedia museum in the region. All geological and biological values as well as cultural and historical heritage of the Papuk Geopark area will be presented in an innovative and interactive way. The extension of this part of the project in terms of visiting valuable parts of the geopark, such as Geological Monument of Nature Rupnica or Park Forest Jankovac, is the purchase of visitor train and electric bicycles in order to make it easier touring around geopark. Another important part of the project is related to the arrangement of presentation halls in the existing Visitor centre in Velika - "House of the Pannonian Sea", interactive exhibition dedicated to the Miocene epoch. The third part of the project concerns the upgrading and developing recreational facilities in the Papuk Geopark, such as the construction of an adventure park at the Duboka Campsite, improving hiking and cycling trails signage throughout the geopark with the installation of concrete trail markers, construction of new watchtowers.

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