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6th International UNESCO Conference on Global Geoparks 2014

ABSTRACTS

Global Geoparks Network 2014

September 19–22, 2014

STONEHAMMER GEOPARK,
TRADE AND CONVENTION CENTRE, SAINT JOHN, NEW BRUNSWICK

The Global Geopark Network (GGN), assisted by UNESCO comprised 100 geoparks at the start of the meeting, located in Europe, Asia, North and South America. As the only member of the GGN in North America, Stonehammer Geopark was pleased to host the first international meeting of network outside of Europe and Asia. Previous meetings had been in China (2004), The United Kingdom of Great Britain and Northern Ireland (2006), Germany (2008); Malaysia (2010) and Japan (2012). On the last day of the meeting Tumbler Ridge Geopark in British Columbia was admitted to the Global Network, along with ten other new geoparks, bringing the global total to 111 global geoparks, and now including Africa. Tumbler Ridge Geopark is the second Canadian member and second North American Global Geopark.

The meeting, which celebrated the 10th anniversary of the GGN, was attended by almost 500 delegates from more than 30 countries. Global Geoparks are about more than just rocks. While a Global Geopark must have exceptional geological heritage it includes sites with interesting archaeology, wildlife and habitats, history, folklore and culture, all of which are intricately linked with the underlying geology. In the following pages, we are pleased to publish the abstracts of oral and poster presentations from the meeting, which were divided into seven themes: (1) Geoparks and sustainable use of natural resources; (2) Engaging Communities; (3) Education and Interpretation in Geoparks; (4) Aspiring Geoparks; (5) Mature Geoparks; (6) UNESCO Collaboration; and (7) Intangible Cultural Heritage.

We wish to acknowledge the outstanding support from more than 60 community volunteers, Experience Providers, and the local hospitality industry that welcomed the world to Stonehammer Geopark. Members of the Stonehammer Geopark are equally pleased to see the abstracts published in *Atlantic Geology*. Our thanks are extended to all of the presenters and the editorial staff of the journal.

RANDALL MILLER
ABSTRACT EDITOR
GLOBAL GEOPARKS CONFERENCE 2014

The importance of a Global Geopark in a rural area in Denmark

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Geopark Odsherred has applied for acceptance into the EGN and GGN and hopes to be accepted into the prestigious network in 2014. For the past six years, Odsherred Municipality has been a driving force in gathering and coordinating the county's key players within tourism, business, culture, and the local communities. Throughout this process, the focus has been on results, responsibilities and relationships. It has been about putting political will behind the visions, about aligning the many varying agendas, and about capitalizing on diversity as much as possible.

A Danish municipality is responsible for a wide variety of public services: schools, daycares, health services, environmental protection, harbors, sporting facilities, roads, fire and rescue, city/county planning, unemployment, nursing homes and many more. The responsibilities include both carrying out the actual work, as well as overseeing it at the strategic level, and are financed through independent tax collection. And there is enough to use the money on, since Odsherred is not among the richest of Denmark's counties. Yet, in its way, it is an advantage for a project like Geopark Odsherred that the administration is so local, covering, as it does, such a broad spectrum.

The geopark has turned out to be a gathering point for thousands of initiatives and projects within four main themes: Through its unique ice age landscape, Odsherred focuses on our rich cultural history, our art history and artistic ambitions and our local produce and products. Sustainability, environmental protection, job creation, education, dissemination, growth, and, not to forget, identity, have become the common denominator for the area's collective development.

Geopark Odsherred is looking forward to putting in even more energy from both the public and private sectors and the NGO-level into the welfare and growth of Geopark Odsherred and the international geopark network.

Presented in Theme 4.

Abyaneh: where the culture and geology meet, a case study of geology impact on a culture-rich local society

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Abyaneh is located in the central part of Iran in Isfahan Province, a very famous historical village for tourists. One of the characteristics of this village is geological related architecture. That means because of the geological setting (lo-

cated in red sandstone and arkoses formations), houses are built from the same materials, and create a reddish landscape in the area. It can be seen not only in the old houses, but also the new ones. The outcrops of these formations also created a beautiful landscape in the area. This landscape along with the architecture of the village made a rare and attractive combination. There are also Karst features in dolomite and limestone formation used by ancient people as temple, shelter, mosque and house. There are many other cultural, natural and geological attractions in the area that have made it a popular tourism destination. Attractions include old shrines, Qanat systems, carpet weaving, handicrafts, ancient school, special ceremonies and celebrities, and the anthropology museum.

GEOHIM and GSI consider Abyaneh as a target for future developments in the Geotourism subject. There have been some communications with a local society to raise their knowledge about Geoheritage and its importance to use inside their other known tourism potentials. It will be an introduction for a mid-term plan moving the area to a national geopark.

Presented in Theme 7.

Protecting Hyderabad's natural and cultural heritage

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Hyderabad, situated on India's Deccan Plateau, hosts Archaean-era geology in its majestic denudational landforms. The city is also a metropolis with high-density urban land use growing exponentially – almost quadrupling – over the last 30 years. This increased spatial need has resulted in urban development displacing Hyderabad's natural heritage, eroding the city's Genius Loci. The ensuing loss has impacted three realms – geological, ecological and cultural. This presentation reports results of a landscape design project that contributes to protecting Hyderabad's cultural identity through the development of an educational Geopark that inspires stewardship by putting Hyderabadis in closer contact with their environs.

Three criteria informed the Geopark site selection: recommendations of a non-profit organization, the Society to Save Rocks; Hyderabad Metropolitan Development Authority's 2031 Master Plan for Greater Hyderabad; and a critical analysis of urgent urban threat to select boulder sites in Hyderabad. The initially chosen 400-Hectare Venkateshwaragutta site was expanded to 600 Hectares to connect relationships between natural systems including a stream corridor, natural lake, and municipally conserved forest areas in the vicinity.

Mirroring the city's dichotomous character, the site's existing conflicting land uses are a religious temple and a master-balancing reservoir located adjacently on the site's tall-

est hillock. They represent the necessities of cultural living in Hyderabad. The challenge in designing this Geopark is to successfully integrate the spiritual, practical and ecological in one harmonious whole, while educating park visitors about interconnected natural environmental systems. This is achieved through an interpretive center communicating best practices in geology and urban water use/conservation, a spiritual complex, and recreational trails. The goals of this park are protecting rockscapes, engaging people physically and emotionally, and inspiring stewardship through education. They are aligned with Global Geoparks Network's emphasis on Conservation, Sustainable Development and Community Involvement.

Presented in Theme 4.

Inclusive development in local communities, an enterprise in Qeshm Geopark, Iran

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Qeshm Geopark was among the first GGN Members recognized in 2006. For many years, Qeshm was famous just for its unique and exciting desert landscapes and geological features but nowadays, after a revolutionary change in management, a wide and inclusive involvement of local communities can be observed through the geopark.

Qeshm society mostly includes traditional and devout people. Women always stay at home and are rarely seen outside. It is not usual for girls and women to communicate with strangers. Involving women - as a very important part of society - in geopark activities is really a challenge. Qeshm geopark management prepared some facilities for women to present their homemade handicrafts to geopark visitors. In the beginning it was just for their simple and traditional products and making them interested to be more active in society and have income to help their families. Hereafter geopark experts help women to incorporate some simple sketches of surrounding landscapes and nature into their products. In this way local people will have some awareness about their local geological and natural features. In addition, they learned simple and general stories and explanations about land formations and try to transfer this information to visitors of their shops. With this simple strategy, Qeshm Geopark involved many girls and women in these activities and as a result they made some impact on their children and husbands. For men, fishing, transportation and small trades was the main job on the island before establishing the geopark. After recognition of the geopark, men living in villages inside geopark discovered that visitors are a good source for their income. They attended several workshops arranged by the geopark in their vil-

lages, schools and mosques. During the workshops people learned how to host visitors and give them suitable services. They also found out their landscape, geology and nature are their most valuable wealth, and protecting and preserving is necessary to keep this wealth. Nowadays there are many local guides to geosites, local accommodation and restaurants in villages inside the geopark.

Presented in Theme 7.

Information belowground: soil as an archive of information

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An environmental education project on soils has been set up in the Cilento Geopark, based on the focal geosite "Grotte di Pertosa e Auletta", through the development of museum exhibits and the involvement of local schools. The geosite consists of a system of caves with a portion of about 3 km and the surroundings open to the public. The MIDA foundation ("Integrated Museums of the Environment") manages the geosite along with a museum and activities for local development and heritage preservation. MIDA works with a Junior Scientific Council (JSC): a group of 40 children from local schools participating in museum and geosite activities.

In 2013, a project was developed with the aim of increasing awareness of geotourists, school children and the local community on the role and importance of soils as links between geology and landscape, but also as an archive of information, e.g., on archeology, paleoclimate, past management, landscape, vegetation and culture. The project was called "Laboratori nella natura", financed by the Campania Region rural development program (psr 2007-2013 mis.313) and involved collaboration between the local municipality of Pertosa, the MIDA foundation, three local schools, the JSC and the Geopark.

Three-dimensional models of the bronze-age archeological site buried in the geosite and now submerged were produced within the project; a museum exhibition on paly-nology and pedo-anthracology reconstructing vegetation and landscapes of Cilento and Vallo di Diano was also set up. Multimedia materials such as a video on ancient landscapes and vegetation and slide shows on methods were also prepared. These materials and exhibitions constitute a new section of the MIDA museum. Activities with the JSC

children involved materials sharing before opening to the public; JCS members of the elementary school also prepare exhibition guidebook for children of their age group.

Presented in Theme 3.

Water conservation and GHG reduction through appropriate agriculture

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Appropriate agricultural management in geoparks may constitute a tool for the conservation of resources, the mitigation of climate change and the reduction of Greenhouse Gases (GHG). Scientists from the University of Basilicata and the Council for Research in Agriculture are conducting research and innovation transfer within the Campania Region rural development program (psr 2007–2013), through a measure for the cooperation between research and primary production, and for sharing of results and best practices. Two projects are implemented in Cilento and Vallo di Diano - Southern Italy for the periods 2010–2014 and 2013–2015 with the aims of: (1) reducing irrigation water use, as well as the consequent potential pollution and soil degradation, through precision agriculture with the aid of geophysical methods. New strategies of differential irrigation within single farm fields are devised on the basis of soil spatial variability instead of the classical sequential vegetation mapping, with a reduction of costs and a higher involvement of farmers and decision-makers in the process of resource conservation; (2) evaluating the genetic resources represented by local landraces for reduced water use; and (3) identifying practices for the storage of belowground carbon and increased N acquisition efficiency for the reduction of emissions of N₂O (a GHG with a warming effect). Research approaches are oriented towards soil-plant interactions and plant-atmosphere gas exchange; plant features linked to soil behavior such as root systems are identified as crucial both for resource conservation, and for the role of plants as a sink of CO₂; soil visualization techniques are considered a key for the identification of uniform zones for appropriate management and also for the effectiveness of participatory approaches of both projects, where local farms are involved in project implementation and/or in diffusion actions.

Presented in Theme 1.

Joint management of Geopark and Biosphere Reserve: the case study in the Hakusan Tedorigawa National Geopark in Japan

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The area of the Hakusan Tedorigawa National Geopark (GP) in Japan is partly overlapped with that of Hakusan Biosphere Reserve (BR). The organizing committee of the Hakusan Tedorigawa GP has started to manage Hakusan BR to allow these two programs to coexist within the same region.

As is well known, both programs are controlled by UNESCO, and the purposes of these programs have become almost the same after the Sevilla strategy of BR in 2002 as follows: (1) Conservation of the regional nature and natural heritage; (2) Encourage scientific research and education for regional nature; and (3) Encourage the local community and economy though scientific based sustainable development using the regional natural resource.

The local ecological diversity cannot exist without local geo-diversity. Furthermore, the local geo-diversity provides much of the effect for local people through the local ecosystem. Fundamentally, the general ideas of these two programs are inseparable. On the other hand, these two programs must be separate in the park system. The authors think that it is necessary to consider the following points for making it possible for these to programs coexist.

For inside of the park: (1) promoting the scientific relationships between two programs; (2) making relationships between organizing committees of each program; (3) organizing the TPO for using each brand and trademark; and (4) organizing budget and human resources.

For outside of the park: (1) promoting the scientific relationships between two programs and (2) organizing the methods to advertise these two programs.

Presented in Theme 7.

Developing Geopark tour packages in peripheral regions: a Shetland case study

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Geopark Shetland is working with Magma Geopark, Katta Geopark and Stonehammer Geopark on a tourism project funded by the Nordic Atlantic Cooperation Fund. The partners, linked by a 'Northern Georoutes' brand, are developing an online holiday booking system through which package tours to each of the Geoparks can be promoted and

sold. The project aims to: (1) promote the Geoparks to a niche market by offering unique, high quality visitor experiences at affordable prices and (2) support local businesses through coordination of tourism activities.

This paper will highlight some challenges faced by peripheral regions in the development and sale of tourism packages, and outline potential solutions using the Geopark Shetland experience as a case study. There have been four key stages to the development process:

(1) Engaging and maintaining stakeholder interest. In spring 2013, Northern Georoutes partners sent an online questionnaire to tourism businesses in each region to establish whether they would be interested in working in partnership to develop package tours. Following results analysis, some suggested package options were outlined for consideration.

(2) Deciding who will sell packages. There are currently no Shetland-based tour operators offering a range of package deals. The Geopark worked with government development agency Highlands and Islands Enterprise (HIE) to explore the pros and cons of becoming a licensed tour operator, or working with an existing operator on the Scottish mainland.

(3) Educating stakeholders about group business. In spring 2014 the Geopark hosted a 1-day seminar for stakeholders, led by experts in the tour package field in partnership with HIE and national tourism body Visit Scotland. It aimed to illustrate the mechanism of developing package tours, the risks and the benefits.

(4) Addressing gaps in market provision. Analysis of market trends and product availability showed potential for business development in Shetland to cater for the adventure tourism market.

Presented in Theme 2

The engagement of local communities in the Geopark project of the Beaujolais, France

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The Geopark project seeks to make people understand their richness. Linked to history of the Earth, geology of the territory shapes their current lives and most human and economic activities. As there is a strong bond between heritage and people, engaging local stakeholders and territory inhabitants seems to be a logical and necessary step in the project.

The labeling process is building thanks to the participation of many local stakeholders. The richness of the territory is enhanced by its people, who hopefully will become greeters; volunteers sharing knowledge about places they love with visitors. Indeed, since its launch, each action

seeks to rely on territorial initiatives that already exist, and impulse a dynamic between them. Thus, it permits them to overcome the isolation of initiatives in the territory. The participatory forum of the 28th of February, 2013 is one example to show that. It aims at giving a voice to the inhabitants, best ambassadors of their own cultural richness, and finest experts on them. The governance of the Geopark project has been built with the same philosophy: working groups bringing together elected representatives, technicians and civil society players, are today the prime movers of the project. These are particular tools that may have been developed to involve for the best the diversity of local stakeholders. In fact, the knowledge of the territory must not be only institutional, and the project ensures a both scientific and territorial coherence thanks to the human resources.

Our participation to the 6th International Conference on Global Geoparks is an occasion for presenting the different tools implemented to ensure the participatory governance and the obstacles it is necessary to overcome in order to make alive the territorial dynamic related to the Geopark project of the Beaujolais.

Presented in Theme 2.

Fundy: the Biosphere Reserve defined by Champlain 400 years ago

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When Champlain landed at Quaco Head on June 20th 1604, it was the first recorded landing of any European in what is recognized today as the Fundy Biosphere Reserve (FBR) in New Brunswick, Canada. Describing how Champlain's maps and accounts help define this Biosphere Reserve tells us something about how UNESCO's MAB (Man and the Biosphere) program differs from UNESCO's World Heritage Sites and other programs of international significance, like the Global GeoPark Network. But it can also lead us to appreciate ways in which Stonehammer and the FBR can, and should, collaborate in our highlighting the promontory near St. Martin's that we happen to share – Quaco Head.

Champlain not only landed at Quaco, seeking valuable ore and minerals, he coasted the FBR, named several features, and recorded Mi'kmaq testimony that the Memramcook and Missaguash rivers were traditional means of travelling across to the Gulf. These features on his, the first detailed maps of this area, delineate the outer perimeter of the Fundy Biosphere Reserve. No one of these features, by itself, matches the "world heritage" significance of the Jogjins Cliffs. And while Stonehammer lists St. Martin's and the Quaco formation as one of their 12 geosites, what can be seen there are not remnants of Champlain's landing. They left little trace on the landscape. Despite Champlain's legacy

being so intangible, however, it helps us define a seam of cultural heritage that runs rich and deep.

The MAB program faces the inherently difficult challenge of bringing out such intangibles. They help us map out those human values worth sustaining, especially when imbedded in a landscape which has fostered them and from which they cannot easily be extracted. Such is the landscape delineated by Champlain. A line drawn round the river systems he first recorded, from the dyked lands of the Tantramar, reaching around the Petitcodiac to the highlands which stretch to Quaco Head, includes all those watersheds which harboured native peoples, generations of Acadians, and the British resettlement of these same hills and valleys... including today the fastest growing communities in the Canadian Maritime Provinces.

Presented in Theme 6.

Expanding the geoconservation toolbox in Northern Ireland

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Focusing on the Giant's Causeway and Causeway Coast World Heritage Site (WHS), located within the aspiring Causeway Coast Geopark in Northern Ireland, this project aims to improve conservation of geoheritage by ensuring that technology supports rather than substitutes practical conservation measures. As a tourism 'honeypot', the Giant's Causeway and Causeway Coast WHS represents Northern Ireland's most significant natural heritage resource site. Located within the Causeway Coast Area of Outstanding Natural Beauty (AONB), the site is beset with conservation designations and legal requirements that have an overwhelming focus on the protection of bio- rather than geodiversity. As such, it represents a contested space, around and within which stakeholders capitalise on its' world-class values. The Causeway Coast and Glens Heritage Trust and Queen's University Belfast demonstrate how 'Digital Documentation' of natural heritage data within a single Geographical Information System (GIS), combined with 3D laser scanning, can facilitate development of simple integrated tools which provide managers with information necessary to make informed decisions about conservation of the area's outstanding geodiversity. Results from the project feed directly into the development of a geoconservation education program and associated field guides for teachers throughout the UK and Ireland. The aim is to enhance the quality of geological education through 'hands-on' training for teachers and students in the appropriate use and conservation of geoheritage sites.

Presented in Theme 3

Percé: Aspiring Geopark

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The Percé area includes two iconic Canadian tourist destinations, both shaped by geology: the majestic Percé Rock and Bonaventure Island, which hosts one of the world's largest gannet colonies. Visitors are greeted by further landscape features of stunning beauty, such as Cap Blanc, the red cliffs of Mont Sainte-Anne, La Grotte, Les Trois-Soeurs, Pic de l'Aurore and the Cannes-de-Roches Cove. The site already welcomes 175,000 visitors per year, which allows for a splendid opportunity to promote the earth sciences. A geopark would in turn enrich the visitor's experience.

The singular landscape of the Percé peninsula and its offshore extension, Bonaventure Island, owes its existence to being located in the middle of a late Carboniferous brittle fault system that juxtaposed together rocks with very different levels of resistance to erosion, which are currently being individualized by coastal marine erosion. Rocks in this highly tectonized area vary in age from Cambrian to Carboniferous and belong to three tectonostratigraphic domains.

Université Laval has agreed to partner with the Aspiring Geopark, and professors from the Université du Québec à Rimouski and Saint Mary's University have agreed to participate. Both the Miguasha and the Bonaventure Island and Percé Rock national parks are also invaluable partners. These organizations will help shape the Aspiring Geopark into a unique cultural and educational experience.

Local businesses, economic development agencies and the federal and provincial governments have committed to a 7 million dollar budget. The park will be administered by a cooperative that has been established by these local partners.

Cultural and educational activities will centre around the main geosites and the pavilion to be built on Mont Sainte-Anne. Multi-media interpretation displays and activities, as well as guided visits to geosites, will shape the visitors' experience. Public presentations by geoscientists will enrich this experience and promote the earth sciences for both local residents and tourists. Field trips, field schools and research by geoscientists from our partner institutions will be encouraged and planned.

Designation as a UNESCO assisted Geopark will ensure that Percé will become an ambassador for geoeducation, and will in turn give Percé a much welcomed exposure to international geotourism.

Presented in Theme 4

Application of geographic information system in Molina and Alto Tajo Geopark

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The Molina and Alto Tajo Geopark covers an area of approximately 4000 km². Despite its population density being below two inhabitants per km², it is one of the larger geoparks. In order to integrally manage it, it is essential to count with a precise and structured cartography, in which superposed shapes are defined and globally analyzed with a holistic vision. Due to this, we are developing a Geographic Information System (GIS) to schedule, organize, and manage geological, archaeological, natural and ethnographic heritage, as well as creating an online platform connected to a geoserver to commercialize touristic resources of the geopark. The GIS has a great use for scientific, touristic, educational and land management purposes. The most significant layers created are Points of Geologic, Environmental, mining and Ethnographic Interest. In addition, a layer of degraded areas is created. These areas require human intervention to carry out a restoration of the ecosystem. These interventions are necessary to restore the ecosystem services and are demanded by the local population. This tool (GIS) is necessary for an efficient management of the resources, their protection, maintenance, and cultural dissemination and to contribute to decision making and problem solving relative to local sustainable development. The present study shows some practical examples of the application of GIS tools in the Molina and Alto Tajo Geopark, analyses of natural risks that can damage the heritage, and detection of touristic points and routes that allow the sustainable development of the population of the region.

Presented in Theme 4

Saarte Geopark project, Estonia

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

Saare County is the most western county in Estonia – its area is 2922 km², representing 6.5% of Estonia's territory. In addition to the island of Saaremaa, there are smaller islands such as Muhu, Ruhnu, Abruca and Vilsandi, and many small islands in the county. All are well-known destinations among tourists. Saaremaa is unique because of its location and its isolation – a unique atmosphere and architecture have been conserved (reed roof buildings, stone fences), the inhabitants of island have its own style of speaking and beautiful traditional costumes.

The Saare County is rich in natural monuments. The most important aspect for the creation of the geopark is an internationally well-known geological monument – the Kaali meteorite crater. The main pillar of Saarte Geopark is based on the presentation of the Silurian era. The outcrops of Silurian that are located all over the island of Saaremaa allow presentation of almost ¾ of the Silurian Period. Most of them are located on the seashore and form high or low cliffs. Due to thin subsoil there are a lot of old limestone fields and several limestone quarries are currently in use. To have an overview of the Silurian bedding over the time, visitors have to travel through the island of Saaremaa from north towards south. The outcrop on the north coast is older, or in other words, of Lower Silurian rocks. Towards the south there are gradually younger rocks, up to the Upper Silurian, under the surface by ending at the latest horizon in Sörve peninsula.

The plan for the Saarte Geopark in terms of international Geopark status is to apply for admission to the European Geoparks Network and Global Geoparks Network in 2013 and hopefully in 2014 be acknowledged as a European Geopark.

Presented in Theme 4

Visitor preferences for communicating the message at Geoparks

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Geoparks, similar to science centres, zoos, and museums, are designed for lifelong learning. Visitors take advantage of the informal learning opportunities presented at these popular destinations and learn about the local geology. Visitor preferences in communication strategies may affect whether they have learned something about the geology of the area. Communication strategies have evolved over time and not only include the traditional techniques of print, radio, television, and in person but have also been enhanced by a variety of social media tools. The proliferation of smart handheld devices and web 2.0 tools allow people to easily access information through these social media communication tools. Our sample of 762 visitors was diverse and in-

cluded both local and international visitors who varied in age. They reported that their preferred method for receiving information or following a topic of interest was either through online tools or print materials with in person information, such as lectures and tours, following. Our study shows that preferences vary among visitors and geoparks would benefit from communicating their message in a variety of formats to reach the greatest audience.

Presented in Theme 2

Stonehammer Global Geopark: the first three years of establishment

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Global Geoparks complement museums and science centres, and provide visitors with geological, historical, and cultural stories. Although all are members of the Global Geopark Network (GGN), they vary widely in size, include very different geological stories, and have different knowledge histories of exploration and cultural connections to the people living in the area. To examine knowledge gains associated with Stonehammer we collected questionnaire data from park visitors during the first three years of operation (2011, 2012, and 2013). Participants completed a short questionnaire that included nine questions measuring concepts central to the Big Ideas outlines by the Earth Science Literacy Initiative (2009). In total, 641 participants completed the survey ($N_{\text{Year 1}}=309$; $N_{\text{Year 2}}=124$; $N_{\text{Year 3}}=208$); 52.2% of participants were from the Saint John area, 6.4% were from other areas in New Brunswick, 15% were from other parts of Canada, and 23.4% were from countries other than Canada. Overall, our participants had high earth science literacy and, on average, were aware of 7.73 of the Big Ideas. Further, all participants had similar scores, regardless of their home location. We also asked questions to determine if participants were aware of the establishment of Stonehammer and, as would be expected, a larger proportion of local visitors were aware of the geopark. Interestingly, the percentage of local participants who were aware of Stonehammer dropped significantly from Years 1 to 3, which could be attributed to the fact that there was a media blitz surrounding the initial establishment of the geopark. It is encouraging to note that almost 50% of participants who were aware that they were visiting a geopark reported that they learned something during their visit.

Presented in Theme 2

Innovation of Langkawi Geopark: embracing past, present and future challenges

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The tourism industry played an important role in the economic well being of the Langkawi Island's community. One of the major tourist attractions in Langkawi is the geopark that serves as a tool for heritage conservation as well as income generation for the local community. Langkawi Geopark is positioned as an archipelago of 99 islands. In 2007, it was awarded the Global Geopark status by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) for its geological history dating back some 550 million years. Langkawi Geopark has been providing benefits and opportunities related to socio-economic, resource and knowledge. In addition, the establishment of Langkawi Geopark has generated new job opportunities, new economic activities and additional sources of income, especially in rural Langkawi. The paper will focus on investigating the past, present and future challenges faced by Langkawi Geopark; and explore how Langkawi Geopark innovatively responded to those challenges. Reflecting on the past, this study provides a brief account of the geopark development covering the geopark concept, heritage conservation and role of Langkawi Geopark in the local community socioeconomic development activities. Present challenges include addressing the issue of whether geopark status positively enhances livelihoods and the sustainability of island communities, tourist expectation and satisfaction. Anticipating future challenges, uncontrolled land development such as development may threaten natural environment and might harm the future of Langkawi as a tourist destination. Given the economic importance of Langkawi Geopark to the country, effective and innovative mechanisms are crucial to ensure a sustainable development programs. On the whole, innovative socio-economic activities need to be designed and created with the intention of enhancing the capacity of Langkawi Geopark to generate benefits for local community without neglecting the conservation efforts and sustainable economic development of Langkawi Island. All stakeholders must realize that Langkawi Geopark will no longer hold much charm for visitors if its natural beauty is gone.

Presented in Theme 5

The Columbia Gorge Scenic Area (Oregon / Washington, United States): a Geopark by any other name

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It is common knowledge that the United States has no Geoparks. With a vast array of unique geological settings, from the Grand Canyon to the many volcanoes in the western US, to special geological settings, such as the John Day Fossil Beds, in Oregon, or the Needles National Forest setting, in South Dakota, the US clearly possesses areas that would be appropriate for Geopark status. The Columbia River Gorge (CRG), located near Portland, Oregon, has been acknowledged as one of the most significant natural landscapes in the nation. In 1986, the CRG was designated as the first National Scenic Area (NSA), with the purpose of protecting and enhancing its unique cultural, natural, recreation, and scenic resources. Today millions of visitors enjoy the impressive scenery and variety of recreation opportunities that the CRG offers. Within the CRG lie several cities, with the largest being Hood River/The Dalles (pop. 100,000). Management agencies in the CRG work collaboratively and engage recreation stakeholders to develop a recreation strategy to help land managers make decisions that address the needs and demands of their agency in a politically charged environment while balancing recreation, natural/cultural resources, and the economy. The strategy would be a mechanism to leverage skills, facilities, and/or assets to maximize each agency's effectiveness as recreation providers while protecting the Crag's values. We will discuss the similarities between a Geopark and the CRG, making use of the self-evaluation document used by all Geoparks that wants to join the Global Network under the auspices of UNESCO. Our results show that the CRG fits nearly all of the criteria, suggesting the CRG would easily qualify as a Geopark.

Presented in Theme 2

Community awareness of Geopark Harz-Braunschweiger Land-Ostfalen

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Geoparks, like many other federal, state/provincial, or local parks, often suffer from a lack of identity. When visitors do not know they are visiting a Geopark it is nearly impossible to educate them about the region and its offerings to the community. This study sought to understand awareness of the Geopark Harz-Braunschweiger Land-Ostfalen, located in north-central Germany as part of a larger study of visitors at the Harz National Park. The first question asked if the visitors were aware that the Harz National Park was a part of the Geopark. The majority (60%) indicated they were aware that the Harz National Park was a part of the Geopark. A follow-up question asked when the respondent had learned about the Geopark. Over half (57%) of the respondents had known about the Geopark for more than one year, one-third (33%) had known about the Geopark for less than one year, and just 10% learned about the Geopark on this trip. Finally, a question about the visibility Geopark information within the Harz National Park visitor center was asked. The vast majority of the respondents (82%) who went to the visitor center had seen the Geopark information. The discussion will focus on understanding what methods the Geopark used to ensure visitors were aware of the Geopark, how they interacted and communicated with the Harz National Park management, and suggestions for increasing awareness of Geoparks. Findings from many previous research efforts suggest awareness of a park (and this case the Geopark) can help increase stewardship of the area, as well as a concern for the environmental and financial health of the organization managing the park. Our discussion will include implications for managers who may want to increase awareness to support these and other causes that may be important to managers.

Presented in Theme 2

Moving geosites: how landslides can become focal points in a Geopark

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Landslides are both landforms and geomorphic processes contributing to the long-term landscape evolution and one of the deadliest sources of natural hazard that endanger lives, property and activities. Many peoples in the world have experienced historical coexistence with landslides and related hazards, adapting settlement location and typology, land use and best practices. At large, local cultural identity is strongly influenced by this adaptation, while in a few

cases landslides are expressions of both geodiversity and cultural identity. In these cases, it seems appropriate to refer to “*moving geosites*”, where academic research supported by geoparks provide insights to educational systems and dissemination to the public administrations, both as geodiversity functioning and effective approach to landslide risk reduction by raising public awareness. This was one of the focal points discussed during the 12th EGN 2013 Conference organized by the Cilento, Vallo Diano and Alburni Geopark. In Cilento, about 13,500 landslides have been inventoried, affecting about 300 km² of territory and 80 municipalities. In this context, the aim of the CVDA Geopark is to convert some landslide areas into publicly accessible geosites, considering this as an effective way to strengthen general awareness and knowledge of all the possible relevant geological assets, singular geomorphological evolution and historical cohabitation experience: Velia-Ascea, Petrosia-Roccamare, Caporra-Caselle, Civitella-Moio, S. Severino-Red Marls and S. Giovanni-Yellow Marls, are only a few examples of “*moving geosites*”. The most representative “*moving geosite*” in the Geopark is Roscigno, also known as “*the walking village*”. The old village, recognized as a UNESCO Heritage site, was completely abandoned since the early 20th century, due to a reactivated landslide, dormant since 4th century BC, when a previous reactivation affected the ancient, italic settlement located on Mt. Pruno. Following the 2010 partial reactivation, an experimental, interdisciplinary, integrated and inter-institutional project, named “*Roscigno Laboratory*”, is going to start, involving the Geopark as focal institutional support to the project. The latter represents the first implementation of the Geopark Action Plan in *providing a different perception of what usually is felt as hazardous, by using geodiversity as knowledge tool in public awareness raising*. Incoming results could be shared with other landslide-prone geoparks around the world, where similar projects could be an additional issue of their core mission within research, education and dissemination actions.

Presented in Theme 1

Geoheritage sites: the starting point for Global Geoparks

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The spectrum of geoheritage recognition ranges from simple interpretive signage to the complex undertakings of Global Geoparks and the ultimate designation of World Heritage status. In all of these, the construction of a geoheritage list is key. Seldom will a Global Geopark encompass all geoheritage sites in a given jurisdiction. Where then to draw the boundaries? In the case where a comprehensive inventory of geoheritage sites has been documented, the se-

lection of possible Global Geoparks has the greatest chance of being made on sound grounds, with an over-arching, connecting theme. Such a unifying theme, which can be expressed as a ‘tag line’, will give an Aspiring Global Geopark a sense of unique identity, and one that can be effectively marketed. Models employed in Ireland, Québec and Nova Scotia illustrate the range of approaches in establishing a list of geoheritage sites. The Irish model requires a formal process of evaluation by specialist teams for a large number of provisional sites (circa 1200), which has proven to be a multi-decadal undertaking. Québec has enshrined geoheritage in legislation, which places responsibility for identification of sites with the provincial geological survey. An open nomination process is employed in Québec, but the list began modestly and is growing incrementally. The Nova Scotia approach has been to develop a list using a simple, universally applicable rubric that has been vetted through consensus of the geoscience community; like Québec, the process invites open nominations. Public awareness of the process of building a list and of the very concept of geoheritage has promoted interest and identified partnerships at different sites, both key to a successful Global Geopark. Sample evaluation tables demonstrate how the list can then be used to assess the geoheritage values of prospective candidate regions, providing a strong foundation that will serve Aspiring Global Geoparks well.

Presented in Theme 1

History and environment: geosites, education, tourism and local development

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Studies involving environmental issues have become common in different areas of knowledge, particularly in the humanities like historiographical debates, human geography, biology, economics, tourism and related fields. What is certain is that definitely the environment theme passed to the order of the contemporary debates. Accordingly, this article is an element that highlights part of the research being developed in university PIBID project (a federal scholarship program) in the areas of History and Environment, which has as a partner Araripe Geopark (first Geopark in the continent), which provides didactic and pedagogical support for the scholars and others involved in the project. The text offers short reflections on the questions. This proposal intends to discuss issues as geosites, education, tourism and local development for the better comprehension

and understanding of the reader.

Presented in Theme 1

Geotourism and geoconservation: prospects and challenges

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This paper discusses the prospects and challenges of designing holistic geoconservation schemes through geotourism, mainly through a case study of the Izu Peninsula Geopark in Japan. It has been variously argued that geoconservation is a 'holistic', 'integrative' and 'multidimensional' conservation paradigm, and one that upholds the rights of 'abiotic nature'. However, all these aspects must be grounded in the local society for the paradigm to effectively deliver, and for this, the participation and association of human actors, notably through geotourism is deemed highly important. It is clear that geotourism must always be careful on possible impacts on geosites and geodiversity, while it should also be ambitious enough to attract more visitors and expand geoheritage profiles in other ways. Two pertinent questions in this regard are: how to 'monitor' geotourism impacts on geodiversity, and what flexible or 'adaptive' management framework is necessary. This research in the Izu Peninsula Geopark explores how existing hiking or nature trails can be integrated to provide a holistic geotourism experience for visitors. In this way, geoparks spread across large geologically diverse areas can utilize existing nature tourism capitals of the region for more efficient geotourism management and increased community involvement. In Izu Peninsula, the overall geopark theme is based on tectonic motion and land formation, but a diversity of landforms including submarine volcanic landforms, terrestrial and monogenetic volcanism and erosional activities on the crust are present. Freshwater and forest resources are also rich in the area. In the geopark, our effort is to integrate individual nature trails on these aspects into the overall theme, and so far the support from the local community has been heartening. However, a robust monitoring framework and an adaptive decision-making mechanism are needed, which we believe are not only issues facing our geopark but challenges for the global geoconservation movement as well.

Presented in Theme 1

**Xingwen Global Geopark:
a local school involvement in geo-education success**

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The purpose of this paper is to illustrate local schools' empowerment for education programs in the Xingwen Global Geopark area. Xingwen Geopark covers an area of 156 km² in the southwest of China, and offers a broad variety of locations of geological and cultural importance. It has densely and widely distributed limestone formations of all ages embodied by Stone Forest, Stone Sea and Karst caves. In 2005, it became a member of the Global Geoparks Network. It has long been considered that education plays a fundamental role in empowering the community, particularly schools, to become agents of change. A local school called Fu'an Primary School, the campus of which is characterized by karst landforms, participated in various educational programs in order to promote the concept of geopark and spread awareness of geological heritage. Indoor and outdoor activities, including interpreter training courses for children, and drawing competitions, were operated successfully. In addition, educational materials such as textbooks, interpretive signs on campus, geopark songs, etc., were also done as supplementary activities to achieve the main purposes of Earth sciences education. After the accomplishment of the actions stated above, school students and teachers have been enhanced to recognize the value and to appreciate and protect the geological heritage of their area.

Presented in Theme 3

Engaging NGO to achieve geoconservation, earth sciences popularisation and sustainable development: the case of Hong Kong Geopark

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The success of a geopark builds on engagements of various stakeholders. However, it is extremely challenging, as Geopark is a relatively new concept that can easily cause misunderstanding, distrust and disagreement. The example of Hong Kong Geopark demonstrates the successful collaboration with an NGO that helped to achieve the geopark objectives. It was the flexibility, efficiency and professionalism of the NGO that reinforced the Hong Kong Government's determination to make possible the establishment of a geopark, as well as the implementation of geopark guidelines. The NGO started playing active roles from initial preparation of the proposal to final submission of the

nomination. Its initial presentations to government departments, institutions and the public have aroused extensive interest. Concerns raised during planning were carefully attended, to avoid future management problems. In addition, the NGO offered networking and liaison for the government with national geopark and global geopark bureaus. It also advised the overall design of the Hong Kong Geopark to achieve its main goal of introducing geological conservation in Hong Kong. After the establishment of the geopark, the NGO engaged in setting up and managing geoheritage centers, initiated the Recommended Geopark Guide System to enhance the overall standard of geopark guides and geopark tours. Promotion and publicity activities associated with geoconservation, earth sciences popularisation, geotourism and sustainable development are the on-going efforts pursued by the NGO. It successfully secured sponsorship of private enterprises in running free geopark tours to raise public awareness of geoconservation, to train secondary school students to become young ambassadors to disseminate geopark message, and organize a geotourism conference in support of the global geopark movement. A NGO can be extremely useful in assisting the government in geopark development. There is no single formula for how to engage an NGO. However, the one thing that makes collaboration work is trust.

Presented in Theme 2

Geopark Quadrilatero Ferrifero, Iron Quadrangle Minas Gerais Brazil

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The Geopark Quadrilatero Ferrifero - Geopark Iron Quadrangle was officially recognized as an Aspiring GGN Geopark in 2011. In September of the same year the Program was officially launched, with its inaugurating initiatives supported by the State Government of Minas Gerais, the professional and institutional members of the 1st version of the managerial system appointed. The gold rush and the barroco style heritage, the local geology and world-class contemporary iron ore mining and steel production determine the original genesis of the Geopark. Over 50 geosites have been compiled, described and are in the process of being prepared for visitation. From a geological perspective the QF is perhaps the most intensively studied region of Brazil. The Geopark Quadrilateral has consolidated itself as a multidisciplinary geo-scientific network, empowered with the aim of catalyzing an ambitious agenda for the sustainable development of the region. The Program Mission Bassin Minier, in the Nord Pas de Calais Region

of France, recognized by UNESCO as 'Paysage culturel évolutif', is a formal partner, and a benchmark in strategic and operational planning. In 2012 the Steering Committee established a set of strategic directions for the Geopark in the coming 5 years: of major interest at this time are the Mountain Ranges Serra da Moeda and Serra de Ouro Branco as the territorial priorities, a more definitive and powerful Governance Model and the empowerment of a Local Sustainable Agenda as priority issues. These priorities have been implemented, adopting the Alto Paraopeba region and its seven municipalities and associated Development Consortium CODAP as a pilot territory and pilot regional governance. Supporting Family Farming is one of the leading initiatives for a more diversified and sustainable local economy. A list of most recent achievements and an evaluation of the current status of local recognition is discussed.

Presented in Theme 4

The Haute-Gaspésie geopark project

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The Haute-Gaspésie geopark project is the initiative of the Municipalité de Mont-Saint-Pierre and the Corporation du Tourisme de Mont-Saint-Pierre. These two organisations were looking for new ways to improve the tourism offer of the region by using its most outstanding resource that is its natural environment. At the same time, researchers from Université du Québec à Rimouski (UQAR) had been studying the glacial history of the area for many years and the people of Mont-Saint-Pierre had seen this as an opportunity to enhance their tourism offer by proposing interpretation activities based on geosciences and original research results. It became self-evident that the best model to achieve the objectives of the town of Mont-Saint-Pierre was a geopark. Thus it became a partnership between the Municipality of Mont-Saint-Pierre and UQAR. Other regional and provincial partners were added : the Centre local de développement de la Haute-Gaspésie, the Société d'aide au développement de la Gaspésie, the MRC de la Haute-Gaspésie and the Parc national de la Gaspésie and the Centre géoscientifique de Québec.

The original thematic of that geopark is the evolution of the landscape from mountain building to the glacial and erosional processes. The present-day Appalachians are the relics of two giants mountain ranges that were completely leveled in a few millions years by erosion. The understanding of landscape story can be seen in a geoscientific tour that

comprises “geomorphosites”. Each site is presented to explain one part of the long story of landscape evolution. The geomorphosites are landforms or landscapes with scientific, cultural, historic, esthetic and socio-economic value because of the way they are perceived or exploited. This approach, developed in Europe and largely used to support and create geopark was adapted to Quebec and it is applied for the first time here in the development of Haute-Gaspésie.

Some of the highlights include marine terraces, glacial valleys and stone pillars, a thrust oceanic crust (ophiolite), marine volcanic and sedimentary rocks, granitic and metamorphic rocks. Other scientific attractions of the geopark project include the Gaspésie National Park, interpretation trails, sea museum, a copper museum and an agate mine.

Presented in Theme 4

Historic and amazing places of the UNESCO Fundy Biosphere Reserve

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In 2011, the UNESCO-designated Fundy Biosphere Reserve (FBR) launched the *Amazing Places* project. Since its launch, this project has identified and promoted 50 Amazing Places (e.g., beautiful viewsapes, geologic features, waterfalls) of the FBR to visitors and residents via brochures, interpretive-content webpages, a Google Earth application, and smartphone-enabled signs at each location. The project was designed to draw attention to the spectacular natural assets of the Upper Bay of Fundy region (in New Brunswick, Canada), the hiking trails, and outdoor exploration opportunities for local residents and visitors alike. The project also supports the communities of the FBR, since these communities largely depend on seasonal tourism and resource-extractive industries. In 2013, the FBR launched phase 2 of the project, which included creating short *Planet Earth*-style documentary videos about some of the Amazing Places, to highlight hidden features and unusual perspectives of each site, which entice the viewer to get outside and visit these places. These videos promote sustainable tourism that respects nature and local culture, and encourages active outdoor exploration. Based on the model and successes of the Amazing Places project, FBR has begun a similar project to catalogue and promote Historic Places of the Biosphere Reserve, in particular those sites of historic significance that may not be represented by a physi-

cal structure or are not curated already by another organization. Several Historic and Amazing Places are found in the Quaco region of the FBR, which is a territory that also forms part of the Stonehammer Geopark. It is our belief that mutual recognition of this naturally- and culturally-important area will lead to increased collaboration in the future between FBR and Stonehammer Geopark.

Presented in Theme 3

The long and special history of the marble quarry of Candoglia, Italy

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The Milan Cathedral (Duomo), one of the largest cathedrals in the world, is not only one of the most famous Italian monuments, but it represents a perfect example of the strong connection between stone and human heritage. The Duomo of Milan is one of the few cases in which the construction material influenced not only the architecture and the building statics, but also all the ornamental part. The fascinating pink marble of Candoglia was the best stone for construction of the Cathedral, due both to the possibility of obtaining very fine sculptural work and its structural features.

It all started in 1387 when Gian Galeazzo Visconti, the Duke of Milan, gave permission for this strong, beautiful marble to be used free of charge by the “Veneranda Fabbrica del Duomo”, the cathedral building committee which was set up to supervise the ambitious plan to build a cathedral in Milan to rival with the major cathedrals of northern Europe. From that moment on, the Candoglia quarry began to operate with one unique goal: build and maintain the Duomo of Milan. The marble blocks were transported from Candoglia to Milan by means of the waterways from the river Toce to Lake Maggiore, along the Ticino and the “Naviglio Grande” canal and then into the city docks.

In the last seven centuries many things changed, but Candoglia quarry continues to provide the building material to maintain the extraordinary charm of the Duomo. The blocks are no longer transported by waterways, but the strong link between the quarry and the Cathedral is still alive. Visiting the quarry workshop today is possible to see, as in the medieval age, carvers reproducing perfectly the damaged blocks, spire and sculptures. The stone becomes culture, daily from the XIV century.

Presented in Theme 1

Sesia - Val Grande Geopark toward a new image

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Last year the Sesia-Val Grande Geopark was included in the GGN network. A successful conclusion for the candidacy procedure carried out over the last years by the Valsesia and Val Grande communities. In the early beginning they announced their candidacies separately, but in the last two years they start working together, combining their candidacies and expressing their desire to become one whole Geopark. The two neighboring territories share the same geological heritage and the same strong will to protect and boost the value of their natural as well as cultural heritages.

The Geopark's territory consists of 85 municipalities, over four administrative provinces and includes 3 regional parks, one National Park and two UNESCO world heritage sites. The Geopark was born from a strong bottom-up process thanks to an enthusiastic engagement of all the involved stakeholders (municipalities, parks, associations, companies, volunteers, etc). This dynamic and polyhedral structure represents the beating heart of the Geopark, but to increase the national and international Geoparks awareness a new integrated and coordinated image is needed.

Starting from December 2013 a competitive design tender of logo, image and communication plan has been promoted among five professional consulting groups already involved in development studies on the Geopark area. The final tender results are expected by the end of the first quarter of 2014. The final goal is to provide Sesia Val Grande Geopark with a new logo, new website, coordinated and integrated image and communication plan to be used both to enhance geopark awareness and to strengthen the link to all the involved stakeholders.

Presented in Theme 2

First step: Quintana Roo, Mexico, is looking for Geoparks!

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In the past two decades, creating Geoparks has largely benefited people living in areas characterized by a valuable geological heritage. Geoparks aim at achieving conservation, provide education, and promote sustainable economic development through the practice of geotourism. Currently, through this global initiative one hundred geoparks have been established, which are located primarily in Eu-

rope and China, while in America there are geoparks only in three countries: Canada, Brazil and Uruguay. In Mexico there is still no geopark despite some attempts.

In this work, the Mexican state of Quintana Roo (QR) is proposed as a suitable region for establishing Geoparks, since it has the geological heritage and other natural, historical and cultural elements, essential requirements for creating Geoparks, and also has strong development tourism for four decades. QR has 44,705 km². Geomorphologically, it is a plain formed of limestone with karst features such as sinkholes (locally known as "cenotes"), and large and complex cave systems. The southern portion is 300 metres above sea level, while the northern part does not exceed 30 metres. Its surface hydrographic network is sparse, while the underground network is complex, interconnected and very long (up to 310 km).

The entire state of QR has geological and geomorphological features that have to be protected and possesses an enormous geotourist potential. The objective of the project is to find potential sites to establish geoparks based on the identification and assessment of its geosites (systems of caverns and cenotes) of QR based on a new methodology supported by geographical analysis, involving local indigenous communities. Finally, with this approach, it is possible to achieve conservation and geological heritage of Mexico in the context of sustainable development.

Presented in Theme 4

The model preparation of a visitor centre on the example of the Železné hory National Geopark (Iron Mountains National Geopark), Czech Republic

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The Železné hory National Geopark is located in the heart of the Czech Republic, approximately 100 km east of Prague. Its area (777 km²) is not too large, but its geological diversity is one of the most interesting areas in our country. In the Geopark you can see a number of geological phenomena in two or three days. It is an open-air geological textbook.

Geology is presented in different ways in the Geopark. There are geological nature trails connected to the network, museum exhibitions, outdoor exhibitions of stone blocks and individual geotourism attractiveness. The next step for the support of geotourism is the building of visitor centres as imaginary gateways to the Geopark. Podhůra – the Educational and Visitor Centre (VNC Podhůra) is the North gate entrance, which was created in cooperation of Chrudim City, Protected Landscape Area of the Železné hory and the Geopark.

The new visitor centre is building up in one of the most frequent places at the entrance to the city forest. Near here

there are also lots of popular tourist destinations. Since its inception there is some premise to interconnect three components - geology, nature untouched by humans, and the cultural forest ecosystem. The upgrade of the exhibition is a passive energy demand of the whole object, so the building will be concurrently the exposition. The preparation of the project is the perfect “cookbook” for other objects of the same or similar using. The exhibitions emphasize to the interactivity, childlike playfulness and variability.

The aim of the Železné hory National Geopark is to build up a network of gateways from the main cardinal points. All visitor centres will be focused on different topic, so that they will not compete with each other. Their connection will create meaningful geotourism products.

Presented in Theme 4

Promotion of earth sciences through Geoparks and World Heritage Sites

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One traditional challenge of many international organizations, including the ‘International Union of Geological Sciences’ (IUGS) and UNESCO, is the promotion of knowledge and understanding of our Planet Earth and to further elucidate the importance of earth sciences to society – thereby also fulfilling an educational mission. UNESCO’s mandate (and privilege) is to integrate undertakings related to Education, Science, Communication and Culture – in cooperation with many partners; whereas IUGS’s mandate (and privilege) is similar but with a strict focus on geosciences. Quite recently “Geoheritage” has been selected by these and other bodies as an excellent theme to meet the anticipated goals on an international agenda. “Geoparks”, as a new ‘brand’, are best defined through the criteria and guidelines of the ‘Global Geoparks Network’ (GGN) – in length the ‘ad hoc Global Network of National Geoparks supported by UNESCO’ that seems to be well on its way to become the ‘International UNESCO Geoparks Initiative’. Complementary to UNESCO’s geological ‘World Heritage Sites’ ‘Geoparks’ have proven to be excellent tools to educate the public about “Earth Sciences” within a socio-cultural realm. Geoparks can also be shown to be areas for recreation and significant sustainable economic development mainly through geotourism. Apart from their important role of protection of geological resources, Geoparks address through their activities a holistic view of landscapes and society, and thus reflect a wider approach to ‘Nature’ than other protective designations, such as National Parks, Biosphere Reserves and World Heritage Sites. Herein we propose that the diverse and dispersed undertakings of all geoscientists should envisage a better coordination and syn-

ergy in the realm of promotion of Earth sciences. Through individual projects all geoscientists could contribute to an increase of appreciation and value of Earth Sciences, and thus support activities related to the overarching UNESCO Geoparks Initiative or the World Heritage Programme.

Presented in Theme 6

‘Bring in the White Coats’ – the GeoCollective 2014

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The English Riviera Global Geopark is committed to working in partnership with creative and performing artists on a range of projects that inspire local people and stimulate an interest in our Geopark and its interrelated geology, heritage and culture.

Geoquest, as profiled at the 2012 conference in Unzen, has developed into a GeoCollective who have been working on a GeoOpera project which has seen young residents work with the GeoCollective Artists and Welsh National Opera to begin to create a new opera inspired by our Global Geopark and our relationship to it.

A scratch (work in progress) performance of Act 1 of the Opera was performed in July 2014 as the curtain raiser for a performance by the Welsh National Opera in front of a packed auditorium.

Thanks to an Arts Council grant and inspired by the prospect of giving Act 2 an international Geopark dimension, some of the GeoOpera performers are here in Stonehammer and will be working with students and delegates to initiate a Global Geopark wide project.

With your help, on return to the UK the full GeoOpera participants (local young people) will pick up the contacts made and start conversations with communities and musicians across the Global Geopark Network, connecting and collecting raw materials that will drive, influence and inform the development of the GeoOpera Act 2.

Through connecting with musicians from around the world, the process of creating Act 2 will give the participants experience of working with multiple international partners to create a new piece of work which will premier in 2016.

The benefits of this project are multiple: tangible and intangible! The creative process inspires our young people to access information about our Geopark and the wider network, it creates social capital, a sense belonging and pride in our Geopark.

Presented in Theme 2

TERRA.vita - 13 years of experience as a European Geopark

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Today's Nature and Geopark TERRA.vita, located in northwestern Germany, started as "Naturpark Nördlicher Teutoburger Wald, Wiehengebirge in 1962. In 1998 a new management was implemented and organized a complete relaunch. Recalling that the naturepark was one among almost 100 other parks in Germany, it was obvious that the region needed a USP to be special. Supported by a professional consultant, the parks significant geological heritage was easily identified as its outstanding feature. As discussions progressed, the invitation to the first European Geoparks Conference in the year 2000 in Spain was circulated. Two naturepark representatives joined the meeting and identified the new Geopark concept as a perfect fit. One year later an application was sent to the new founded European Geopark Network and was accepted for three years. Another year later the USP was integrated in the parks daily work, based on very basic strategic plan and new CD/CI manual. TERRA.vita Geopark was born.

Meanwhile, TERRA.vita has successfully passed three international revalidations as a European Geopark and was awarded three so called "green cards" in a row. As we have learned, a continuous improvement process and a participation in common Geopark projects are crucial to pass geopark audits, which are conducted now every fourth year. The presentation delivers a deep insight into TERRA.vita's daily work as a Geopark, focusing on project development processes, the monitoring of the parks success, the promotion of geological heritage and Geoparks in general, supporting a regional sustainable development, installation and improvement of geotouristic infrastructure, environmental education activities, the active role in the European Geopark Network. All these efforts are achieved with limited resources and are possible as the Geopark exploits its great potential as a networker in the Geopark territory.

Presented in Theme 5

Sustainable Geoparks: scoping studies in 4 key activity areas

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At the end of 2013 representatives of seven European

Geoparks expressed their will to set up a joint project in the area of sustainable development. To that end they participated in interviews that showed all Geoparks aim to promote themselves as sustainable tourist destinations, and that there is an interest in sharing best practices and experiences with other Geoparks. Three of the Geoparks (TERRA.Vita, Germany; Magma, Norway; Hondsrug, Netherlands) commissioned individual scoping studies (carried out by Kristian Petrick, All Green Energies) with the objective to establish a baseline in four key activity areas:

(1) Sustainable mobility: Access concepts and information to geo sites with public transport or bikes (modal switch, mobility points), introducing e-bike, e-Vehicles and e-Buses, charging infrastructure

(2) Sustainable hotel businesses: certification/labelling of hotel businesses, criteria for appropriate labels (e.g., EU Ecolabel), promotion activities, combination with the European Tourism Indicator System ETIS;

(3) Geothermal energy from Geoparks: shallow and deep geothermal potential, information and maps available from other EU projects, guidelines for promotion activities, stakeholders and pilot project identification;

(4) Energy & climate strategy: review of strategic plans of Geopark jurisdictions, definition of own competencies, inclusion in EGN/GGN Charter.

The scoping studies help the Geoparks developing further ideas and activities together with their stakeholders by using a common approach, and at the same time they serve as preparation for a potential joint project which may be submitted within a public funding program (e.g., Horizon 2020, INTERREG V). The other Geoparks (Burren & Cliffs of Moher, Ireland; Reykjanes, Iceland; Idrija, Slovenia; Azores, Portugal) may join the project at a later stage.

It is intended to present selected results of the scoping studies (and potentially further activities carried out in the course of 2014) at the 6th Global Geoparks Conference in order to inspire other Geoparks to join the initiative.

Presented in Theme 1

Tourists and local community's attitude on geo-park as a geo-tourism

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Purpose: The purpose of this research is to focus on identifying the socio-cultural effects of geo-tourism in the Qeshm geopark through evaluating the attitude of the lo-

cal people of Qeshm toward the growing industry of geo-tourism, and evaluating the stimulations and the level of satisfaction of eco-tourists traveling to, and visiting Qeshm geopark, as well as the factors influencing them.

Design/methodology/approach: In this study, which is based on the Social Exchange Theory, qualitative and quantitative methods are used. From qualitative point of view, tens of interviews were conducted among tourists, and local people staying nearby the sites of Qeshm geopark, and in terms of quantitative method, we distributed questionnaires among the locals and tourists, thereafter the data were collected and analyzed according to the level of satisfaction of geo-tourists; and for the local residents, we analyzed the data based on evaluating their point of view in terms of the socio-cultural effects of geo-tourism.

Findings: (1)-According to geo-tourists, visiting natural sites in the Qeshm geopark is the most important factor for their trip. Most of the tourists are satisfied by traveling to Qeshm and factors such as interest to visit natural sites, tourism activities, and duration of their stay, show the highest level of satisfaction among geo-tourists. (2)- Local residents of geopark have also a positive and satisfied view toward the geo-tourists. And this view is at a higher level among those who are at higher cultural, social and economic levels. The majority of the population nearby the geosites is rural and has a traditional life style. They were significantly satisfied, as both visitors and authorities respect and help them maintain their cultural and traditional values.

Presented in Theme 1

Six classic geological routes of Danxiashan Geopark

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Danxiashan, one of the first Geoparks, is located in Guangdong Province of south China, covering a total area of 292 km². On August 1st, 2010, Danxiashan, as one part of China Danxia, was listed the World Heritage by the UNESCO. It is the place where the term “Danxia Geomorphology” on a worldwide basis is given. Its typicality, diversity and irreplaceability is embodied in its research work and has been a national, even worldwide base for academic research, popular science tourism and teaching practice. During development of more than 30 years, six different geological routes cover great landforms, beautiful scenes, ancient buildings and unique culture, etc.

1. Geological route 1: (about 2.5 hr) Mid-mountain Gate—E Yu Shang Shan—Entrance of Zhanglao Peak Ticket Station—Mid-mountain Pavilion—Mengjue Pass—Bai Zhang Canyon—Jin Shi Yan Temple

2. Geological route 2: (about 2 hr) Sun-viewing Pavilion—Xue Rock—Hong Qiao Yong Cui (Rainbow Bridge

Embracing Green)—Scale Cave—Shao Yin Platform—Bao Zhu Peak—Rudder Rock

3. Geological route 3: (about 2 hr) Yangyuan Rock—Breast Stone—Drying-cloth Rock—Jiu Jiu Tian Ti (Ninety-nine Stairs to Heaven)—Ximei Fortress

4. Geological route 4: (about 2.5 hr) Xianglong Lake—Yinyuan Rock—Wo Long Gang (Crouching Dragon Hill)

5. Geological route 5: (about 1.5 hr) Line 1: Yangyuan Rock Quay—Danxia Power Station (tour about 1 hr); Line 2: Sister Peak—Goddess of Mercy Rock (tour about 1.5 hr)

6. Geological route 6: (about 1 hr) Tong Tai Bridge—Lion Rock

Presented in Theme 3

Analysis of features of granitic geomorphologic landscape in Mt. Chaya

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This paper discusses the types and features of granitic geomorphologic landscape in Mt. Chaya National Geopark, and compares the features of granitic geomorphologic landscape in Mt. Chaya, with those of granitic geomorphologic landscapes in China and in the world. Features of granitic geomorphologic landscape in Mt. Chaya include: (1) granitic geomorphologic landscapes are mainly geomorphologic landscapes of granite pictographic stones, which have more than one hundred granite pictographic stones in all forms. Affected by mineral composition, degree of crystallization, spherical weathering of medium-coarse grained syenogranite, the surface of majority of pictographic stones of granite are smooth and edgeless. Therefore, they look more vivid and realistic instead of abstract; (2) The granitic mass in Mt.Chaya appeared in stocks and are distributed in a small area, which make the whole granitic geomorphologic landscape as delicate and elegant as a “natural potted landscape”; (3) The terrain is unique because Mt. Chaya rises straight from the ground and borders the plain, making it very magnificent; and (4) Mt. Chaya has many geomorphologic landscapes of granite caves, cave in cave, cave link cave; the length of a cave can be as long as dozens of metres or even a hundred metres.

The granitic geomorphologic landscape in Mt. Chaya has a very high aesthetic value and it is embodied in the following aspects namely beauty, uniqueness, majesty, peril and illusion. The features of granitic geomorphologic landscape in Mt. Chaya is thought to be formed by medium-coarse syenogranite, the relatively coarse mineral crystallizations and the uniform lithology, joint fissures developing in moderate density, unique geomorphologic position and the special climate condition in the transitional zone from

north subtropical zone to warm temperate zone, which is a powerful witness to the significant zonality of granitic geomorphology. This paper provides references for finding similar granitic geomorphologic landscapes with the aesthetic value.

Presented in Theme 1

A network platform for communities to be forceful

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Araripe Geopark provides the means for those who want to live in a sustainable way of life to develop their work and grow by themselves. In the interior of Brazil, 600 km from Fortaleza inside the territory, the nine Araripe Geopark communities nearby the geosites are no longer totally isolated from the rest of the world, they have all the technology they need to connect with us. Mainly the satellite internet and others; like modern roads, shops, etc. This creates great opportunities for people, but can also bring unbalance. The differences they find between the things they hold and the things they discover, might create a strong wish to get those things they have seen and that they do not yet possess. This is a reality repeated all over the globe. Those communities do not have the social structure to solve problems brought by the difficulty of adaptation to the new technology and quick economic development. The practice they know does not bring them the things they desire, to achieve welfare. They have to learn how to get it. They have to work. But the societies where they live do not give them the choice, neither the work, or in the limit they migrate. A lot of them cannot afford that. They see themselves withdraw to a reality they do not like. Often they revolt and their cultural roots are the first to be dismissed. We know how to help those people and we have the means to help them reach their goals on what they need, we have the knowledge. But like almost everything in life, there is a factor that is the most subtle, the human behavior. In our region there are several associations and non-governmental organizations that work with destitute communities. Araripe Geopark leads this partnership project, between those organizations and our nine communities that claim the creation of a network platform that can provide the knowledge they need, and a locale where they can change experiences, in an easy way.

Presented in Theme 2

Benefit chains at Messel Pit World Heritage Site: creating a geotourism highlight in the tourism destination Odenwald, Germany

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What is behind the miracle to become a geotourism star for a destination that leads to additional numbers of valuable visitors? The geotourism shown through the collaboration of Messel Pit UNESCO World Heritage Site (WHS) together with the tourism destination Odenwald is a process, which builds a common appearance through a corporate design with quality offerings of walking activities, overnight stay packages, and public transportation with quality tour guide offerings, locality specific, and showcases regional products. The later to offer enjoyable earth discoveries and geotourism products like e.g., a “rain forest cake” with a cup of coffee, a “Maar crater soup” or Messel Pit revived fossils to former animal shape cookies or too merchandise products like a rainforest painting book, a set of playing cards in a quartet or a “Safari plate” for children after their guided time-travel tour across e.g., the Messel Pit WHS. Like the saying “a swallow does not make spring” – an offering, a museum, and a hotel do not create the benefit in geotourism. It is the interaction, exchange and combination of experiencing the destination by its obvious geotourism highlights in context with the today’s society that makes the success and benefit chains.

These are chains of different contributing partners, exchanging, promoting and benefiting by the quality of their products and service for visitors. Answering the call to such demands, each partner has to establish quality standards. The different partners will have different aims: economic direct or economic indirect, others an identity aim and image, and some are not aware of the side effect – a pride aim like the local residents at a destination. Finally, there is a benefit chain comprising all who participate “a bit”. “Bits” come together to formulate flow of revenue, etc. Descriptive and quantitative data on this development is presented.

Presented in Theme 1

Ten years of exchange: Messel Pit WHS and Geo-Naturpark Bergstraße-Odenwald, Germany

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A close collaboration with the Global Geopark Bergstraße-Odenwald has been developed, in exchange to implement guided tours, the training of Geopark Rangers, and a wide range of public relations and geo-educational

tools. The WHS integrated his partner in the development and implementation of a visitor centre based on a holistic Geopark concept of connecting geological, natural and cultural heritage to strengthen the “Geo-identity” of the people.

Both partners integrate each other in their annual magazines and publications as well as into regular activities and events like the European Geoparks week. This annual event acts as a huge platform to communicate the regional geological, natural and cultural heritage to the public. Too it promotes other Global Geopark partners in Europe. Messel Pit acts as northern entrance gate to the Geopark with information about the territory and other European and Global Geoparks. Related to public events like the German-wide “Day of the Geotopes”, Messel Pit was awarded as “Geotope of the year” from the Global Geopark Bergstrasse-Odenwald.

In the field of geo-education, both partners have developed programs as well as corresponding tools. The “Geoworkshops for kids with the Geopark rangers”, follow e.g., geo-scientific themes of the Messel Pit, which are “rain forest”, “fossils”, “volcanoes”, and “below the surface”. The young participants also receive the Geopark and Messel quartet – playing cards which reflect the territory in a holistic overview with nice photos and short phrases to be read to all, thus training oral communication. The Messel Pit has also developed promotional collaboration with the regional tourism organization “Odenwald-Tourismus” with the WHS as a lighthouse for the tourism destination. Funded by the German Federal Government and the State of Hesse this collaboration also promotes awareness of the Global Geopark. All these activities have led to a mutual benefit for both partners and also to economic development of the territory as the visitor numbers from the Messel Pit prove this.

Presented in Theme 3

Proposal and problem of Geopark concept to small islands: a case study of the Mishima Village Geopark Concept, Kagoshima Prefecture, Japan

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Purpose: This paper focuses on geotourism as a new form of tourism, and aims to further the debate on the potential for introducing geoparks and geotourism as a form of sustainability, especially for small, close-knit island communities struggling with aging and declining populations. The specific focus centers on the Mishima Village Geopark concept, the only small island complex, as of September 2013, aiming for designation as a Japanese geopark.

Methods: The definitions and basic features of geoparks and geotourism found in the literature are first presented. The opinions of both Mishima Village Office employees

and Satsuma Iojima residents are then reported to highlight different perspectives on the potential of introducing geoparks to small islands.

Results: Debate still surrounds “the earth’s heritage” and the basic questions regarding the proper focus of geoparks and geotourism. The opinions of those living on small islands reveal the need for continued debate aimed at building consensus among administrators and local residents on the proper introduction of geopark and geotourism, taking full account of the characteristics of an aging population, depopulation, and a close-knit community.

Conclusions: In the development of geoparks, especially those on small islands, geotourism can be an important means of building sustainable communities.

Presented in Theme 4

An introduction to Sakurajima-Kinkowan Geopark

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The Sakurajima-Kinkowan Geopark is located in Kagoshima, which rests at the very southern tip of mainland Japan. The geopark area includes the active volcano, Sakurajima, and the sea born of volcanic activity, Kinkowan.

Sakurajima was born 26,000 years from our present day. Until now, it has had 17 major eruptions. It presently has approximately 1,000 smaller eruptions per year and, for more than half a century, has been considered a rarity throughout the world because of the ash which showers the surrounding areas as a result of its frequent activity.

Kinkowan, which surrounds Sakurajima, is a bay endowed with an undersea caldera, the Wakamiko Caldera, and a depth of over 200 metres. The Wakamiko Caldera releases volcanic hydrothermal gas on a daily basis. Kinkowan itself is home to over 1,000 species, including dolphins.

Working with the Theme of, “the bonds between the volcano, people, and nature,” the Sakurajima-Kinkowan Geopark crosses through time and space to tie together nature, history, culture, and industry. Because of this, the Geopark has earned recognition for the lasting impression it leaves with its visitors.

This Geopark’s most unique feature, however, is that for nearly 60 years, right before the lively and actively erupting Sakurajima there lays a city with a population of 600,000 people who take the frequent eruptions and clouds of smoke as daily occurrences. Japan’s highest-level volcanic monitoring system is in place here, including concrete evacuation plans, and disaster prevention practices that have been carried out for many years. These plans help create a complete understanding of disaster counter-measures for many people. This is the realization of “union with the volcano,” something very rare throughout the world.

Presented in Theme 4

Monuments and memories of the people who live with volcano, Sakurajima Geopark, Japan

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Sakurajima is one of the most active volcanoes in Japan. Small eruptions have been occurring since 1955. The average number of the small explosive eruptions is 832 times a year in last five years. 5,000 people live in Sakurajima volcano, and 600,000 people live in Kagoshima city that is located within 20 km of the volcano. People have calm and regular lifestyle, even if ashes fall more than 800 times a year.

The last big eruption of Sakurajima volcano occurred in 1914. Lava buried the eight small villages, and many people had to migrate to different area after the eruption. They told the experience and lesson that they learned to their descendants orally. Details of the incident have been forgotten as time goes by, but the outline is still transmitted. On the other hand, the stone monuments with carved inscriptions about the incidents are found all over Sakurajima, and it tells the story of the time in detail.

We can find 80 monuments in and around Sakurajima, the record of the inscriptions, interpretation of the incidents after the event, and also summarized as variety of books. We also mapped all monuments and remains of the eruptions on Google Maps. It makes it easier for the visitors to Sakurajima to find each memorial spot and learn about the history in a more active and accurate way. For example, the map can tell the monuments are distributed more to the east side of Sakurajima, corresponding to the leeward side at that time.

We also held a geo-tour to take people and explain the monuments. It is possible to imagine a state of eruption based on the inscription carved in the stone monument. Participants were able to enjoy the tour, and have an experience just like with the people in those days.

Presented in Theme 7

Creating new Geotourism in cooperation with local people, Geo-guide, Geo-masters in Muroto Geopark

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Muroto Geopark Promotion Committee (MGPC) was organized in 2008 by local groups such as the Association of Commerce and Industry and the Tourism Association; it also included research institutions such as Kochi University, Kochi University of Technology, and JAMSTEC

(Japan Agency for Marine-Earth Science and Technology). Politicians, researchers, and local administration officials cooperated in organizing the Committee. However, discussions among the Committee members were not very active. When we introduced workshops for the discussion of our action plan, it worked very well. As a next step, we decided to make geopark promotion teams.

In July 2013, the first meeting of the Muroto Geopark Geotourism Promotion Team was held. We announced to the committee members and local citizens that they were able to join the team if they were really interested in creating new geo-tourism. We kept announcing that anyone interested can join and can do so whenever they please.

In November 2013, we conducted 2 tours; one of the tours took place in a fishing port, and the other was in the sweet potato field on the marine terrace. Both of them were successful, but at the same time showed further challenges. After the tours, we gathered and discussed what we found out from the tours and decided what to do next. Now, we are planning to create new geo-tours for each season.

The members of the team are really active and we aim to create more jobs for younger generations in the area. Hopefully these activities will lead to a sustainable local development.

Presented in Theme 2

Irish Geoparks: the sustaining role of EU funded projects

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Three Irish Global Geoparks have built their foundation and ongoing success on the bedrock of mostly EU funded projects. Copper Coast Geopark and Marble Arch Caves were early members of the European Geoparks Network in 2001. Marble Arch Caves later expanded into County Cavan to become the first international Global Geopark. The Burren and Cliffs of Moher joined the network in 2011.

The Geoparks have developed EU and other project partnerships within Ireland and outside – mainly in the INTERREG Atlantic Area (including UK, Spain, Portugal) and the NEED Northern Atlantic Periphery (including Norway, Iceland). EU funding has helped secure the foundation of the Geoparks, as in the purchase and refurbishment of a deconsecrated church, now serving as the Copper Coast visitor hub, which was achieved through INTERREG and LEADER funding. The Burren and Cliffs of Moher established its educational resources with a suite of booklets, maps and school packs under a NEED project. The Marble Arch Caves developed and expanded through various cross-border projects under EU Peace Programmes

(SEUPB), most recently enabling the enhancement and addition of information centres.

Geopark partnerships with local authorities and state bodies such as Failte Ireland (tourism), Heritage Council, National Parks and Wildlife Service, as well as universities, have also been crucial in developing projects and attracting funding. The two geological surveys of Ireland, GSI in Dublin and GSNI in Belfast, are long-standing partners of established and spiring geoparks, and GSI has supported Geopark geologist employment since 2008.

Irish Geoparks and aspiring projects have attracted an estimated 20 million euro total EU funding since 2001. The overall financial benefit to their development would appear obvious. However, there are questions relating to the administrative burden of successfully facilitating projects to realize full funding. Careful selection and management of projects and programme regions are therefore important considerations.

Presented in Theme 2

Geodiversity as a tool for the better management of geoheritage

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With the rapid development of geoparks in China, geologists have begun to focus on the exploration of geoconservation and sustainable utilization of geoheritage. With the aim to make a comprehensive framework for better management, experts have been aware of the importance of geodiversity, which has been gradually known to the public and widely used in geological research in recent years. The concept of geodiversity can be expressed as the diversity of the special places and objects in nature, which includes concrete manifestation of the natural range of geological strata, structure, lithological characters, fossils and geomorphic landscape, and processes, as well as reflecting their regular patterns and interrelation. Research regarding geodiversity is complex and challenging, but is an essential part in the process of providing guidance for geoheritage planning and meeting new requirements of development of the geological resources. As demanded, the establishment of an evaluation index will promote the sustainable utilization of geoheritage resources. There is an abundance of geological heritage in China, among which three geoparks have been chosen as research areas (Hexigten Global Geopark, Xingwen Shihai Global Geopark, Mt. Funiushan Global Geopark).

Certain laws and regulations have been issued to protect geological landscapes in China, and the identification and

conservation of geodiversity has become an important and effective measure in doing so. From this perspective, the theoretical definition of geoheritage and practical conservation find common ground. Geodiversity reflects the diversity of nature resources and also shows us the possibility to secure the natural values in combination with human utilization.

Presented in Theme 1

The Charlevoix Astrobleme Geopark Project

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Charlevoix is a popular tourist destination, mainly because of its terrain, climate and more importantly its cultural heritage. But few people know that Charlevoix is geologically unique in Quebec and even Canada because of its geological history and the tectonic and catastrophic events that shaped and still model its landscape today.

Three major geological provinces of North America occur in the Charlevoix: (1). Precambrian rocks of the Canadian Shield north of the St. Lawrence; (2). Paleozoic rocks of the platform of the St. Lawrence, which is just south of the Shield and mainly near the north shore of the St. Lawrence; and (3). Appalachian rocks which we find traces of in Isle-aux-Coudres.

All these rocks have witnessed a meteoritic impact which transformed profoundly the geology from Petite-Rivière-Saint-François to Saint-Siméon on the Upper North-Shore of the Saint-Lawrence River. The Charlevoix astrobleme was discovered in 1966 and several impact structures and typical meteorite impact rocks have been identified. The central peak and ring grabens are among the most visible and accessible impact structures in the world. Charlevoix is still an active seismic zone as well, which significantly influences its landscape.

In addition to highlighting the astrobleme and the ongoing seismic activity, the proposed geopark also wants to highlight the current processes that change the landscape and which are natural hazards such as bank erosion and landslides.

Presented in Theme 4

Northern Georoutes: Geoparks develop North Atlantic tourism brand

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Magma Geopark in Norway is leading a tourism-based project funded by the Nordic Atlantic Cooperation Program (NORA) in partnership with Geopark Shetland (Scotland), Katla Geopark (Iceland) and Stonehammer Geopark (Canada). The partners are working with a range of stakeholders, to develop a holiday booking system to connect tourist routes in this area. They aim to: (1). promote the North Atlantic Region as the 'destination of choice' for a niche tourist market through development and promotion of a distinct brand; (2). support local businesses in each Geopark through coordination of tourism activities; and (3). contribute to sustainable and affordable global tourism.

The project is capitalizing on the unique landscapes and natural assets in the Geoparks to stimulate geo-tourism by developing tour packages that can be promoted and sold online. Tours will be enhanced by innovative new tourism products, including app based guides and games developed by Icelandic software developer Locatify.

The first phase of the project involved a questionnaire to potential stakeholders, such as accommodation and hospitality providers, tour operators, transport businesses and marketing organisations. It aimed to gauge interest in the project, discover what stakeholders could bring to the project, and find out what they would hope to gain from participation. The information was used to develop a 3-day themed tour package for each Geopark. The 'Northern Georoutes' brand was established – logo, website, tour search engine and Facebook page – to promote the packages <www.northerngeoroutes.com>.

This year an online booking system is being implemented, in accordance with relevant legal requirements, along with the development of associated tourism products.

Phase three will involve development of further packages and dissemination of project results to a wider audience – specifically members of the Global Geoparks Network. Potentially the Northern Georoutes project could be a precursor to a wider 'Global Georoutes' brand involving Geoparks from around the world.

Presented in Theme 2

FLAG: a community initiative in popularizing the Geopark concept in Langkawi Geopark

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Langkawi Islands received its Global Geopark status in 2007 with minor comments for improvement. Despite this huge success, the 2011 revalidation reports revealed many weaknesses, particularly in its management, promotion and visibility. Awareness and understanding of the Geopark and geotourism potential remained low in various segments of the community. In order to overcome these issues, an NGO, namely the FLAG or *Friends of Langkawi Geopark* was established in February 2014 by a small group of enthusiastic stakeholders, comprising private individuals and corporate members. Its primary objective is to garner community interest for the Geopark and to convince them that Geopark is the best concept in achieving the islands' goal for sustainable development and the best tool for local socioeconomic enhancement through geotourism endeavor. FLAG strives to defend Langkawi Geopark's global status and aspires to make Langkawi a better Geopark in the future. Under its official slogan and motto, *Love Langkawi Geopark – Assist Not Resist*, FLAG intensified Geopark awareness programmes for various target groups in different sub-districts of Langkawi in collaboration with local authority. FLAG has proposed several measures and projects that can increase the visibility of the Geopark in Langkawi. Today, FLAG is steadily gaining its momentum and it is perceived that this organization can be a powerful medium to mobilize peoples' interest in popularizing Geoparks and assisting Geopark managers.

Presented in Theme 2

Cultural geology in the Sesia-Val Grande Geopark, NW-Alps, Italy

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Landscape is a complex dynamic combination of landforms and processes. These elements are memories of the history of the Earth and enable us to understand the evolution of our world. The paper describes first the conceptual framework and the methodology followed in order to investigate the relationships between landscape's geodiversity,

environmental dynamics and man in the Sesia-Val Grande Geopark (Northern sector of Piemonte Region, Italy), and then the suggestions for a program of appraisal and popularization of geoheritage.

Sesia-Val Grande Geopark offers a wide variety of geological and geomorphological elements, and holds stories of different people, who founded their independence in the mountain environment by using the available local resources and even suffering the difficulties. There are traces of human activity starting from the Neanderthal man on the Fenera Mountain; Walser settlements from the 13th Century (in the upper part of the Sesia and Ossola valleys) and several mines dating back to period of Savoy Kingdom (19th Century). In this perspective, the physical landscape of the Sesia-Val Grande Geopark has been analyzed and geosites individualized as available resources for human activity and settlement. Comprehensive interpretation of geosites showed that local community suffers, models, works, enhances and destroys part of the landscape, giving it a “personality” that can be defined as landscape culture. Culture proved to be not only the “activities of human being” but also the “the product of the interactions with the environment in which people lives”. Geosites described may, therefore, be proposed as elements of sustainable tourism, aware of local resources and respectful of local traditions.

Presented in Theme 7

Geosites of Terras de Cavaleiros Aspiring Geopark, Portugal: tourism value assessment

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Terras de Cavaleiros (Land of Knights) is an Aspiring Geopark located in northeastern Portugal. The main geological features are related to Variscan tectonics and allochthonous terrains. The 42 geosites inventoried in the geopark were assessed for their tourism value. A methodology was applied based on four main criteria (availability, use, logistics and perceptiveness) and 13 sub-criteria (accessibility, visibility, safety, indications, use of geological values, use of other values, land status, cleanness, toilet facilities, food facilities, accommodation, aesthetics and understanding of contents). This method was previously tested before at the Arouca Global Geopark, also in Portugal. Twenty-five of the 42 geosites have a tourism value below 50%, in 15 geosites this value ranges from 50% to 75%, and only two geosites have more than 75%. According to the results obtained in this assessment and their relation with previous results concerning the scientific value and vulnerability, the

42 geosites were ranked following a star classification (from 1 to 5), resulting in a more widespread value. Twenty-nine geosites were rated with 1 star, 7 with 2 stars, 5 with 3 stars, and only 1 geosite with 4 stars. Based on the data obtained, on the assessed criteria and sub-criteria, and on the identified issues, some actions were proposed to enhance the geosites tourism value and to support the geotourism policies of this aspiring geopark.

Presented in Theme 4

Geoparks and indigenous cosmology

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Geoparks have been identified as some of the geologically and topographically most interesting places on Earth. They are defined by their geographic uniqueness and their relationship to nearby human inhabitants. These special places are recognized by the scientists and authorities of the countries where they are found, and they are often important tourist attractions. This paper intends to examine the meaning of these special places for the original indigenous human inhabitants. Geoparks are awesome features, such as volcanoes, caves, waterfalls and rapids, faults and cliffs, places that leave human beings with a sense of wonder. These features are usually recognized by indigenous peoples as places of power, fear and origination, revealing common human cosmological beliefs that cross boundaries between very different and often distant cultures, beliefs that have endured throughout history, migrations and civilization changes. This paper suggests that UNESCO seek out and display these unique cultural commonalities and ways of believing about these centres of power in the Earth's crust which all humans find so inspiring.

Presented in Theme 7

Explaining why geology matters to geopark visitors: an ecosystem services approach

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The ecosystem services approach has gained momentum since the international Millennium Ecosystem Assessment (MEA) was published in 2005. This approach is now a major means of assessing, qualitatively and quantitatively, the value of nature to society and as such is being used by politicians and planners in making decisions about the environment. Ecosystem services are the goods (e.g., materials derived from nature) and services (e.g., functions performed by nature) that benefit humans. The MEA classified them into Regulating Services, Supporting Services,

Provisioning Services and Cultural Services. The approach has usually been restricted to assessing the value of biological goods and services to society (e.g., food and forestry as provisioning services, woodland walks and ecotourism as cultural services). However, geology is also part of nature and by omitting its contribution to the well-being and prosperity of society, the value of nature is grossly underestimated. Using the MEA classification, this presentation will outline about 25 ways in which geology benefits society and discuss how this approach can be utilized in a flexible way to explain to geopark visitors how geology benefits them both within the geopark and beyond.

Presented in Theme 1

Advancing in geo-scientific management in the Cilento, Vallo Diano and Alburni Geopark, southern Italy

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During the 12th EGN Conference, held in Ascea-Velia, Cilento, Vallo Diano and Alburni European and Global (CVDA) Geopark, Southern Italy, the local geo-scientific community supported the Geopark activities and promoted the “Cilento Model”, as an innovative approach in raising public awareness and consciousness in the Geopark about risk, resources and climate change management, education and dissemination. In particular, at the Conference the geo-scientific premises, ongoing experiences and future perspectives about the above subjects were discussed as to support local sustainable development. The methodology proposed was based on the link between geoheritage conservation, geodiversity preservation, geotourism promotion and fruition with biodiversity, ecosystem functioning and ecological services, adopting trans-disciplinary approaches, integrated procedures, adaptive modeling and participative processes. Therefore, the CVDA Geopark experiences within the EGN and GGN Network can constitute an interesting point to be resumed during the 6th International UNESCO Conference on Global Geoparks, discussing about the geological key areas as basic factors for “geo-identity, geo-diversity and geo-networking” in the Cilento Geopark grand-strategy shared with other geoparks. Since its establishment, the CVDA Geopark has directed efforts in the following projects: Geodiversity supporting

Biodiversity, through the creation of the Bio-Geodiversity Network, for research, education and dissemination; Geoheritage Management, through the construction of the Geodiversity Risk & Resource Monitoring Systems, starting with karst systems, “landslides as moving geosites”, risks and resources in coastal geodiversity; intangible heritage project, as a link between geodiversity and traditional landscape best practices, local products and Mediterranean diet and life-style. In the 2014 planning, the CVDA Geopark will address the up-to-date geo-scientific knowledge in the multi-level educational system using, as “occasion”, the European Geopark Week and, as “locations”, the Educational Local Center Network and, finally, as “tools”, supports and grants offered to geo-scientists and students dealing with CVDA geodiversity. As in past experiences, during the Geopark Week a variety of activities will be carried out (e.g.: seminars, field trips, a fair, etc.), addressed to a wide audience (researchers, public administrators, professional geologists, students, tourists, local people).

Presented in Theme 1

Kula Geopark: Turkey's first European and Global Geopark

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The Kula Geopark is situated in the Aegean Region of Turkey at Western Anatolia, within Manisa province, covering an area of 300 km². Kula is the youngest volcanic field in Turkey where Quaternary volcanism (1.1ma, 300ka and 10ka) prevailed up to prehistoric times.

The outstanding volcanic structures of Kula Geopark area have been well known at least for 2000 years. The great ancient Greek Geographer Strabo (63BC–24AD) in his majestic book “Geographica” named Kula as “Katakekau-mene” (fire-born) because of the coal black lava.

Strabo (63BC–24AD) Geographica: ...After this region one comes to the Catacecaumene country... The surface of the plains is covered with ashes, and the mountainous and rocky country is black, as though from conflagration... There are to be seen three pits, which are called Physse, or breathing holes... Above them lie rugged hills, which are reasonably supposed to have been heaped up by the hot masses blown forth from the Earth...

Kula Geopark area is awarded by high geodiversity representing 200 million years of earth history including volcanic structures like spatter cones, maars, successive lava flow plains, lava caves and tubes, craters, basalt columns, dykes, 79 monogenic cinder cones aligned through a fissure as far as active karstic caves, badlands, fairy chimneys, mesa structures and schist topography. In addition to these outstanding geological heritages, Kula Geopark hosts

15,000 year old prehistoric human footprint fossils, which were conserved in the ash deposits.

The Kula Geopark Project was initiated in 2011 by PhD Erdal Gumus. In September 2013 the Kula Geopark became the first Turkish member of the European and Global Geoparks Network.

Kula Geopark offers indoor and outdoor-guided tours for tourists and regular geo-education programs for students via thematic geotrails and the Geopark Visitor Centre “Katakekaumene” which serves as a mini Geology Museum within the Kula town.

Presented in Theme 7

Using technology for education: a geopark partnership

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Locatify is an Icelandic company founded in 2009 committed to deliver GPS games and personal-guided audio tours for Smart devices. Locatify is a service provider for technology and digital platforms, allowing our Partners in the fields of tourism, education, and entertainment to publish their location-aware content on Smart Devices.

Locatify’s SmartGuide technology uses GPS location data and augmented reality to offer guided audio tours with pictures, maps and treasure hunt games. The system’s design tools are suitable for amateur and professional designers alike. They can create and publish their material on Smartphones and pads. The system is available to all game and tour designers, wherever they want to create, edit, and publish guided tours and treasure hunt games.

Locatify has created branded apps with games and guides for Magma Geopark and Gea Norvegica Geopark, which have profited the geoparks to great extent. In cooperation with four geoparks the aim is set to create an app in which all geoparks that are interested could take part. In the oral presentation we want to present this goal and show how it can benefit geoparks around the world.

Locatify has taken part in the project Northern Georoutes in creating a website where geoparks can sell specialised packages to travellers to discover Northern areas. The booking system developed in this project will also be available through a website in the app and will be used for the app noted earlier.

Presented in Theme 3

The application of carrying capacity imperative in sustainable geopark planning

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Carrying capacity is a concept related to the optimum number of visitors and the engagement of their activities without creating environmental degradation. This concept has been widely employed in nature tourism for managing outdoor recreation by tourism managers, researchers, and policymakers for sustainability and conservation reasons. As a stream of nature tourism, geotourism involves visiting fragile natural areas in the form of hiking, trekking, and camping. The unique aspect of geotourism is that it specifically focuses on landscapes with geological and geomorphological features, such as weathering, erosion, deposition, igneous processes, and tectonic activity. Properly run geotourism activities should instill visitors with a sense of appreciation for particular geological structures and physiognomic characteristics of fossils, rocks, sediments, landforms, and landscapes in addition to commonly found tourism motivations. To apply the carrying capacity concept in such unique landforms and for the said purposes, adaptation to the conventional carrying capacity approaches is required even though the main activities of geotourism are similar to tourist activities in other tourism contexts.

Against this background, conducting a systematic review of the current state of knowledge on the carrying capacity imperative applied in the members of Global Geoparks Network since 2004 when “Geoparks” was first proposed as a UNESCO programme would be appropriate. This paper thus purports to examine (1) how the generic carrying capacity imperative minimizes the environmental degradation associated with geotourism and maximizes the sustainable use of natural resources in global geoparks, and (2) what kind of adaptation is called for in the application of conventional carrying capacity imperative associated with geological heritage. Based on these, we hope to advance the methodological innovation of carrying capacity imperative related to global geoparks for the sustainable management of geotourism resources in the future.

Presented in Theme 1

Langkawi Global Geopark's education initiative in raising Geopark awareness

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Since the inclusion of Langkawi as a Global Geoparks Network member in 2007, Langkawi Development Authority (LADA) has been planning both on physical and software development on Langkawi Geopark along with other agencies and organization in Langkawi. Langkawi Geopark has been actively organizing several prominent programs with the school children in Langkawi and also other schools outside Langkawi District. Among the programs are Geopark Camp, Geopark Goes To School, School Goes To Geopark, GeoExpo and GeoXPDC, together with cooperation of Langkawi District Education Department and Malaysia Nature Society's Environment Education Centre. Teachers in Langkawi also have been involved with the Geopark's training program. Geopark Club also been integrated as a new club for schools in Langkawi where this club will play the role to disseminate information and programs on Langkawi Geopark. For a long-term goal, Langkawi Geopark aims to introduce Geopark Modul in the school curriculum endorsed by Ministry of Education, especially to schools in Langkawi. A new interpretive center called Geopark Discovery Center is being built as a one-stop center for students and tourists to get information about Langkawi Geopark and other Global Geoparks in the world. This center would be the first of its kind, interactive interpretive center in Malaysia. Several other programs, such as Langkawi Geopark Carnival and GeoHunt have been organized annually to engage and educate with the community in a more responsive way. With the Langkawi Research Center establishment, we are hoping that community in Langkawi will be get benefit and involve in 'service based learning', 'community based research' and problem based learning to help improve their livelihood and embrace the geopark concept in their live.

Presented in Theme 3

Alpine plant communities on Mt. Apoi and their conservation and utilization

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The Hidaka Mountains of Hokkaido – the northernmost

island in the Japanese Archipelago – were formed by a collision of crustal plates approximately 13 million years ago. Situated in the southwestern part of the mountains, Mt. Apoi is made up of peridotite formed when part of the upper mantle was thrust up from the depths of the Earth. Despite its low altitude (810 metres), Mt. Apoi provides habitats for large numbers of alpine plants. This mountain of flowers has been designated as a special natural monument of Japan.

Alpine vegetation thrives on this low-altitude mountain due largely to the presence of ultrabasic peridotite rock, which forms a barrier preventing the penetration of flatland plants. In recent years, however, rapid vegetation changes that cannot be prevented by this barrier have been taking place, presumably as a result of global warming.

Local government officials, researchers and area residents have worked together closely to protect Mt. Apoi's valuable and beautiful flowers for over 15 years. Their activities initially focused on responses to damage caused by the illegal removal of plants, and included patrols, networking with other regions and regulatory improvement. Recently, however, their work has centered on exploring the possibility of reviving flower habitats through artificial environmental modification efforts such as flower restoration experiments and the removal of dwarf stone pines. Meanwhile, Mt. Apoi continues to attract some 6,000 climbers and researchers annually, and serves as the heartland of education and tourism in Mt. Apoi Geopark.

This paper highlights the current situation of alpine plant conservation initiatives promoted in Mt. Apoi Geopark and their utilization in the context of geotourism and geological heritage education as well as conservation activities.

Presented in Theme 1

Study of recharge area for supporting Geopark conservation on the slopes of Batur Volcano based on geological setting, content of deuterium and oxygen isotopes of groundwater chemistry

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Bali Island where the Batur Volcano is located has high precipitation. Due to the growth of population, a change of public housing has developed toward the slopes of the volcano. However, the Batur Volcano belongs to the International Geopark, therefore it is important to conserve the groundwater for this area. This proposed study is related to determination of the recharge area by combining geological setting, stable isotopes and chemistry content of ground-

water, as well as the experiences for other conservation studies on volcanic areas in Indonesia. Until now, previous studies on Batur Volcano have only been based on the conventional approach. Therefore, the accurate determination of recharge area becomes a key factor for the groundwater sustainability to supporting Batur Geopark.

Presented in Theme 1

Becoming a geopark through the co-construction of a geopark festival

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Raising citizens' awareness and improving their knowledge of the geopark they live in are among the important functions of a geopark. This is normally done using a variety of methods, such as educational activities, sporting activities and trips on which a guide or researcher tells about a specific topic. Geopark festivals (geopark days) are another method of raising local awareness of a geopark, but to a lesser degree it is used as a concrete tool – as a method - to engage local communities in the (re)construction of a geopark. Starting with the theoretical approach, *participatory design* Geopark Odsherred has managed to exploit its annual geopark festival as a catalyst, not only to raise awareness of the geopark, but as a specific method of engaging local communities throughout the area in the construction of the geopark festival, hence in the geopark itself. From being a top-down idea the festival has now become a rich event where citizens, council officials, the cultural and scientific elite co-constructs. For this reason, this paper argues, that the annual geopark festival in particular is key when it comes to engaging local communities, but also as a means of engendering identification with the geopark and making the citizens active geopark ambassadors of the geopark.

Presented in Theme 2

Tumbler Ridge Aspiring geopark

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The Tumbler Ridge Aspiring Geopark Steering Committee submitted an application to become a member of the Global Geoparks Network in 2013 (the second from North America and the first from the west). Tumbler Ridge is a small, remote, community on the eastern flanks of the northern Rocky Mountains in northern British Columbia.

The proposed geopark area is 7,822 km², centred around Tumbler Ridge. Sedimentary rocks of the Western Canada Foreland Basin predominate, from Precambrian to Cretaceous. Till and alluvial deposits from the Wisconsin glaciation of the Late Pleistocene are also present. Metallurgical coal-mining forms the mainstay of the local economy, along with natural gas and forestry.

The proposed geopark is rich in palaeontology. Cretaceous dinosaur bones and trackways, and Triassic fishes and marine reptiles are of particular significance. The Peace Region Palaeontology Research Centre is the only museum that supports the research of British Columbia's vertebrate palaeontology heritage. It boasts a large collection of vertebrate fossils from the Triassic to the Pleistocene, and is the central institution of the proposed geopark, with public interpretive displays in the Dinosaur Discovery Gallery, guided tours to dinosaur tracksites (including evening lantern tours) and educational camps.

There is a network of thirty hiking trails to geological and natural features that include dinosaur trackways, waterfalls, canyons, caves, rock formations, alpine lakes and mountain summits. All these attractions were featured in 2013 at a symposium in Tumbler Ridge that brought together representatives of established and aspiring geoparks in Canada. The initiative is volunteer-driven, and is supported by expert scientific advisors.

Presented in Theme 4

Connecting Brabant's aeolian sand regions through landscape history

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At the moment, the communities in Brabant each have their approach in attracting tourists. We propose a common landscape-historical approach for a European Geopark "Brabant's aeolian sand landscapes" (*provisional title*), to connect and promote their territories. Each community focuses on a specific part of Brabant's landscape history that stretches from the Weichselian polar desert up to the modern bio-engineered landscapes.

We divided Brabant's landscapes into geo-natural and

geo-cultural landscapes. Many of these landscapes are unique in Europe and some have a geology that remains virtually untouched. Examples of geo-natural phenomena of interest are: (1). *the different types of sand dunes* from huge linear dune systems, large parabolic dunes up to modern small-scale shadow dunes; (2). *loam forests* developed on loams deposited in periglacial lakes; (3). “*donken*” *embedded in river clay*: the summits of large parabolic dunes, that were buried due to the fact that Brabant is situated on the border of a geological basin; (4). “*wijst*”, the geological phenomenon which causes higher grounds to be wetter than adjacent lower ones, due to aeolian sands blown against re-activated faults of Caledonian origin; and (5). *huge active driftsands*, Weichselian dune areas that were re-activated during medieval droughts.

Part of Brabant’s geo-cultural landscapes maintained their original geological structure and show the way humans used the geo during the ages. Examples are i.e.:(1). prehistoric mounds on the fringe of sand plateaus; (2). the small-scale cover sand topography, earth banks and ancient woodlands preserved in “Het Groene Woud”; (3). “*bolle akkers*”, agricultural fields with characteristic “*plaggen*” soils; (4). the sand landscapes with remnants of the extensive moorlands, reclaimed for fuel as early as the 1300s; (5). the cliff with dunes and drowned villages, invaded by the sea through burning of peat for salt; and (6). the 19th century landscape painting colonies of Heeze and Kalmthout with dune heathlands and active drift sands as important painting themes.

Presented in Theme 4

Wells Gray and North Thompson-Robson Valley Global Geopark proposal

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On the map of British Columbia, Wells Gray Provincial Park is a large green spot 340 km northeast of Vancouver. At 540,000 ha, this magnificent wilderness preserve is as large as one in every five nations on earth. The boundaries

of the park circumscribe nearly the entire drainage of the Clearwater River and encompass a region of tremendous geological diversity. East and north, Wells Gray bristles with unnamed peaks and ice fields, interrupted by long fjord-like lakes. South and west the landscape is more subdued, with rolling, flower-strewn highlands, scattered summits, and the broad, flat-bottomed Clearwater Valley itself. Periodic volcanic outpourings over the past three million years have transformed this landscape into a wilderness showcase of volcanic features: lava flows, cinder cones and numerous remarkable volcanoes that erupted under glacial ice or even into glacial lakes. With 18 named volcanoes, many of them shaped by ice contact, and 25 km³ of erupted lavas, Wells Gray is a landscape of international geological significance. Superimposed over this volcanic activity are numerous meltwater-carved canyons and waterfalls for which Wells Gray – the “waterfall park” – is justly famed. The Murtle River (the world’s largest river captured within the boundary of a park) is punctuated by six major waterfalls including iconic Helmcken Falls, experienced annually by thousands of national and international visitors. The geology captured in Wells Gray, now celebrating its 75th anniversary, is augmented by a rich diversity of plants and animals. As one of the world’s most accessible assemblage of ice-contact features, this fascinating landscape clearly merits recognition in the global GeoPark arena as the ‘flagship’ attraction within a designated ‘regional destination corridor’ that stretches almost 300 km from Mount Robson (a UNESCO World Heritage Site), southwards – a corridor renowned for experiences associated with its unique geomorphology, biodiversity, cultural heritage, and wilderness values.

Presented in Theme 4

Using smartphones in the field to hunt geological treasures – experiences from Gea Norvegica Geopark, Norway

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Being out in the field is essential in learning about geology. Individual observations in the field and hands-on geology give an extra dimension to indoor classroom teaching. A classic way of teaching in the field is to let the students observe by themselves and take notes, and/or the teacher guides the students around. This works well as long as the teacher knows the geology and is a good mediator, or if the arrangements are thought through and the students are well prepared. Unfortunately, the enthusiasm of learning has a tendency to decrease with the age of the students, and this combined with the general comprehension that geology is difficult and abstract, makes the approach to geology in many cases difficult.

Today’s technology of mobile devices makes it possible

to approach geology in new ways, which in the field will add another dimension to the learning experience. There are several ways of using smartphones in teaching geology, but we will focus on the applications called TurfHunt and Smartguides made by the Icelandic company Locatify.

TurfHunt is a game with a set of geographic locations, created by a “game owner”. People can be invited to join the game, and must physically reach the locations in the game in order to score points. For additional points there may be a set of multiple-choice questions on each location that must be answered. A scoreboard is continually updated to reflect the score of each player/team. Smart Guide is a guided audio tour including photos and maps. Smart Guide can be enjoyed on location using the GPS activation or from anywhere else (e.g., in the classroom) by browsing the photos, maps and listening to the guides. Both applications give us the opportunity to introduce geology in a fun but still informative way. The two applications can be used separately, but also together, e.g., to find an answer to the TurfHunt game in the Smartguide info.

Gea Norvegica Geopark has, during Autumn 2013, tested these two applications on school children in local schools, and will continue this work during Spring and Summer 2014. They have also been tested on a broader audience at various geopark locations. So far it has been a success in making learning fun. The school children immediately paid attention to the tasks and actually worked hard to find ways to find information for correctly answering the TurfHunt questions. The most frequently asked question has actually been: when can we do it again? Are there other TurfHunts and audiotours in the area, and can we play this outside school as well?

Presented in Theme 3

Employee training program of Zigong Global Geopark

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To afford more opportunities for employees, Zigong Global Geopark has implemented a series of employee training activities. Firstly, several professional experts were invited to attend the training program in Zigong, make presentations and explain geoscience knowledge for park employees, including Professor Dong Zhiming, from the Chinese Academy of Sciences Institute of vertebrate paleontology and paleoanthropology, Chen Anze, the Vice Chairman of Geological Society of China Tourism geology and geological park Research, and Zhao Zhizhong, Researcher at the Chinese Academy of geological sciences. Secondly, the Park held a development and construction academic seminar, with a call for papers from employees, and encouragement of employees to share experiences about the Park development. So far, we have held the first session

in 2012 yet. The third was to invite representatives to visit other parks in countries such as Thailand, South Korea, and Australia as well as visits to Xingwen Global Geopark, the Mount Longhushan Global Geopark, Yanqing Global Geopark to hold a discussion meeting, and exchange experiences on park construction and management. Fourth, the Park sent employees to participate in national geological park guide training, to visit other parks and learn their knowledge and experiences. Fifth, the Park supported employees to continue education, and has already sent employees to complete the MLR graduate courses. According to the Employees Training Program, the research level has been greatly improved. There have been 53 research papers published during 2008–2012, covering geology, paleontology, geological heritage, museology, in addition to the publication of eight monographs, as well as several popular science books.

Presented in Theme 3

Challenges in interpreting the landscapes of Zhangjiajie Global Geopark of China

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Zhangjiajie Global Geopark is a top-listed tourist destination of China, famous for beautiful landforms composed of around 3000 vegetated sheer vertical sandstone pillars and peaks, some of which extend up to 350 m high, while more than 1000 are higher than 200 m. Quartz is the predominant material of the sandstone landforms, around 90%. These landforms are rare in the world for their large number, height and fairly pure composition. However, they were discovered not long ago and there has been a lack of sound scientific knowledge on the physical mechanisms and evolutionary processes underlying the formation of these landforms. As a result, confused interpretations of the landscapes have been given. To clarify the confusion, detailed research work has been undertaken in the geopark recently. Based on the progress of the research, a scientific interpretation of the landscapes can be presented. The distinct landscapes are characterized not only by pillars, peaks and walls of sandstone but also by tableland, natural bridges, gorges, lakes, waterfalls, gullies and streams. They are the result of flow down-cutting relative to regional gradual uplift, following a pathway of down-cutting the initial tableland by flow and then developing into gullies. With the continual down-cutting, gullies turn into narrow and steep creeks and run over a number of knickpoints. Eventually all the creeks merge into a stream wandering in wide and flat valleys and moving a large amount of eroded sediments out of the drainage basin. It is through this process that various

distinct landforms are resulted from in Zhangjiajie Geopark. Taking this interpretation as the theme of the geopark, a number of science popularization activities are planned and implemented in the geopark.

Presented in Theme 3

Tianzhushan Global Geopark strongly propels the community development

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In recent years, Tianzhushan Global Geopark has rapidly developed the tourism economy, and the reception capacity of tourists has been constantly rising. The park administrative agency has strongly propelled community development through establishing co-construction, co-management and co-sharing systems, skill training, authorized strength and executed planning, financial support, propagandizing and popularizing, holding competition and other methods, obtaining obvious comprehensive benefits. There has been newly increased opportunities of employment and more than 50,000 tourism practitioners all over the county. Broadened channel of employment has promoted the farmland transfer and scale operation, and has sprung up a batch of family farms and farmers' specialized cooperatives, becoming one of "national key hundred strong counties of tea production". Trichosanthes seed of Tianzhushan has won the national geographical indication products protection certification, accelerating the agricultural efficiency. The administrative agency has sponsored Tianzhushan prose, photography, painting and calligraphy, singing competition and other activities to greatly mobilize the culture creation enthusiasm of communities. Couples of cultural communities have successively set up. Cultural scenic spots have been built up and opened in sequence, and nonphysical cultural heritages have been passed on and developed. Local government and park administrative agency have strongly propelled the construction of "tourism city, charming town, beautiful village and happy homeland", not only improving residents' living condition, but also attracting more tourists to check in and take a vacation. Residents have further improved their awareness of environment protection, and have firmly established green and low-carbon development concept, farmers have paid high attention to develop eco-friendly industry, and private invested scenic spots have emerged in large numbers, expediting the ecological cultural construction.

Presented in Theme 2

Scientific values of unique geopark sites in South Korea: Jeju Island, Mt. Mudeung and Jeonnam Dinosaur Coast Geoparks

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Korea has more than five tentative global geoparks and one Global Geopark (Jeju Island). Among them, unique geopark sites with universal scientific values are located in the southwestern part of Korean peninsula: Jeju Island, Mt. Mudeung and Jeonnam Dinosaur Coast Geoparks.

Jeju Island is the emergent portion of an intraplate basaltic volcanic field developed during the last 1.8 Ma in the southern coast of Korea. The island is made up of a broad and gently sloping lava shield and also dotted by at least 360 volcanic cones and craters. The geopark includes 9 geosites: Mt. Hallasan, Manjanggul Lava Tube, Seongsan Ilchulbong Tuff Cone, Seogwipo Formation, Cheonjiyeon Waterfall, Jungmun Daepo Columnar-Jointed Lava, Mt. Sanbongsan Lava Dome, Yongmeori Tuff Ring, and Suweolbong Tuff Ring. Jeju Geopark became a member of the Global Geoparks Network in 2010.

Located near the center of Gwangju Metropolitan City, Mt. Mudeung has a wide range (> 11 km²) of columnar joints in high altitude (> 750 m). The columnar joints are made up of Welded Tuff (or Dacite), which is thought to be a result of a large-scale volcanic activity during the Late Cretaceous. The length of one column surface measures 1 m to maximum 7 m. This is much larger in scale than any other columnar joints reported around the world. Also there is a variety of geo-heritage sites located near the area, including the Hwasun Dinosaur Track Site, Hwasun Dolmen Park, Rock Cliffs, Hot Springs, Coalfield, Caves, Talus Slopes etc.

The dinosaur fossil sites of Jeollanam-do province are well known by its universal and scientific significance, and are listed as a tentative site for the UNESCO World Heritage. The tentative name for this geopark is 'Jeonnam Dinosaur Coast Geopark (JDCG)'. JDCG consists of 40 geosite locations, which are under eleven main geosite groups.

Presented in Theme 1

Current geological education program at Aso Geopark, Japan

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Curators at Aso Volcano Museum, one of the base facilities of Aso Geopark, have developed a unique variety of geological education programs for elementary to high school students in the area of Aso Geopark. The museum staff supports school educational activities through lectures and field trips, using unique geological and topographic features around the school, as well as natural bounty and disasters. Teachers and students work closely to develop an educational curriculum that encourages students' interests, and stimulate their ideas on regional resources and their preservation. At the end of this educational program, students organize a symposium to present and share their work with students from different schools.

These programs increase students' attachment to the regional resources, and provide a chance to learn and discover Aso's precious nature through sharing ideas with other students. At the same time, the student's messages also deliver huge impact to adult's ideas concerning their local communities.

Apart from these museum educational activities, learning about grasslands is also delivered through Aso Geopark activities. A variety of subjects related to the regional geological resources tend to widen to this educational program. Presented in Theme 3

Understanding various geohazards

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Aso volcano is an active volcano with the world-leading gigantic caldera. Active Nakadake crater, with unique topography formed by continuous volcanic activities and geological features comprised of pyroclastic flow, volcanic ash and lava, all of which can be observed. These features create special climatic conditions. While receiving blessings from the volcano, there is high tendency for occurrence of climate disasters such as landslides, floods due to high overall rainfall and frequent torrential rains, and also volcanic disaster. The climate disaster is likely to occur in the rainy season and may affect mainly the local communities. On

the other hand, the volcanic disaster may impact tourists as they visit the Nakadake crater. It seems that eruptions may occur once in several years and decades. The crater releases huge amount of volcanic toxic gas a day even during calm periods. In the past, gas-poisoning accidents occurred frequently at the site. Moreover, the disaster also brings serious impact to agricultural crops in the region.

Overall, most natural disasters in the Aso region relate to the volcano. Its cause, sites of occurrence, disaster victims and occurrence tendency is varied. As long as we share the natural bounty of the volcano, a deep understanding of various natural disasters related to the volcanic background is essential. Raising awareness of disaster prevention for the local community as well as visitors is important role for Aso Geopark activities.

Presented in Theme 1

Initiatives for local development in San'in Kaigan Geopark

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San'in Kaigan Geopark is located in western Japan and spans a total of 3 cities and 3 towns in 3 prefectures. About 17 million tourists visit in a year and enjoy hot springs, sea bathing and skiing in the area. When our geopark was admitted as a member of the Global Geoparks Network in October 2010, many local residents rediscovered regional resources and developed local products.

In Mio district, Shin'onsen Town, Hyogo prefecture, where aging and depopulation are going on, a village revitalization group has been set up, and wakame seaweed and squid nare-zushi has been produced. San'in Kaigan Geopark Promotion Council dispatched business experts to this district to advice about the sales of wakame seaweed products. As an effect, the yield of them increases twice higher than the previous year. The group has also launched water taxi since last May.

In Kyotango City, a landlady group has started to serve Geo-Dinner at each hotel. One of the members has begun a water taxi, allowing visitors enjoy beautiful seaside scenery from the boat. The number of visitors in 2013 is five times higher than that in 2012.

Geopark tours using canoe have been attracting interest as a new sport especially in Takeno of Toyooka City. In Toyooka City, two NPOs related to geopark guides have been set up in 2013. A total of 10 people work daily and some projects, such as "Genbudo Cave Light Up Event" and "Nature Experience Plan for Mothers and Children" have been launched.

As mentioned above, in many places in San'in Kaigan Geopark, people are taking initiatives for local development using regional resources. We, the council, continue to

provide the place for sharing various experiences between groups or organizations that put in active effort on local development, and dispatch specialists to support.

Presented in Theme 2

Geo-stories created by volcanic activities in the Kirishima Geopark, SW Japan

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If it were not for the peak, Takachihonome volcano located at the eastern Kirishima Volcano Group (KVG), SW Japan would not become the object for people's faith. Considering that mountain worship is not seen in the western KVG where violent features of craters are conspicuous, the influence brought about by the beautiful shape of Takachihonome volcano is obvious. Such an elegant appearance was formed by the cone-like lava dome covering the summit area.

If it were not for many craters, there would not be the variety of vegetation in the present KVG. Though each crater has been activated independently over the last decades in KVG, various stages of vegetation succession can be seen similarly in narrow areas. The 2011 eruption of Shimoda volcano newly brought about the opportunity for observing renewal vegetation succession after the eruption.

If it were not for the caldera-forming eruption, there would not be rural landscape at the Ebiono area, northern foot of KVG. Large-scale subsidence associated with the huge eruption made originally steep mountains into a vast basin suitable for cultivating rice. In addition to this topography, the abundant-water resource in the basin has also supported lives of people who live inside a caldera.

Presented in Theme 4

Promotion materials for local communities

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Aso Geopark Promotion Council contracts with local advertising agencies for publishing promotion materials of the geopark activities to local communities as one of interaction tools between the locals and the geopark.

One of its PR materials, 'Asolulu' a tabloid newspaper, is published by combined investments of private sectors and the geopark promotion council, a public interest incorporated foundation. Contents of the paper include special topics of Aso Geopark as a headline and latest news from en-

tire areas of Aso Geopark for every issue. Many people who relate to the geopark activities or regional resources and communities contribute to its writing and editing. About 40,000 quarterly papers are mainly distributed to all houses in the area of Aso geopark and also some for tourists. Local communities and visitors can share the same information. Moreover news and reports about the geopark activities are posted regularly on the park's official website, facebook page and twitter account in multiple languages. However, with an increasing aging population in the region, there are many people who do not use Internet. Therefore distribution of the paper to the entire household is highly effective to share information with the elderly as well as a comprehensive promotion tool to the all areas of Aso Geopark.

Presented in Theme 2

Geological field excursion courses in the Muroto Geopark: examples from the 113th Annual Meeting of the Geological Society of Japan and International symposium on Gondwana Evolution and Dispersal

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An Excursion guidebook, including the following four field trips in the Muroto Geopark region, has been published as a supplemental issue of the Journal of the Geological Society of Japan. Trip A: Quaternary crustal movement and coseismic uplift along Muroto Peninsula. Trip B: Stratigraphy and paleontology of Pliocene Tonohama Group (Astronomically tuned time scale and high resolution paleoceanography). Trip C: Melanges and dikes of the Miocene Nabae complex, Muroto Peninsula. Trip D: Murotomisaki gabbroic Complex- Field observations of magmatic differentiation processes.

All four courses are designed as one-day field trips to understand the relationship between; Holocene marine terrace and sea level change by paleoseismological uplift (Trip A); and geological processes recorded in the Shimanto belt which is one of the best-documented on-land accretionary complexes in the world (Trip B to D). The guidebook is accessible online via following URL; <http://www.geosociety.jp/faq/content0007.html> (in Japanese)

The excursion courses and guidebook were prepared originally for professional scientists, engineers and students, however, it is available to arrange and use for undergraduate course study, scientific camps for high school through upper grades of elementary school, etc. Maps, figures and tables in the excursion guidebook have been used also for international conference and symposium trips.

Presented in Theme 3

Cultural aspects of geological sites in the Golden Geopark of Lapland

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The proposed “Golden Geopark of Lapland” in northern Finland and inside the Arctic Circle is one of the most unique wilderness areas in northern Europe. It comprises dozens of rounded and rocky fells crossed by the deep river valleys of Ivalojoki and Lemmenjoki. It consists of 23 geological sites and 22 cultural historical sites of various types. The distinction between them is often blurred, since many geological sites have cultural aspects, too. Most of them are related to the 140-year history of gold mining. Finnish Lapland’s gold history begins with the Ivalojoki River in 1868, when the first discoveries of gold nuggets in the soil were made there. The discovery led to a great gold rush amid the uninhabited wilderness. Close to 500 men could be counted in the area, digging and panning for gold. Rocky gullies, glacial melt water channels and sandy river terraces were transformed into colourful gold-panning communities. Gold-bearing quartz veins in Precambrian bedrock were also prospected. Mine shafts tens of metres deep were dug in solid rock with rudimentary tools.

For centuries, people have been fascinated by the peculiar landforms, and many popular beliefs and myths are linked to them. Boulders and cliffs situated in peculiar places have been thought to be sacred places. The rugged Ukko Island and the fells of Nattaset, with rocky tor-formations on their summits, are visible from a distance of tens of kilometres. They are known to have been the ceremonial sites of the old Sámi, who are now the only indigenous people of the EU. Fish and reindeer were sacrificed in order to ensure success in fishing and hunting, and to appease the unseen spirits. Geological formations related to the history of gold prospecting and sacred places are at present famous tourist destinations, too.

Presented in Theme 7

The picture book about geo-stories of Toya-Usu Global Geopark

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Toya-Usu Global Geopark is a volcanic geopark located

in Hokkaido in northern Japan. There are major farms producing vegetables and fruits in this area, and the land the crops are grown on contain a moderate amount of alkaline ash and pumice from the Toya volcano and the Usu volcano. Therefore, the soil is well suited for cultivation, with a balanced pH and good runoff of water. There are also forests in various transition stages around Mt. Usu. This produces bio-diversity with each environmentally accepted creature due to frequent disturbance and restoration by the eruptions of Usu volcano in recent years.

Because of this, we can find a lot of hidden tales “Geo-Stories”, associated with the activity of the living Earth when we focus on the different aspects of local industry, people’s livelihood, and the natural habitats of living things.

In 2014, Toya-Usu global geopark produced the picture book *Toya-Usu Global Geopark Storybook* in order to comprehend the relationship between the worlds above and under the ground world. It is edited to include easy-to-understand text and illustrations to reach local people of all ages.

Presented in Theme 3

Using volcano eruption remains to teach about the consequences of volcanic eruptions in Toya-Usu

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Toya-Usu global geopark is a volcanic geopark located in Hokkaido, in northern Japan. Usu volcano is active and has erupted four times in the 20th century (in 1910, 1944–45, 1977–78, and 2000). On the advice of academia, local municipalities have preserved collapsed apartments, a hospital, a public bath, roads, and bridges as ‘Volcano Eruption Remains’ to teach about the consequences of volcanic eruptions.

We always have geo-hazard risks no matter where we are on the living Earth. However, geo-hazards such as volcanic eruptions and earthquakes occur infrequently, and it is difficult for us to understand the risks without experiencing them firsthand. Therefore, Volcano Eruption Remains are a highly effective tool to vividly see how the damage of a natural disaster will affect our lives by viewing the real devastated structures. Here we will present the Volcano Eruption Remains in Toya-Usu as case examples to share.

Presented in Theme 3

Volcano Meister as an interpreter of the Toya-Usu Global Geopark and disaster prevention

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Toya-Usu global geopark is a volcanic geopark located in Hokkaido, in northern Japan. It shows collapsed structures, which we present elsewhere as Volcano Eruption Remains with educational potential. However, in order to really understand what happen here, it is important to go beyond preservation just for beauty, and learn from the experience and knowledge of local guides.

At Toya Caldera and Usu volcano, the global geopark is accrediting local residents as ‘Volcano Meisters’ who can tell the history of eruptions and disasters of Usu volcano. (Meister means expert in German). Many such meisters are also used in guide activity because they are knowledgeable about disaster prevention, but also about the charms of the geopark. Over the past six years, twenty-nine Meisters have been accredited. They have been active in various ways, such as workshop lecturers, tour guides, guidebook writers, etc. The number of applicants for Volcano Meister accreditation is growing and activities in the geopark are increasing each year.

Here we present the accreditation system of ‘Volcano Meister’ and the performance of the geopark.

Presented in Theme 3

“Let’s have a fun on the earth in Happo Shirakami Geopark in Japan!”

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Both children and adults like playing at the foot of Shirakami Mountain area. Long ago, Marco Polo introduced Japan to Europe as a country of illusion. In this country, Happo Shirakami Geopark is located on the seashore in the northwest of Japan Island Arc. The east side of Happo Town borders the Shirakami mountain area with Mt. Shirakami rising high in the center of this mountain range. These mountains are composed of granite that was formed in the late Cretaceous Period, and the surface is covered with natural undisturbed forests. Many kinds of animals such as Asiatic black bears find sanctuary living in this protected area. The west side spans all the way to the Japan Sea. On the seashore we can see granite, tuff and lava giving evidence of tremendous shallow volcanic activities referred to as the “Green Tuff Movement” which was involved in form-

ing the Japan Sea. Along with this movement, black ore was formed in the seabed. People made use of this black ore as valuable mineral resources.

After the Green Tuff Movement had subsided, through the Quaternary period up to the present, sedimentary rocks were mainly formed, but in a part of this area, andesitic magma occurred. During that period, oil was accumulated in Subari andesite and for nearly thirty years oil was mined at the Hachimori Oil Field.

Presented in Theme 1

Golden Geopark of Lapland: a Geopark with a golden theme

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The Golden Geopark of Lapland is a project aimed at establishing a Geopark in northern Finnish Lapland. The main themes will be gold and geology, with side themes of culture and nature. Geology and human culture go hand in hand in the area of the future Golden Geopark. It includes several geologically interesting sites, some of which have international value. The area is rich with placer gold deposits, a fact that caused a gold rush in the 1860s. Gold prospecting is a significant part of the area’s history, and the main remnants of the gold history are chosen as geosites in the future Geopark. Gold prospecting still continues today. Geology in the area also plays an important role in other human culture, as the indigenous Sámi people used some geologically interesting places as places of worship.

The aspiring Golden Geopark is located 300 km north of the Arctic Circle, so the nature and climate are unique. In summer, the midnight sun lasts for six weeks, and in winter the sun does not rise for a month and a half. During this dark period it is possible to see the Northern Lights. The sites of the future Geopark have been chosen so that there is something for everybody – sites in the wilderness reached only by a two-day hike, as well as sites that are accessible by car. There are excellent possibilities for recreation and outdoor activities, and the area has a ready infrastructure for travelling: there are good transport connections, and 17,000 accommodation places.

Supporting local businesses and getting them involved in the Geopark activities will be a focus of the aspiring Golden Geopark.

Presented in Theme 4

Intangible cultural heritage, landscape and livelihoods: 'More than just a sideshow'

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There is growing recognition within the Global Geoparks Network (GGN) of the contribution made by intangible cultural heritage (ICH) as an important additional element in helping a geopark to generate a more complete presentation of its landscapes. However, the deployment of ICH brings with it its own complex sets of issues. The sustainability of ICH expressions is closely linked to the social, cultural and economic viability of communities living in and from the landscapes of the geoparks. Avoiding the drift towards static, museumified folkloric expressions, which may struggle to retain their relevance to the daily reality of the geopark, means taking seriously the challenges of ICH safeguarding and management.

Drawing upon experience from a number of geoparks, but most significantly from Katla Geopark in Iceland, this paper highlights the importance of bringing an understanding of the present day economic, social and political context to the promotion, safeguarding and use of ICH in the geopark setting. This may differ substantially from the context out of which cultural expressions and traditions initially grew. Through ongoing case studies, we explore how ICH may be able to adapt to the challenges of being thrust, through exposure to international tourism and to networks such as the GGN, from the local to a regional and global stage. Key questions such as 'how far can a "traditional" expression flex whilst maintaining its "authenticity"?' and 'what stimuli are required to ensure the valorization and transmission of an ICH expression down to future generations?', are explored in detail. In so doing, this paper touches on the 2003 *UNESCO Convention for the Safeguarding of Intangible Cultural Heritage* to consider whether ICH practice may offer a further mechanism through which geoparks can converge with other UNESCO programmes and tools.

Presented in Theme 7

The sacred and dream upon the Batur Global Geopark

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Bali Island has been known as one of the sacred places in the world where both UNESCO World Heritage and Global Geopark sites are located, and it is the same recognition as Batur area has. So it is not surprising that the Batur area also has countless places of sacred culture that are not only living around the Mount Batur caldera, but also the island of Bali on the whole. The past culture that was inherited by the ancestors can be found in some villages that are situated inside and outside the caldera. Information derived from the anthropologists study state that some elements of the sacred culture are still believed and maintained by the Balinese that is primarily related to the religious system. This system can be seen in Terunyan village that is known as a Baliaga village and classified as the ancient Bali village that was established before the Hinduism influences on Bali Island. A number of past remains of Pre Hindu artifacts such as the existence of a indigenous tradition handed down from generation to generation as well as the burial culture that can only be found in the village. Furthermore, based on qualitative descriptive method some references or notes of sacred heritage from the author, and foreign travelers who visited the Batur area from the colonial to independence era in Indonesia, will be explored and presented. The dream of the region to be investigated is that it be recognized as one of the famous tourist destinations from the past era as a member of the Global Geopark Network member. As the final result, the sacred cultural interpretations that can be used in achieving the dream of the Batur revival as one of the best tourist destinations in Bali and Indonesia in particular, and the world in general.

Presented in Theme 7

Byeonsanbando National Park

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Since Jeju Island became a member of the Global Geopark Network in 2011, the geopark concept has been rapidly developed and has generated both the official recognition of geoparks as distinctive areas, and the increase of interest of new territories to develop geoparks. Among superlative geological heritages of Korea, Byeonsanbando National Park would deserve another geopark in Korea. The park is

located along 35 km of coast of southwestern Korea, covering a total area of 155 km². The park is appreciated as a multifunctional park with an excellent harmony between mountain and sea. Geologically the Cretaceous Kyokpori Formation and thick deposits of volcanic tuff outcrop over the area. The park is divided in two large sections i.e. the outer Byeonsan in the shore area, and the inner Byeonsan in the inland area. Among geological and geomorphological attractions at outer Byeonsan are the Chaeseokgang and the nearby Byeonsan Beach. Chaeseokgang is an eroded coastal cliff, thus it was named after sedimentary rocks that were eroded by the ocean waves, resembling hundreds of thousands of stacked books. Nearby, the Byeonsan Beach is one of the three most beautiful beaches on the west coast of Korea. Inner Byeonsan on the other hand is famous for its valleys, lush woodlands and waterfalls. Here there are about ten peaks, each over 400 m in height, including Uisangbong (508 m, the highest peak), Sinseonbong (486 m) and Ssangseonbong (459 m). Several historic ancient temples like Gaeamsa, Naesosa, and Wolmyeongam together with historic remains such as the ancient Yucheolli ceramic ware site, Guamni dolmen site are found in the area. Byeonsanbando National Park is characterised by its well-preserved natural ecosystem. A variety of rare animals and plants are distributed within the park and many of them are designated as natural monuments.

Presented in Theme 4

Embedding Geopark themes in the curriculums of local education

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Rokua Geopark explores the heritage of the last Ice Age. The natural and cultural environments of the area create a special laboratory for environmental education activities. To enhance these activities Rokua Geopark has initiated an environmental education project with the contribution of the European Union Regional Development Fund during Summer 2013.

The aim is to create a model for permanent environmental education actions within Rokua Geopark and enhance the knowledge and thus strengthen the pride of local identity among students and inhabitants. A critical point in achieving this aim is embedding the geopark themes in the curriculums of local educational units from early childhood to adult education.

The project has developed several well-proven practices cooperating with schools and other educational units and inspiring the teachers with geopark themes. During interactive introductory lessons the teachers have gained information about geoparks in general and about Rokua Geopark's aims, values and geological heritage in more de-

tail, and thus realized the values of their living nature and the importance of students to understand the uniqueness of their home area.

Organizing workshops for teachers has been the next step. The focus has been to search similarities between geopark themes and curriculums and generate ideas of materials and methods needed. The workshops have included brainstorming sessions during which the teachers have considered how to embed the necessary geopark themes in the curriculums.

The results of workshops have been both important and informative. They have been analyzed together with the directors of education services of the municipalities and under consideration has been the reality and possibility of including certain themes in the curriculums. During Autumn 2014 and Spring 2015 the materials and methods will be practiced with teachers and tested with students as a part of the curriculums of the schools.

Presented in Theme 3

Connecting "geo" and life for the sustainability of "geo-life": a proposal of an important role of Geoparks

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This presentation aims to propose a new concept, "geo-life", and relevant ideas for geoheritage conservation, education, tourism, and regional development. From a case study on the possibilities and difficulties in small-scale cattle breeding, farmers in Ojiro, a mountainous area of San'in Kaigan Global Geopark, Japan, and the author argue how "geo" aspects of the area affect the ecosystem and human life. Ojiro is a remote rural area with severe depopulation issues, but more than 99.9% of all of Wagyu (Japanese Black) in Japan are the descendants of "Tajiri-go" from Ojiro, and here is known as the homeland of Kobe Beef. The methods used in the study are simple, interviewing with all 22 cattle breeding farmers and relevant people, and reading relevant documents extensively. Although small scale and family managed farms are facing difficulties in many rural areas in all over the world, these farmers had sustained nature-based culture and had managed secondary nature with regional diversity. This case study shows that both agricultural production system and farmers' skills and attitudes had been born from "life" which had been suited to the "geo" characteristics of the area. However, due to economic reasons, these "geo-lives" are on the verge of extinction even in the study area. By revaluing and highlighting the stories of "geo-lives" and making a system for utilizing them, geoparks will play a role in sustaining the relationship between nature and society. The author provides some ideas to geopark activities.

Presented in Theme 7

Characteristics of map information on the websites of Geoparks

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A map is a fundamental tool to describe and analyze “geo”-related information. Maps are also necessary to promote education, research, and tourism on geoparks. However, few studies have been conducted to analyze the relationships between geoparks and maps. Maps of geoparks have many possibilities for transmission of information if they are on the websites. Most of the geoparks have their own websites, because they can update them as needed by themselves and many people who become interested in geoparks or relevant areas can casually browse it. For these reasons, this study aims to assess characteristics of map information on the websites of geoparks and discuss the challenges and possibilities. All the contents on the official websites of GGN (Global Geoparks Network) and JGN (Japanese Geoparks Network) members were browsed, and varieties and numbers of maps on the websites were examined. As a consequence, large differences are found in the degree of map information on the websites. Geoparks in Asia other than Japan (the majority is China) tend to publish small number of maps on the websites, and introduce the contents by only texts and photos. Moreover, many maps of the territory and model courses maps are published in Europe. Some particular geoparks in Europe have rich maps showing the activities of the Earth through geological maps etc. Geoparks in Japan are characterized by many maps showing access from outside of the geoparks, model course maps, location maps of museums, restaurants, accommodations and so on. On the other hand, there is still great potential in geological maps and topographic maps as educational materials if they are on the websites of geoparks. In order to enrich the geopark as a “great place for learning geo”, roles of map information on the websites can perform crucial functions.

Presented in Theme 3

OneGeology: standardized global digital geological data in one place

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OneGeology is an initiative of Geological Survey Organizations (GSO) around the globe that dates back to Brigh-

ton, UK in 2007. Since then OneGeology has been a leader in developing geological online map data using a new international standard – a geological exchange language known as the ‘GeoSciML’ (currently version 3.2 exists, which enables instant interoperability of the data). Increased use of this new language allows geological data to be shared and integrated across the planet with other organizations. One of very important goals of OneGeology was a transfer of valuable know-how to the developing world, hence shortening the digital learning curve. In autumn 2013 OneGeology was transformed into a Consortium with a clearly defined governance structure, making its structure more official, its operability more flexible and its membership more open where in addition to GSO also to other type of organizations that manage geoscience data can join and contribute. The next stage of the OneGeology initiative will hence be focused into increasing the openness and richness of that data from individual countries to create a multi-thematic global geological data resource on the rocks beneath our feet. Authoritative information on hazards and minerals will help to prevent natural disasters, explore for resources (water, minerals and energy), identify risks to human health on a planetary scale, and to help rising awareness among the general public about geodiversity and preservation of geological heritage, also through the relation with the GGN. With this new stage also renewed OneGeology objectives were defined and these are (1) to be the provider of geosciences data globally, (2) to ensure exchange of know-how and skills so all can participate, and (3) to use the global profile of IG to increase awareness of the geosciences and their relevance among professional and general public. We live in a digital world that enables prompt access to vast amounts of open access data. Understanding our world, the geology beneath our feet and environmental challenges related to geology calls for accessibility of geoscience data and OneGeology Portal (portal.onegeology.org) is the place to find them.

Presented in Theme 2

History and role of the Izu Peninsula Geopark in developing social understanding of geological hazards for mitigation of natural disasters

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The Izu Peninsula Geopark (IPG), one of the Japanese national geoparks, is located on the collision zone between two active volcanic arcs, Japan and Izu-Bonin arcs, and is characterized by frequent seismic and volcanic activities. Residents and visitors enjoy various geological benefits, but face the risks of earthquakes, tsunamis, and volcanic erup-

tions. Especially, in 1989, a submarine eruption occurred only 3 km off the City of Ito, which is one of the major spa resorts in Japan and has a population of about 70,000. Although the eruption soon ceased and gave no physical damage to the city, underground magmatic activities have caused earthquake swarms about 50 times since 1978. Despite this situation, the local government did not like to let people know the risk of eruptions explicitly, because they feared that tourists might not come. Although volcanologists requested countermeasures for volcanic eruptions, their opinions were ignored.

The first author (Koyama) realized that the negative awareness of the government was caused by the citizen's lack of understanding of geological risks/benefits, and started popularization of knowledge and education about geological history and associated human activities in the Izu Peninsula. Open lectures and excursions by the author were held 75 times during 2004–2013 with the assistance of local NPOs, the municipal boards of education, and the IPG Promotion Council. The author also wrote geological essays in the weekly column of a local newspaper during 2007–2012. These efforts resulted in an increase of people, who understand risks/benefits balance and consequently in the establishment of the IPG in 2012.

The statement about the role of the IPG (spreading of knowledge about geological phenomena) has been included in the disaster mitigation program since 2011 and the IPG Promotion Council is now an official member of the mitigation council of volcanic disasters in the Izu Peninsula.

Presented in Theme 2

Promoting Rokua Geopark and the Geoparks networks in Finland

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Rokua Geopark, the first and only Geopark in Finland, became a member of the European and Global Geoparks networks in 2010. The Geoparks network was mostly unknown in Finland before the membership. After three years of functioning as a geopark, Rokua Geopark has been able to raise the awareness to a new level. In 2014 Finland has five areas interested in joining the network and the Finnish Geoparks committee has been founded to guide the development of these aspiring Geoparks.

The strategic aim of Rokua Geopark is to raise awareness of its area and services so that the number of visitors to the Geopark area increases, creating new job opportunities for the local people. With the creation of the Geopark the area has been able to attract some new customer groups and to increase the knowledge of the area as a tourism destination.

The main actions so far have been the preparation of a

communications strategy, and plan and inform the public accordingly. The brochures, website and information panels have been renewed. Events have been made, with the Rokua Geopark Challenge adventure race as the main product. The adventure race has been completed for three years, and it is currently the biggest adventure race in Finland. The Geopark Challenge has also been broadcast on national TV for each of three years. The Geopark has also started cooperating with local businesses in joint marketing and in the making of new tourism products. Close cooperation with the local schools is also a valuable tool in raising Geopark awareness amongst the local people.

The communication and promotion actions have raised the awareness of Geoparks as interesting tourism and living areas, but a lot of work is still to be done to get the Geoparks brand better known inside Finland and abroad.

Presented in Theme 2

The results of outdoor-learning activities practiced in Happo Geopark area in Japan

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The Happo-Shirakami Geopark area is located in the northwest of Akita prefecture in northern Japan. The Shirakami-Sanchi, a UNESCO World Nature Heritage site registered in 1993, is home to the largest untouched beech tree wilderness area in East Asia. Nestled between the Shirakami-Sanchi and the Japan Sea is Happo Town.

Our community has made it an important goal to educate the public, and especially the youth, about our precious surroundings. We send Geopark instructors to each of our three elementary and two junior high schools to present lectures and lead educational outdoor activities.

Here we describe activities named 'Enjoy Shirakami' that were performed by the children who joined the Geopark course in Hachimori Elementary School. At the conclusion of each outdoor tour, the instructor asks the students what their definition of the Geopark is. The children commonly answer, "It is the place where we play and enjoy ourselves on this earth. Our Geopark committee discussed the feedback received from the children and we are impressed with their astute awareness, and the phrase "To play on the earth" that captures the essence of the Geopark.

Presented in Theme 4

Integrated Management strategy for the UNESCO protected sites in Jeju Island

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Jeju Island has three UNESCO related titles, World Natural Heritage Site (WHS), Biosphere Region (BR), and Global Geopark (GG). It also has a Ramsar site in the territory. These kinds of sites are usually classified as Global Protected Areas (GPAs) by IUCN.

As keeping the natural environment in sustainable state for a long time compromising the local pressures from economic development is very important in Jeju Island, Jeju Special Self-Governing Province (JSGSP) organised a special management body, World Natural Heritage Center, to effectively implement the 'Nature First Policy' in Jeju Island. In this regard, we are now developing several measures that shall be adopted by JSGSP, Korea central government, and other related bodies. Some examples are; (1) Consolidating legal supporting basis by enacting 'Management and supporting act on the internationally protected area'. Currently, as the legal framework managing the four sites are scattered in different acts in Korea, we are now considering a new act to manage all the GPAs; (2) Giving financial and other kinds of support when revalidating processes; (3) Setting up supportive system or programs to local people near the protected sites who are suffering from difficulties in exercising their right of properties; (4) Governmental compensation funding for keeping the valued environment sacrificing the development chances; and (5) Providing high quality ecotourism programs prepared by specialized experts etc. We are expecting good ideas on this topic while we are in GGN conference and hope some co-works if possible.

Presented in Theme 6

Outstanding geoh heritage values of the Hantangang River Geopark in Korea

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Hantangang River originates from the Pyeongyang area in Gangwon province, North Korea and flows down to Cheor-

won, Pocheon, and Yeoncheon in Gyeonggi province, South Korea. The total length of the river is about 141 km long including the length of about 81 km in South Korea. About 500,000 to 130,000 years ago, basaltic lavas were erupted from multiple volcanic activities near Pyeongyang area in North Korea. These lavas flowed down for over 110 km along low land areas (pre-Hantangang River), and formed the large area of lava plateau in Pyeongyang-Cheorwon-Pocheon-Yeoncheon regions. The beautiful scenery of basalt gorges has been formed by the erosion of the Hantangang River and its distributaries. The Hantangang River Basalt Gorge has very significant geological and geoh heritage values to understand the volcanic activities during the Quaternary Period near convergent plate boundary and the special landforms produced by river erosion in central part of the Korean Peninsula. Along the river, geological features such as multiple lava flow units, basaltic columnar joints, columnar joint-produced waterfall, caves, pillow lavas and paleosols can be found produced by a combination of volcanic activities and river erosion processes, together with Paleolithic remains. The presence of pillow lavas that are larger than 1 metre in diameter along the valley provides significant geoh heritage values because it is not common to find such a large amount of pillow lavas on land. Pocheon-si, Yeoncheon-gun and Cheorwon-gun have begun to develop a geopark program along the river with geotourism and sustainable socio-economic development. Strong involvement of local residents will assure the strong potential to become a member of Global Network of National Geoparks.

Presented in Theme 4

Assessing the economic impact of Geoparks

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Geopark designations are expected to provide positive economic benefits to local businesses, communities and urban areas. In order for a region to retain its International Geopark designation, the coordinators for the geopark, must demonstrate that the geopark is promoting positive economic benefits to the region. Given, however, that geoparks are often ungated, with geographical boundaries on a map rather than on the ground, and the fact that unique geological sites are promoted rather than a location within a gated area, this leads to challenges on how to actually measure these forecasted benefits. Further to this, the geopark does not have site managers, instead businesses are encouraged to provide activities at various sites that geopark enthusiasts can pay to experience.

This paper reviews the literature on the various methods that can be used to assess the economic impact of geoparks, as well as providing a framework for determining which

method would be most likely to provide the best measurement given the number of tourists, the spatial area that the geopark encompasses and the numbers, size and type of events that might occur in the region as a result of the geopark. The methods will comprise not only surveys of tourists to the region, but will also provide guidelines on how businesses can help document the economic impact of conducting business within the geopark and/or supporting the designation. Although the literature is not prolific with respect to assessing economic impacts of geoparks, information regarding other designated areas such as national and provincial parks, as well as gated and ungated events will be examined for examples and best practices.

Presented in Theme 1

The evolution of a Global Geopark: challenges and achievements in the Marble Arch Caves Global Geopark

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The Marble Arch Caves Global Geopark can trace its modern history back to 1985 when Fermanagh District Council opened the Marble Arch Caves as a tourist attraction in a rural part of Co. Fermanagh in Northern Ireland. Together with the adjacent Cuilcagh Mountain Park, the Marble Arch Caves became the first European Geopark in the UK in 2001 and then with the creation of the Global Geopark Network in 2004, it became known as the Marble Arch Caves Global Geopark.

Since then, the Marble Arch Caves Global Geopark has undergone substantial change and has evolved significantly from being one of the smallest Global Geoparks in the network, when it comprised of only two sites and contained no real communities within. Following a major programme of expansion that took place in both 2007 and 2008, the Marble Arch Caves Global Geopark is now made up of over 40 individual sites, involves numerous local communities, and perhaps most notably, spans the international between Northern Ireland (UK) and the Republic of Ireland.

Such change is not without its challenges; using two currencies, two units of distance, two education systems, and being jointly managed by two local authorities operating in very different jurisdictions, are just some of the issues that present themselves on occasion. But the opportunities that have arisen from the creation of a cross-border Global Geopark have undoubtedly outweighed any negativity.

Increased geodiversity, wider educational target markets, attraction of EU funding, and a much stronger community network, are just some of the benefits of the expansion of the Marble Arch Caves Global Geopark. But perhaps most important of all, is the sense of peace and reconciliation

that this rural area has managed to achieve in what was once a region in political turmoil.

Presented in Theme 5

The geological map with thematic elements and submerged landscapes map of the National Park of Cilento, Vallo di Diano, and Alburni European and Global Geopark: a dissemination and planning tool

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The Geological map with thematic elements and submerged landscapes map of the National Park of Cilento, Vallo di Diano and Alburni - European and Global Geopark, scale 1:110,000, has been realized through the collaboration between the Geological Survey of Italy/Institute for Environment Protection and Research (ISPRA) and the National Park of Cilento, Vallo di Diano and Alburni. The map was carried out through a reasoned synthesis of CARG Project data, the cartography project of the New Geological Map of Italy at 1:50,000 scale. The deposits of the Geopark were distinguished considering their geodynamic context and the time of their deposition with respect to the Apennine chain orogeny. The map's legend gives information about lithology, thickness, depositional environment and age of the lithostratigraphic units. The geological map has been enriched with the most significant geomorphological and hydrogeological elements showing the potential of the park territory, and includes a selection of the main geosites and caves, to highlight the archaeo-zoological and geological heritage. The backside of the map contains: a short explanation; a synthesis of the geological setting; the hydrogeological map of the Geopark's territory, at 1:240,000 scale; a detailed insert map, at 1:30,000 scale, describing geological-geomorphological and bionomic features of the marine protected area of Punta Licosa. A WebGIS application of

the map is also available. The main objectives of this work are the following: to achieve an official document for the institutional activities of the Geopark; to realize a user-friendly tool aimed at dissemination of the geology and the marine geology of the Geopark; to develop the knowledge of the territory and the environmental education and to valuing, protecting and promoting the geodiversity of the Geopark, as a key to understanding the geological evolution of the Mediterranean Sea, and to understanding how the geology has influenced the landscape and the settlement on the territory.

Presented in Theme 1

Mt Cangshan in Dali: the “Eaves of the World Fastigium”

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Located in Dali prefecture of Yunnan Province, China, Mt Cangshan stretches 50 km from north to south, with its highest peak, Malong Peak, elevated at 4,122 m asl. Mt Cangshan has been regarded as the “Eaves of the World Fastigium” because the lofty Himalayas diminish in this mountain. The rocks that make up the mountain date back to as early as 2 billion years ago but the mountain came into being in a geologically recent time, some 40 million years ago, as a result of the Himalayan orogenic movement. Mt Cangshan is a “textbook” of metamorphic rocks. A wide variety of metamorphic rocks are well displayed and preserved. In particular, the metamorphic rock marble, which has been called “Dali-yan” (Dali rock) in China since at least the seventh century (Tang Dynasty), is the best and most representative, its rich colors and patterns are unrivaled in the world. In 1937, Austrian scientist, H. Von Wisman came to Dali and discovered abundant glacial relics in Mt Cangshan that renders the mountain a representative area in China of glacial activities of the last glaciation in the Quaternary Period. Since Mt Cangshan is the southernmost mountain that the last glaciation could reach, the concept of “Dali Glaciation”, an equivalent of Würm Glaciation in Europe and Wisconsin Glaciation in North America, was established. Today, the upper part of Mt Cangshan is still dominated by various glacial landforms, which are of great geological and paleoclimatic significance. Mt Cangshan is also one of the three major floral endemism centers in China, embracing 9 vegetation types, 14 subtypes within its 500 km² terrain. It is a world-class type locality of plant species. Recorded plant species include 60 endemic species, 2,330 spermatophyte species and 28 nationally protected species. There are 433 animal species, of which 45 species under national protection. Since designated as a national Geopark in 2005, Mt Cangshan has played a critical role in protecting geological heritage and promoting local socio-

economic development, it has also become a base for geological study, education and geoscience popularization.

Presented in Theme 4

Huangshan Geopark seeks international partnerships

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In the past four years, Huangshan Geopark has been widely seeking international partnerships to standardize the conservation and tourism development at this natural and cultural heritage site. (1). Seeking memberships in world-renowned organizations. Mt. Huangshan Administrative Committee (HSAC) became a member of the Global Sustainable Tourism Committee (GSTC) in October 2010. HSAC joined the Pacific Asia Travel Association (PATA) in October 2011. HSAC joined the International Union for Conservation of Nature (IUCN) in November 2011, the first member from China’s world heritage sites and geoparks. (2). Participating in international projects for sustainable development. Huangshan became one of the ‘Observatory for Sustainable Tourism Development’ at World Heritage Site in 2008, a project launched jointly by UNWTO and UNESCO. (3). Partnership with other programs of GGN and UNESCO.

The Man and the Biosphere Program: “Securing Biodiversity Conservation and Sustainable Use in Huangshan Municipality” project was ratified by the Global Environment Facilities (GEF) in September, 2011.

World Heritage: In 2014, Huangshan will continue to participate in revising the system of measures for excellence in destinations for nature-based tourist destination, positively apply for the GL list, which was launched by the IUCN, and hold an international symposium on UNESCO-designated sites and sustainable development in Huangshan with the UNESCO (HIST).

The Global Sustainable Tourism Council: In the lead of GSTC, we have participated in the formulation of “The Global Sustainable Tourism Criteria for Destinations” (GSTC-D), which was officially released during 2013 World Travel Market (WTM). At PATA in September, together with PATA and Huangshan Scenic Area Administrative Committee, the Global Sustainable Tourism Council has published the second version of the “GSTC Criteria for Hotels and Tour Operators” (GSTC-H&T; 2.0).

At the end of 2013, Huangshan has won the title of one of the Best Tourist Destinations of the World, conferred by The World Centre of Excellence for Destinations (CED) by competing for international awards. HSAC was one of the three finalists in 2010 for the Destination Stewardship Award organized by WTTC.

Presented in Theme 6

“Build a dream with love for children of dinosaurs’ hometown” Zigong Global Geopark present tickets of drama of ‘Alice in Wonderland’ for children

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Zigong Global Geopark is a world-rare largest park with Middle Jurassic dinosaurs, associated with a typical stratigraphic sequence, profound salt-well production history and colorful local culture. How to utilize its rare resources and make the whole community to be involved and enjoy, is the soul of events the geopark has planned, such as the Mascot Collection, Series Popular Science Activities, and Publications, etc.

One of them is to ‘Build A Dream with Love for Children of Dinosaurs’ Hometown’. It is an event to offer children of the community who can’t afford tickets a chance to watch drama in theatre. However, there were only 5 days left before its performance when the geopark knew the drama of ‘Alice in Wonderland’ would be on at Zigong. It was not simple to buy 450 tickets as a present; the geopark has actively organized interactive activities implanted dinosaurs centering “love” and carried them out with community. Such as, dinosaurs accompanied children to visit the dinosaur museum; the director of the museum presented tickets on the spot; actors performed at schools; exhibition of 70 drawings chosen from the activity of Drawing the Most Lovely Dinosaurs of National Day Holiday (224 children from different cities have got involved) in theatre and so on. Media have continuously interviewed and reported the whole event.

By statistics, 108 children visited the dinosaur park of the geopark without paying, the page views of the microblog was 88,000 during 5 days. Undoubtedly, the element of attractive dinosaurs is successfully used throughout the event, through which people who could not visit the geopark are able to know the geopark, as well as to voluntarily propaganda the geopark. Therefore, the geopark has promoted its influence and awareness widely and helped the community to provide children with more chances to build self-confidence and experience a happy childhood.

Presented in Theme 2

Didactic games as a part of the educational program at the Terras de Cavaleiros Aspiring Geopark, Portugal

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The Terras de Cavaleiros Aspiring Geopark (TCAG) is

located in northern Portugal, covering an area of 700 km² with an extraordinary rich and complex geology framed by the Iberian Massif. The Pre-Mesozoic allochthonous geological units, geological structures, landforms and geological resources are represented in the 42 geosites. The complex geology makes its interpretation a hard task for schools, the general public and tourists. Nevertheless, especially for schools, educational programs were created based on the themes included in school curricula. From a total of eight programs, five include a geological component. In order to complement the educational offer and to encourage the learning of the geosciences in a didactically reasonable and enjoyable way, a set of didactic games was developed. The main objective of the games is to learn concepts about geological heritage and to explore the most important places in the geopark territory. They combine different educational concepts such as puzzles, board games and interactive approaches and are suitable for children from first grade to high school.

Presented in Theme 3.

**Geological heritage management:
monitoring the Azores Geopark geosites**

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The monitoring of geosites ensures better conservation of geological heritage and improves the management practiced in a given geosite. A monitoring plan aims to identify the threats that endanger the integrity of the geosite and quantify the loss of its relevance over time.

At the end of 2013 an experimental monitoring of the geological heritage of the Azores Geopark was implemented, with several field tests in the Terceira, Faial, and Santa Maria islands that allow preparation of a final checklist and monitoring table to be applied systematically to all terrestrial geosites in all Azorean islands. The monitoring record includes parameters such as the geosite status (cleanliness, condition of access, signaling), its geological conditions of interest (conservation, threats, natural evolution) and the characterization of the public (direct counting and behaviors observation). Given the high number of Azorean geosites and its dispersion through the archipelago, the monitoring of the geosites will be implemented in close cooperation with the Nature Guards Corporation of the 9 Island Natural Parks (key partners of the Azores Geopark).

The effective monitoring started in 2014 with a monthly frequency in all islands, and the first results are expected by the end of the year. Monitoring is scheduled throughout the

calendar year, covering different seasons and natural conditions (e.g., weather conditions), and visiting conditions (e.g., high and low number of visitors).

In the near future, the Action Plan of the Azores Geopark includes the monitoring of the shallow submarine geosites, which should start in 2015 in partnership with regional dive companies and sea related institutes, such as the Azores University Department of Fish and Oceanography.

Presented in Theme 1

Geoparks ushered in the age of electronic popularization of science

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Popularization of science is one of the three major themes of constructing geoparks. With the development of geopark construction, managers of geoparks continuously explore the patterns of popularization of science. Now geoparks ushered in the age of electronic popularization of science. Fangshan global geopark has made a great success in this respect. It will publish an electronic guidebook and a series of electronic guide maps of Fangshan Global Geopark in June 2014. The guidebook and the maps are geopark-related electronic popular science readings both in Chinese and English with touch maps. Nearly 150 of the most unique geosites with bilingual explanations and beautiful photographs are covered in the guidebook. Two-dimensional codes of website, WeChat, microblog and voice introduction of Fangshan Global Geopark have been adopted in the electronic guidebook and the guide maps. Visitors can learn more information of Fangshan Global Geopark and earth science knowledge from more factors and various angles on these two kinds of popularization of science readings. Besides, the electronic guidebook truly realizes the people-oriented concept, because it also develops a braille version for blind person. It makes silent images and tedious words become lively. And it also makes the blind persons who are wandering in ordinary paper popular science readings experience the spectacular scroll drawing by time and rocks in the earth's surface. It is pioneering the use of braille popular science readings in geopark construction in China. We believe that electronic popularization of science will become a trend in global geopark construction sooner or later.

Presented in Theme 3

Geomorphological heritage and landscape enhancement

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The hegemony of the positivist method throughout the twentieth century promised advances in Physical Geography. Only since the 1970s, when a concern with environmental issues emerged, was there a rescue from the study of ecology and the idea of the relationship between society and nature. In this context, it not only redefined geography, but all other areas that support geographic analysis: Geomorphology, Climatology, Biogeography, etc. It also revamped the analysis favored by some approaches and some scales of analysis at the expense of others. In terms of geomorphology, this, which previously had a regional descriptive and generic scale imprint, currently, has been concerned with environmental issues in a timely nature (morphodynamics) and this has appropriated the concept of landscape, expressing society's relationship with nature: that on one hand expresses the structure of natural elements (biotic and abiotic) and others, provides the material and immaterial conditions under which develops human life on Earth. Under this set of products, services and representations that different landscapes are able to sustain, it can be considered a collective heritage. The geomorphological heritage consists of a set of geomorphosites, ie natural areas where the main attributes are related to geomorphological dynamics and landforms, with some value to society. The greatest difficulty in this task at the moment is to clarify that the geomorphological heritage has its own field of research and that, within the concept of geological heritage, currently discussed mostly by geologists, must recognize the importance of the inventory and valuation of landforms and associated processes. The geomorphological heritage is one of the keys to the dissemination of Earth Sciences, strengthens and stimulates environmental awareness education and economic and sustainable development activities.

Presented in Theme 1

Mainstreaming geoheritage into conservation policies: first steps and achievements in the Aspiring Geopark des Monts d'Ardèche, France

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Throughout Europe, conservation policies are mainly based on the presence of rare and/or threatened habitats or species, but the underpinning geoheritage is only seen as

secondary, when considered. The aspiring Geopark of Monts d'Ardèche shows a great variety of geological forms, which has a prominent influence on the overall biodiversity heritage, especially in terms of specific richness and diversity of habitats. In public policies related to nature protection, only soils are sometimes considered as having a direct link with the presence of specific, rare or endemic plants or animal species or natural habitats, and references to the geological substrate is seldom noted (e.g., in the designation of the European *Natura 2000* network of Special Areas of Conservation).

Parc naturel régional des Monts d'Ardèche has identified 77 geosites over its whole territory, according to various geological criteria (scientific interest, potential for interpretation and for tourism development). The corresponding biodiversity features have been assessed for those sites, as well as their legal status regarding nature protection and spatial planning policies. Results show the importance of geomorphology and micro-relief for the presence of remarkable biodiversity, whatever the geological substrate is. There is furthermore no clear evidence of a higher "biodiversity score" for geosites. No specific legal protection is granted for geological heritage.

Further to this analysis, 51 geosites will be equipped with interpretation panels and devices. In order to better take into account the "biodiversity features", a dedicated study will help with designing and implementing equipment in the field, to minimize their impacts – and the impact of the expected increased visits – on biodiversity.

Through an inclusive approach, Parc naturel régional des Monts d'Ardèche tries to mainstream conservation activities and touristic development in an overall local development strategy, which is a key-factor for developing geotourism and for keeping the geoheritage alive.

Presented in Theme 4

The Ardèche chestnut civilization: from geological constraints to a regional wealth

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Poor soils that are acid or sandy are generally known to have a low agronomic potential. They lack clay and do not capture and save enough water for a cultivated plant to develop properly. When located on steep slopes, they face erosion and can easily be leached and degraded.

Situated on the eastern edge of the Massif Central, Parc naturel des Monts d'Ardèche shows a large diversity of geological forms, including sedimentary, metamorphic and magmatic rocks. These geological features gave birth to sev-

eral types of soils, all of them characterized by the presence of silica and considered as having a poor agronomic value.

To overcome these natural handicaps, local communities have, amongst other things, developed the culture of chestnut trees (*Castanea sativa*) as early as the low Middle Ages. These traditional orchards have once permitted local communities to face famines. In modern times, this crop has become a real asset for remote territories, Ardèche producing 50% of the French chestnut production.

Comparing maps of the presence of chestnut orchards in Ardèche with geological and soil data, we distinguished several types of "terroirs", including areas with sandstone from the Trias, siliceous limestone rocks, crystalline deposits or volcanic formations. A wide diversity of varieties and practices come on top of this geologic background and contribute to the richness of chestnut civilization in Ardèche.

Today, a quality label confers to Ardèche chestnut a reputation far beyond its production area. It is much appreciated as fresh fruits, and there is also a large demand by the confectionary industry. The large-scale cultivation of chestnut trees has also widely contributed to the renown of Monts d'Ardèche. It is an important pillar for rural development, a component of its ecological diversity, and an emblematic element of its landscapes that reinforce the touristic attractiveness of the territory.

Presented in Theme 4

Geoparks and international students exchanges: a window of opportunity

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Partnerships between the Rokua (Finland) and the Sesia-Val Grande (Italy) Geoparks started an exchange program for Secondary School students. The study and the visit of both territories is an opportunity for students to observe some relevant geological elements and processes that do not exist in their own country. Moreover, the hosting in families allows them to feel the culture of the area.

The visit to the Sesia-Val Grande Geopark during 2014 is described here. Students are welcomed by the community, local schools and by the staff of the Geopark. Then, field trips allow for discovering the main geological attractions of the area: the Sesia supervolcano, the deep structure of the Alps, the Insubric line and the Monte Rosa Glaciers. A cooperative learning process is offered: the Italian students guide their buddies in using an application suitable for mobiles (smartphone and tablet) that allows to track the trip and to gather georeferenced geological data and photo-

graphs. These data are later downloadable on PCs in a Google Earth format for post-field trip processing and discussion after visiting facilities and interpretation centers of the Geopark. The activity is a part of a University research project that aims to understand how the use of virtual tours and digital tools aids and stimulates the geological interpretation of an unknown territory.

During scholastic year 2014/2015, the Italian students are hosted by the Finnish families. The exchange project underlines the relevance of the educational and cultural values of the Geoparks, and it really benefits from the Network. Geoparks are the ideal destination for international study tours based on the sustainable tourism concept, in which the travel is conceived as an opportunity for sharing both scientific knowledge and intangible and tangible culture. Equally, they are the appropriate places for testing and practicing innovative educational strategies, shareable in an international context.

Presented in Theme 3

Effects and issues of resident involvement in the “Walking Model Route Map”

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One of the important roles of geopark activities is the understanding of the geopark concept, its territory, and its features by local residents. For this purpose, it is important that they participate in geopark activities positively, although it might be sometimes difficult. To address the issue, we have planned “Walking Model Route Map” across the San’ in Kaigan Geopark in cooperation with local the community, to promote better understanding and communication with local people, government and academia involved in geopark activities.

In a geopark, creating a tour route and map that allows visitors to easily explore the geosites is required. The “Walking Model Route Map” provides tourists with opportunities to enjoy the feature of each area. Each map includes outlines of about twelve “must-see” geological spots, allowing visitors to enjoy sightseeing and learn about San’ in Kaigan Geopark.

Map development: (1) Local guides, tourism facilities, local residents, geopark-related officials and academia, formed a working group to create a draft map; (2) Members of the group surveyed field sites and checked the most important points, safety, etc.; (3) Academia created a map; and (4) The working group checked the content of the map. To make it understandable to the general public, we posted images and descriptions of the map on Facebook and modified and simplified them using information collected from

the public through SNS (Social Networking Service).

We were able to make “Walking Model Route Map” useful for local residents, by involving experienced local guides and people in the area. It is important that geopark guides take part in map creation. Firstly, geopark guide’s participation makes the map more practical. Secondly, by working together with local residents and researchers, scientific information is shared among local people. As mentioned above, we think that resident involvement in planning “Walking Model Route Map” is effective. From now on, it is also necessary to accept visitor’s opinions and continuously update the map so that it becomes more effective and useful for both visitors and local residents.

Presented in Theme 3

The Lava Tube of La Corona, a Geosite working as a small but sustainable and profitable Geopark: Lanzarote and Chinijo Islands Geopark Project, Canary Islands, Spain

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The Canary Islands are located on the African tectonic plate over a passive continental margin in an intraplate geodynamic context, its’ basement is composed of oceanic crust. Lanzarote is located in the northeast of the Canary Islands, 125 km from the coast of Africa. It has an area of 845 km² and a maximum altitude of 671 m. In the north of the island, a more than 7.6 km long lava tube extends, formed during the eruption of Corona (25 kyr ago) and composed of a complex network of tunnels and superimposed galleries with domed ceilings up to 20 x 20 m and interior lakes, it is identified by a chain of jameos (collapsed of lava tubes). The last section is “Túnel de la Atlántida” and is entirely flooded and only accessible by cave divers. This section offers access the world’s most extensive anchialine ecosystem in a volcanic island and represents excellent models to study evolution and morphological change. The conditions of this closed system in all the tube have allowed the installation of the Geodynamics Laboratory where there are Geophysical and Climate Change instrumentation from many countries in the world.

Along the tube there are two tourist centers: “La Cueva de los Verdes” and “Jameos del Agua”. The visit to La Cueva de los Verdes is a journey into the bowels of the Earth. A spectacular and unique experience along the superimposed galleries, it received 334,326 visitors during 2013. Jameos del Agua is a creative work attributable to César Manrique in a nature place with auditorium, restaurant, museum and “La Casa de los Volcanes” (scientific, educative and tourism

center). In 2013 it received 612,450 visitors. The economic benefits translate into contracts to the local population, as well as an annual fee to the Town Council.

Presented in Theme 4

Interpreted geological trails in Terras de Cavaleiros Geopark: a new tool for geotourism and education

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Terras de Cavaleiros (Land of Knights) is an aspiring Geopark located in northeastern Portugal. The main geological features are related to Variscan tectonics and allochthonous terrains. In order to value these natural resources, a set of trails was defined integrating a geoturistic and teaching strategy in the geopark. The footpaths and itineraries are supported by a geosites inventory, and by other sites with natural and/or cultural value. Descriptive and interpretative leaflets with pictures were developed for each trail, addressed to tourists with basic knowledge in geology. A guidebook with more detailed information was also prepared. The footpath “Vale da Porca – Salselas” is set around the Vilariça fault in order to enhance the interpretation of basins and mountains related with this tectonic structure. A larger trail, named “Morais ocean”, is located in the core of the Morais Massif, a polymetamorphic geological unit that comprises a high geodiversity related with Variscan allochthonous terrains. The trail contains a set of stops where it is possible to see and interpret these continental and ophiolite sequences that characterize the region and that constitute the main scientific value in the geopark. The trail “Geologic Resources” is related to the lithological and mineralogical features with mining and historical interests, such as wolfram, talc and limestone. The trail “Geological Faults and Earthquakes” is dedicated to the landscape interpretation and based on tectonic structures and landforms.

Presented in Theme 4

Creating a unified brand image of Japanese geoparks through collectible cards

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There has been a delay in the creation of a unified brand

image of the Japanese geopark movement, which is gaining increasing popularity in Japan. However, many Japanese citizens and tourists in the country are unaware of the Japanese geopark network. We created collectible cards for Japanese national geoparks to disseminate information on the concept. Each card describes the geoheritage (e.g., landscapes, landforms, outcrops, mineral specimens, and fossil specimens) through images and text. Tourists and citizens are thereby able to learn about the geoheritage. Moreover, they will want to collect the cards of other parks. Thus, collectibles are an effective method of popularizing geoparks.

Presented in Theme 3

Creating a unified brand image of Japanese geoparks The Museum of Molina as interpretation center for Molina and Alto Tajo Geopark

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One of the main Molina and Alto Tajo Geopark interpretative resources is the Regional Museum. It was inaugurated twelve years ago and offers several working areas as: Exhibition, research, outreach and teaching. We will talk about the latest achievements for the didactic Geopark objectives.

The aim of the Museum is to convey to visitors and in particular students, how life depends of geology and changes the physical medium on which it sits. The museum discourse is divided into six halls: Hall of Paleontology and Geology, that shows geologic processes in a dynamic way, explains the formation of rocks and, supported by a stratigraphic structure, the geologic history of the region; Entomology Hall, where highlights the great diversity and importance of insects, essential basis of life on our planet as an important part of the food chain; Wildlife Room where visitors are immersed in smells, sounds and images, where vegetation and animals are around, losing the feeling of being in an enclosed space and being transported to a natural environment; Archaeology Hall, presents the human being in its cultural and adaptive aspect, highlighting its evolution during the Paleolithic, Neolithic, and especially the pre-Roman Celtiberian culture periods of our region; Human Evolution Room, showing the latest findings of paleo-anthropology and Temporary Exhibitions, where graphic Geopark works from local artists find a place to be exposed.

The aim of this presentation is to describe how the remodeling process of the first three rooms, has allowed us to research new didactic techniques for students and Geopark

population. In addition, this remodeling has been used as educational tool for immersion on Geopark values, because they have participated in the development of the remodeling process.

Presented in Theme 4

Wind plus water: self-sufficiency of the Island of El Hierro, UNESCO Biosphere Reserve

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At the very southwest of the archipelago, the smallest of the Canary Islands (Spain) has been historically dependent on external goods and materials including the supply of energy. To this day, the electricity consumed by the population of El Hierro is generated by diesel engines whose fuel is imported regularly by sea. A decade ago, the Island Council of El Hierro (the “Cabildo”), the electricity company Endesa and the Technological Institute of the Canary Islands – owned by the Regional Government of the Canary Islands –, decided to join forces to create a public-private partnership with the aim of achieving electricity and water self-sufficiency with the use of clean energy sources. In 2004 the Gorona del Viento El Hierro Corporation (S.A.) was founded. El Hierro will be the first island in the world to become self-sufficient by providing its own electricity from renewable sources when Gorona del Viento’s wind-hydro power plant comes into service this year. One of the most important milestones of the “El Hierro 100% renewable energies strategy” has been reached with the launching of this plant. In addition to local objectives, the wind-hydro power plant of El Hierro will serve as a focal point for other territories with similar circumstances at EU level and internationally. This concept is highly applicable to islands and even to isolated inland areas, therefore the project also aims to be a global point of reference.

Presented in Theme 1

Legal system and current management status of Geoparks in Korea

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The Korea National Geopark (KNP) is certificated park by the Minister of Environment for development of the local economy through conservation, education and tourism, for places that have Earth scientifically important areas and that have magnificent landscapes. At present, KNP members include five Geoparks (Jeju Island National Geoparks, Ulleung-do-Dok-do National Geopark, Busan National Geopark, Gangwon Peace National Geopark, and Cheongsong National Geopark) by certification criteria. The ministry of environment allows the Korea national park service (KNPS) to perform duties such as examining the required documents, evaluation and actual inspection on the spot. Therefore, the Ministry established National Geoparks Secretariat under natural park act in order for the systematic execution of geoparks-related tasks, such as examining the requirement of documents and investigating the geological heritages and geopark candidate sites, and other management as follows: (1) Investigating on geological heritages and Geosites; (2) Geopark experience program and Development and Promoting of educational program; (3) Geopark research and promoting of knowledge and information; and (4) Research and Inspection of Geopark management et al.

Presented in Theme 2

Tourism perspectives in Baños, Ecuador, a municipality of the Tungurahua Aspiring Geopark project

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Baños, located in the province of Tungurahua, in the center of Ecuador, between the Andes and the Ecuadorian Amazon, has tourism as an economic base. It is one of the entrance gates to the Sangay National Park, a world heritage site, which is home to the volcano Tungurahua (Throat of Fire in Quichua, the indigenous language). The volcano has been active since 1999 and frequently spits smoke and fire. Due to its topography and natural attractions, it is a premier destination for hiking, biking, rappel, canyoning,

climbing, rafting, horseback riding, bridge jumping, kayaking, among others. There are many waterfalls and deep river gorges that can be crossed with “tarabitas”. Beyond ecotourism, the area receives visitors interested in health, religious, adventure and geological tourism. With a population of 20,000 inhabitants, it has several lodging options, restaurants, 49 local tour operators, and many spas and public pools with the hot water from the depths of Tungurahua volcano. Many of the tour operators offer tours that are conducted on vehicles called “chiva”, a kind of truck adapted to carry passengers. The city has great accessibility and culture connected with volcanism. The Basilica of the Virgin of the Holy Water was built with volcanic rock. The Geopark Project is already being promoted in the city on the map distributed to visitors and in a specific folder about the Project, which explains what a Geopark is, and its benefits to the community.

It is suggested there be the creation of an interpretive center addressing aspects related to geological heritage, an increase environmental interpretation and to conduct more educational programs. This way, because the city is prepared for tourism, can receive many tourists, has adequate infrastructure, outstanding cultural aspects and geological heritage, it has ample conditions to become the first Geopark in Ecuador.

Presented in Theme 4

Fernando de Noronha Aspiring Geopark project, Brazil: history, culture, and tourism

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The islands of the archipelago of Fernando de Noronha (Brazil), with 26 km², were officially discovered in 1503 and suffered several invasions, due to its strategic location next to one of the navigation routes from Africa and Europe. These occupations were Dutch, French and Portuguese and left rich archaeological and cultural heritage buildings. In addition, there are many legends in the region, some related to geological aspects. For over two hundred years the main island housed a convict colony, later transformed into a political prison. During World War II, it was created as a Brazilian Military Federal Territory and the USA installed a Support Base. Between 1957 and 1965 there was a new North American presence at an observation post for guided missiles. In 1988 a Marine National Park was created and in 2001, UNESCO considered the archipelago a World Heritage Site. Currently, the archipelago is a major ecotourism destination and very popular for honeymooners. The hostels have different identification according to their category,

1 to 3 dolphins. There are museums, visitor centers, variety of entertainment and food including local cuisine, seafood and international cuisine options. There are receptive agencies, rental cars, dive centers and an association of local artisans. It is the only State District in Brazil. All visitors must pay the TPA - Tax of Environmental Conservation, created with the purpose of promoting and preserving the safety, quality and comfort for the well-being of the population and visitors, and control access and permanence of visitors in the archipelago. Since 2007 actions are being carried out to prepare the region for the submission of a dossier to join the Global Geoparks Network.

Presented in Theme 4

The Ngorongoro Aspiring Geopark, Tanzania: a unique Geopark project in Africa developed with European Union support

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Ngorongoro area is located in the Northern part of Tanzania close to the Kenyan Border. This area is an important National Park, a Biosphere Reserve and a part of its territory is also World Heritage. It contains unique sites presenting not only the more important African biodiversity but also the more famous sites related with the human history. The famous site of hominid footprints from Laetoli (3.6 Millions years old), the Olduvai gorges where *Paranthropus boisei* was found, and the historical camp of the Leakey family are some of them.

The aspiring Ngorongoro Geopark project includes all these sites but covers a wider area allowing the integration of important sites as the Oldoinyo lengai, sacred mountain for the Masai people, a unique active volcano in the world by its production of natrocarbonatite lava and the Natron lake, Ramsar site, important breeding place in East Africa for the pink flamingos.

Beside the majority Masai population, several ethnic groups are present in the territory and are strongly associated in the Geopark process which should provide new sustainable economical impact for the population situated outside the present protected and managed area. It is the first Geopark project supported by the 10th European development Fund (2 Million Euros) and its management is placed under the Ngorongoro Conservation Area Authority.

Presented in Theme 4

Shimabara Peninsula and me

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I was born and raised in the Shimabara Peninsula. We grew up under the watchful eye of Mount Unzen. The presence of this beautiful green giant was the backdrop to our childhoods. Although we knew it had erupted 200 years ago, most of us never thought it would break its silence again. Much to our surprise, in November 1990 it erupted and remained active for the next 5 years, claiming 44 victims in its wake. In time our hometown thrived and flourished again. People moved on and the eruption became a bad distant memory. The next generation of people was unaware of the help we had received in our hour of need from the outside world. This ignorance made them slightly indifferent to activities concerning the Geopark and visiting guests connected to it.

Feeling this indifference from the community during my time as a volunteer in the November 2007 COV5 conference in Shimabara, saddened and disturbed me. I felt we had not been as hospitable as we could have been, had everyone been aware of the facts.

In 2008 the Shimabara peninsula was honored to be certified a Global Geopark. Four years later in May, the 5th International UNESCO conference was hosted in Shimabara. I was delighted to serve as a volunteer for this conference. However my excitement was abated by the tepid response of the community.

I decided to take action. I asked the volunteers who had participated in this event to fill in questionnaires about their experiences. By sharing this information with the next generation, we might be able to teach them about the glorious legacy of our hometown and our friends overseas who reached out and gave us a helping hand. I believe we owe this to our beloved hometown, Shimabara.

Presented in Theme 2

What is reasonable geotourism in volcanic areas?

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Volcanic activity creates many beautiful landforms and produces fertile soils, geothermal energy and mineral resources in many places in geological time. It is expected that the role of geotourism in the volcanic areas like in Japan, Indonesia, and Greece is different from that of non-volcanic geoparks. Geotourism in those geoparks not only provides stories on the geological and related histories to visitors, but also should provide knowledge on volcanic

hazards and convey disaster experiences of local people.

Although volunteer and skillful guides have grown already in many touristic volcanic areas, special training is needed to teach them about geo-tourism practices in volcanic areas. In Toya Caldera-Usu Volcano Global Geopark, “Volcano Meister network” has been established for the main purpose of minimizing disasters from future eruptions. The Meisters also serve as well-trained and model guides in the geopark. In Unzen Volcanic Area Global Geopark, geo-guides are expected to behave as leaders of their community and visitors when they face sudden volcanic hazards. In particular, stories told by guides that directly experienced volcanic disaster, are very effective for visitors (and young people) to understand behaviors of nature hazards and disasters.

Soon after severe natural disasters, scientists often want to preserve damaged spots or buildings as memorial sites. However, those sites make some people suffer and recall painful memories. Considerate and sustainable conversation is requested to preserve the disaster sites as geo-/cultural sites. Networking of geoparks is effective when they meet geohazards, such as examples at Kirishima and Izu-Oshima volcano geoparks. Soon after disasters, members of the Japan Geoparks Network assisted the sufferers to rebuild communities by giving hands, donation and encouragement, and helping them to learn about natural hazards to reduce risks from future disasters.

Presented in Theme 1

Southern Saimaa Lake area: a potential new Geopark in Finland

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The Geological Survey of Finland (GTK) has worked for several years with the clear aim of spreading knowledge about geological heritage to the public, to the tourism sector, and to places of education. GTK also provides professional help to the authorities and the local projects in their work to create new Geoparks in Finland. GTK also has a representative in the national Geoparks committee established in 2013.

Rokua, the first Finnish Geopark, has increased interest in the Geoparks Network and its benefits to tourism in Finland. Currently, there are several areas in Finland that want to join the Geoparks Network.

The furthest developed regional Geopark project at the moment is the Saimaa Lake Geopark project in southeastern Finland. The objective of the project is to demonstrate the geological development of the lake scenery and geological sites related to it. An important goal is also to develop the tourism in the area. Cities of Imatra, Lappeenranta and

Mikkeli and five municipalities are part of the project area.

Southern Saimaa is one of the most representative lake areas in Finland. It is located in the intersection of geological key sites where the Vuoksi River that regulated the development of eastern Finland's Lake District intersects with the arch-shaped Salpausselkä end formations. The Salpausselkä end formations were formed during the cold climate periods 12,500–11,500 years ago. When satellite images became more common, they were thought to be the most beautiful terrain formations created by glaciers on the northern hemisphere.

During the lake phases of Saimaa, humans arrived in the area. They were fishers and hunters. They left behind rock paintings that can be seen in Astuvansalmi. The Astuvansalmi rock paintings are the largest collection of rock paintings found in Scandinavia, comprising about 70 paintings. The oldest paintings were made about 3000–2500 BC. The Saimaa ringed seal is among the most endangered seals in the world. The only existing population of these seals is found in Lake Saimaa. The population is descended from ringed seals that were separated from the rest when the land rose after the last ice age. The Saimaa ringed seal has been protected since 1955.

Presented in Theme 4

From valueless to valuable: geopark approach in sustainable transformation of disused quarry in Yandangshan Global Geopark of China

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Mining and quarrying sites in China create significant environmental problems that have occasionally triggered social unrest. They become a major political concern particularly for local government. In recent years, government and local communities have taken thorough environmental impact assessment, restoration plans, and the ways they are implemented, seriously. Operating mines and quarries generate local employment and stimulate economy, and are thereby able to supersede the adverse environmental impacts of their activities. However, such benefits vanish with the cessation of operation. Local discontent with operators over loss of jobs and permanent destruction of the local environment requires pacification and solution. This paper studied the effectiveness of a geopark to revive a quarry site in their post-quarrying period in Zhejiang Province of China. The geopark approach has proven to be very successful in transforming this disused quarry into a famous tourist attraction by pulling in over a million visitors per year from its surrounding cities including Shanghai and Hangzhou. They are attracted by the global geopark branding, the areas

stunning and massive quarry caves, historical artefacts and traditional stone culture. Thousands of jobs are created for local people, either directly under the geopark management authority or indirectly by the geopark related local services and manufacturing enterprises. The revived quarry site makes possible the preservation of its ancient Chinese quarrying history and traditional stone culture, which concurrently produces an extremely strong sense of pride and belonging among the local communities. This case study is an excellent example in China reaffirming the effectiveness of a geopark in the restoration and transformation of valueless mining and quarry sites into valuable 'gold mines' for sustainable uses and the long-term benefits of local people.

Presented in Theme 1

Intangible cultural heritage in Japanese geoparks

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The purpose of this presentation is to report on the situation of intangible cultural heritage (ICH) of Japanese geoparks. Important first points are the translation of the word 'geopark' into Japanese and ways to safeguard ICH in Japan. Japanese geologists introduced the word 'geopark' into Japanese with the phrase 'Daichi no Kouen.' 'Daichi' means 'the earth' and 'the land', and 'Kouen' means 'a park'. In brief, many Japanese people are aware that a geopark is not a geological park. Additionally, the Law for the Protection of Cultural Properties enacted in 1950 first defined in legal terms 'intangible cultural properties' so that it is very easy for us to introduce the importance of ICH into Japanese geoparks. We established the Japanese Geoparks ICH Working Group in 2012. In the case of San' in Kaigan Geopark, we began monitoring the ICH inventory in 2014. For instance, Inshu washi became the first registered national traditional art and craft from all the Japanese paper production areas of Japan in 1975. Ministry of the Environment listed the charming sloshing sound coming from paper drainage boards operated by paper craftsmen in 1996 as a Japanese cultural sound to be handed down to the next generation, along with being the sound of a sophisticated art. There are some, however, who are uncertain about showing ICH in geoparks. When these people ask us how ICH relates to geology, we use the word 'geostory'. A geostory includes geological, biological, and cultural aspects. All elements are interdependent on one another in the context of the history of the earth. ICH is one of these elements. Creating a geostory is important. The development process surrounding a lagoon named Koyamaike provides a good example. Koyamaike had an impact on the way of life around it, resulting in current environmental and cultural concerns there.

Presented in Theme 7

Education methods utilized in the Oki Islands Global Geopark

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Geopark education is currently conducted as part of the formal school curriculum in all elementary, junior high and high schools in the Oki Islands Global Geopark. Most notably, as of April 2014, 'Geopark Studies' will be adopted as an elective subject at the Prefectural Oki High School. The creation of this new class can be viewed as a success of the educational activities of the geopark in the school to date. Moreover, it demonstrates concordance between geopark educational activities, and the aims of the Shimane Prefectural Board of Education to enhance knowledge and pride of the region. In fact, geopark education is increasingly viewed as a valuable model for enhancing knowledge and interest in local heritage, especially geological heritage, within schools around Japan. This success can be attributed to the integrated approach of geopark education. These days, technological entertainment is ubiquitous, and it is increasingly difficult to encourage children to spend time outdoors and develop an interest in the geological heritage, nature and the traditional culture of their region. However, geopark education effectively utilizes resources that are familiar to the students and draws connections to topics covered in other classes, such as earth studies, biology, history and studies about local culture. In the Oki Islands Global Geopark, students are actively encouraged to think about how the nature, history, and culture that developed on the islands are intrinsically connected to the land. The main theme of the geopark, which is to discover connections between the 'geohistory', 'unique ecosystem' and 'lifestyles and traditions' of the people is often emphasized. This presentation will highlight specific examples of how geopark educational material and human resources (including geopark information boards, the geopark educational comic and geopark guides) are utilized in the elementary, junior and senior high school curriculum, in order to demonstrate the effectiveness of geopark education in schools in the Oki Islands.

Presented in Theme 3

The growth of Geoparks in Canada

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The Canadian National Committee for Geoparks operates under the auspices of the Canadian Federation of Earth

Sciences. The committee is the national body charged with responsibility for administering geoparks. It receives formal Letters of Intent from aspiring geoparks, responds to them and conducts site visits to prospective geoparks. This international meeting is taking place at the birthplace of geoparks in Canada: Stonehammer Global Geopark in southern New Brunswick that was accredited in 2010. Stonehammer was the first Global Geopark to be established in North America. Since that time, the Canadian National Committee for Geoparks has been encouraging communities across Canada to consider geopark status as part of their social and economic development plans. The response has been growing to the point that there have been three additional Letters of Intent received and one of these, the community of Tumbler Ridge in British Columbia, has completed an application to the Global Geoparks Network in 2014. Two other communities are working on their applications: Bonavista Peninsula, the site of the Aspiring Discovery Geopark in eastern Newfoundland, has received a site visit from the Canadian National Committee and the community of Percé, Québec has received a response to their recent Letter of Intent. Another seven communities in British Columbia, Alberta, Ontario, Québec, and Newfoundland are known to be considering geopark status. Thus the community of geopark people in Canada has spread coast to coast and the future for geoparks looks very bright. At the time of the site visit to Tumbler Ridge Aspiring Geopark, a two-day conference was held on geoparks with representatives coming from many geopark projects across Canada. This was the first major gathering of the growing geoparks community in Canada outside Stonehammer Global Geopark.

Presented in Theme 2

The partnership Azores Geopark/Azores Tourism Promotion Board: strengthening the geotourism in the Azores Archipelago

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The Azores Global Geopark has a unique geodiversity and geological heritage that is the basis for a strategy of sustained development of the local communities, based on geotourism and on nature tourism, and the promotion of an economic growth of the territory with respect for its en-

vironmental values.

In the last decade, tourism has proved to be an economic activity with great potential in the archipelago, which is strongly focused on providing emotions and experiences to visitors mostly taking profit of the major icon of the Azores: its volcanic landscape.

The mission and goals of the Azores Geopark includes the promotion of Geotourism. This desideratum is being accomplished in close cooperation with the official tourism entities, especially with the Azores Tourism Promotion Board, which is responsible for promoting the Azores as a tourist destination and for the qualification of the tourism offer in the Region.

As a consequence of this close partnership, Geotourism was included in recent years in the official touristic policies and is one of the Azorean touristic products, together with Scuba Diving, Hiking, Whale and Bird Watching, Meeting Industry, Golf, Health and Well Being, and Canyoning, among others.

For the next years this close partnership has been reinforced, the Azores Geopark being responsible for the Azorean Geotourism policies, through a joint Action Plan that includes several activities such as: (i) the Azores Geotouristic Guide; (ii) the Azores Geopark Passport; (iii) edition of leaflets and brochures promoting the varied geotouristic activities; (iv) the development of a geotourism web micro-site; and (v) promotion in touristic fairs and national and international events.

This partnership (Azores Geopark/Azores Tourism Promotion Board) is a relevant tool on the management of tourism in the Azores and the implementation of policies of geoconservation that ensure the promotion of the geotourism (e.g., of the volcano tourism) as a touristic product of outstanding quality and reputation.

Presented in Theme 1

Analysis for Kebumen Geopark: an effort to preserve geological heritage and increase local prosperity

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Kebumen, one of the regencies in Central Java Province, Indonesia, Southeast Asia, has various geological heritages as geotourism objects, for instance Karangsambung Melange Complex and Karangbolong Karst Complex. Karangsambung Melange Complex consists of various exceptional outcrops that refer to the oldest rock in the Java Island, Indonesia. Besides that, these outcrops are evidence for Cretaceous-Tersier Subduction of the Eurasian Plate

and Indo-Australian Plate. Today, fresh outcrops are on the wane because of intensive weathering and erosion in a tropical zone, and hazards from local communities. Hence, it is needed to preserve these geological heritages. Besides geological heritages, Kebumen has also cultural heritages, for example Gamelan, Tari Lawet, and Batik Tanuraksan. On the other hand, Kebumen is fifth rank of the poorest regency in Central Java Province. To solve this problem, it is required to manage geotourism and cultural potential as a productive and sustainable source of local prosperity. A Geopark, as a system from UNESCO to integrate the preservation of significant examples of geological heritage in a strategy for regional sustainable socio-economic, environment, and cultural development, is recommended for Kebumen. A Geopark represents global tourism quality for local geological and cultural heritages. Being able to achieve high quality geopark guidelines for Kebumen would increase local prosperity, and preservation of geological heritages, by increasing visitors. This prosperity is measured from increasing enterprises, improving human living condition, and improving education about geological heritages. It is noteworthy that a big effort is required for realizing Kebumen Geopark because assessment of geological heritages have not carried out for geopark, and not all of communities have known about the geopark. But, with cooperation, preparation, and working together, Kebumen Geopark could be realized.

Presented in Theme 4

Geostory related to volcanic eruptions, farm products and landscapes: an example of the Hayasaki Seashore in Unzen Volcanic area Global Geopark

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Highlights of a Geopark are not only outcrops, rocks, strata, and natural landscapes with earth scientific value, but also human histories, cultures, and local customs. Especially in Japan, where natural disaster occurs frequently, such as earthquakes, volcanic eruptions, tsunami and so on, the life-style of people is strongly affected by natural phenomena. But, in other words, these disasters bring us Japanese original culture. Unique features of Japanese Geoparks are, therefore, that tourists can enjoy a relation between the lives of local people and Earth's activities. In this Poster Presentation, we introduce the geostory of the "Hayasaki Seashore".

The Hayasaki Seashore is the place where the Shimabara Peninsula was born. About 4.3 million years ago, submarine volcanoes started to erupt around the Hayasaki area. In an early stage, strong phreatomagmatic explosions caused by contact basaltic magma with seawater-shattered magma,

and a lot of volcanic ash was deposited. As the volcano grew, only magma spouted out from the crater. Later, the force of the eruption declined and the basaltic lava flow covered the surface. The first figure of Shimabara Peninsula was a volcanic island such as current Hawaii Island. This is the formation process of Shimabara Peninsula, analyzed by characteristics of pyroclastic strata.

These volcanic eruptions affected the living of people deeply. The potatoes, which are main farm products in Shimabara Peninsula, are harvested from reddish-brown soil in Hayasaki area. This reddish-brown soil is only generated when the conditions of basaltic strata, warm and damp climate are matched with each other in a long history of 4 million years. Stone walls of potato fields in Hayasaki area are also unique. Local people use planar lava blocks separated along cooling joints inside lava flows when they make stone walls. Local scene is, therefore, indirectly affected by volcanic eruptions.

Presented in Theme 1

**Science education made interesting for young people:
international study group visits and outdoor education in
the Aspiring Reykjanes GeoPark in Iceland**

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

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

For the past five years GeoCamp Iceland has annually received a number of secondary school study group visits from Denmark focusing on natural sciences. This has been done in collaboration with educational institutions, local teachers and experts in the area, and in recent years in cooperation with the aspiring Reykjanes Geopark. The groups travel to Iceland to be able to witness and experience geology, geography, earth science and renewable energy resources. For them the active involvement and close proximity to the sources of geophysical activities and harnessing of renewable energy sources, is equal to few other places on earth. Due to this closeness to raw and unspoiled environment, along with easy, inexpensive and frequent access, Iceland has recently become a viable and highly sought after outdoor classroom.

Iceland become a popular travel destination for international study groups because of easy and short access to places of geological interest, earth formation, visible tectonic plate boundaries and utilization of renewable energy sources.

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

A geologically young land, Iceland is located both on a hot spot and the Mid-Atlantic Ridge which runs right through the country. Places on the boundaries of the two tectonic plates, the Reykjanes region is here the ridge breaches the ocean's surface. The region is geologically active with geothermal sites, rock formations and unspoiled natural beauty. It is a place where you are always in close proximity to Earth's energy sources and the elements that are constantly shaping the landscape. This is the ultimate natural science classroom and provides an ideal learning environment for study groups.

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

Presented in Theme 3

Local food as a way to promote Geopark Odsherred

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The landscape of Odsherred has determined the agriculture of the area. When the ice withdrew, after the last ice age, several fjords remained. Two of them, Sidinge Fjord and Lammefjord, were reclaimed in the nineteenth century, transforming them into mineral-rich farmland. Both fjords, and Lammefjord especially, have become renowned for supplying vegetables of very high quality to the "New Nordic Kitchen". The Danish restaurant NOMA is the star of the New Nordic Kitchen, having been awarded "Best Restaurant of the World" in 2012 and 2013, and many of its creations feature Lammefjord produce. At Dragsholm Castle in Odsherred, one of the oldest buildings in Denmark still in use, the gourmet cuisine relies heavily on the nearby fields, forests, and coastlines of the geopark.

In the beginning of 2013, Geopark Odsherred took the step to form a cluster of farm shops and other producers of local food products. The goal is to increase the reputation and selling of local produce and food products and to increase the awareness of the geopark. To achieve this, three initiatives have been taken: (1) Developing standards for labeling local produce and food products as a “geopark product”; (2) Developing a design for the label that (a) is attractive for the producers, and (b) has a clear attachment to Geopark Odsherred; and (3) Developing a model for local distribution of local produce and food products, so that local restaurants, cafeterias and others can have easy access to the products.

In December 2013, the first local produce achieved the Geopark Odsherred label, and several products will follow in 2014. Thereby, the local people and the tourists will meet the geopark on a daily, practical level.

Presented in Theme 4

Cacahuamilpa Grotto: geoheritage in a potential Geopark in Mexico

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The Cacahuamilpa National Park (CNP) is located 150 km to the south of Mexico City. Outstanding features include the best-known Mexican grotto (Cacahuamilpa), distinguished by the dimensions of its gallery, up to 100 m wide and 90 m high, and its variety of colossal speleothemes (stalagmites, stalactites, gours), as well as other caverns and exokarstic landforms such as dolines and ponors. It is one of the most visited show caves in Mexico, with up to 350,000 visitors annually. Facilities to permit access include a platform along the entire gallery (about 1,400 m long) and illumination; guidance is provided by local staff. The CNP was created in 1936 and it is currently managed by a bilateral federal government-local indigenous administration. In addition to the main grotto of Cacahuamilpa, three other caverns are part of the National Park. However, they do not constitute the central attraction, mainly because of accessibility limitations and a lack of detailed studies of the complex hidrokarstic regional system. This presentation paper briefly shows the work being done by local and federal authorities, indigenous communities and academic institutions to transform the CNP into a true Geopark, first to be identified at a national level and second to fulfill the conditions to join regional and international networks for geo-

conservation and geoheritage, in particular the Global Geoparks Network supported by UNESCO. Current work includes inventory, identification and assessment of geosites and geomorphosites within the CNP, design of cartographic and other outreach material needed for the promotion of geotourism in the park, training of local guides, and more specialized research related to paleoseismology based on geochemical analysis of fallen stalagmites, geomorphology and paleogeomorphology.

Presented in Theme 4

The role of Chorotega people knowledge in Aspiring Rio Coco Geopark

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The contribution deals with the importance of knowledge, skills and traditional lifestyle of Nicaraguan indigenous peoples for the aspiring Rio Coco Geopark. It focuses on the analysis of the level and form of usage, or at least the respect for this know-how passed from generation to generation, and for other elements of collective memory of this emerging geotourism destination. The author presumes that the quantitative and qualitative level of usage of this know-how has been increasing within the geopark since the geopark initiative has emerged.

To verify this hypothesis, the national, regional and local authorities were inquired as well as the local indigenous people – Chorotegas. The research of these native people was focused mainly on their perceptions – which kind of impact has the Rio Coco Geopark initiative on the level of respect and integration of their traditions, skills, knowledge and lifestyle into the majority population.

It is believed that the sensible fusion of the modern science with the traditional indigenous knowledge can be a helpful step for solution or even prevention of many environmental and cultural problems, not only in the areas with fragile natural and cultural heritage.

Presented in Theme 7

Birthing Stones House: a case of success in Arouca Global Geopark

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In Castanheira village (Arouca Global Geopark, Portu-

gal) crops out a singular geological phenomenon, related to the weathering of the Castanheira Nodular Granite. It exhibits a type of granitic nodular texture that as far as it is known, is unique in Portugal and worldwide. Through the process of erosion, black nodules are released from the host granite and accumulate in the soil, leaving a small cavity on the rock coated by a thin biotitic layer. Due to this phenomenon, local farmers and shepherds have been calling this rock, for a very long time, as the “stone that give birth” (*Pedras Parideiras*), which became one of the most visited geosites in Arouca Global Geopark. In November 2012, the “Casa das Pedras Parideiras” (Birthing Stones House – Interpretation Centre) located in the Castanheira village opened to the public. This new infrastructure was created in a restored small traditional house to enhance and endow this geosite at the Freita Mountain. The main aim is to promote its scientific, educational, cultural, recreational and touristic potential. Thus, the services offered by the interpretation centre includes guided visits by specialized guides from the museum and also to the Freita plateau to general public and educational community, touristic information, and shop with locally manufactured products. Between November 2012 and December 2013 were received 30,504 visitants of whom 53% were individual visitors, 25% touristic groups, 21% educational groups and 1% visitors in work context (journalists, master’s theses, among others). The main visitors are Portuguese from the north region of the country. The foreign visitors represent 3% and come mainly from Brazil, Spain and Germany. Due to the high influx of visitors, three full time jobs for people were created, who also nowadays help the local inhabitants, mostly of them elderly. It is a true case of success in Arouca Global Geopark.

Presented in Theme 3

Science, education and geotourism based in the geological heritage: different approaches in the Terras de Cavaleiros Aspiring Geopark, Portugal

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The Terras de Cavaleiros Aspiring Geopark (TCAG) is located in northern Portugal, covering an area of 700 km² with an extraordinary and complex geology, as well as a remarkable collection of natural and cultural values. To those belong the Albufeira do Azibo protected landscape, with a beach ranked as the best lagoon beach of Portugal, and as a cultural highlight the Caretos de Podence, diabolic and mysterious figures characteristic of the Carnival. The area has a recognized scientific geological value and a long tradition of research and scientific visits. In relation to mineralogical, petrological, structural, geomorphological and

hydrogeological characteristics, 42 geosites were identified in the territory of the geopark. Beyond the scientific evaluation of the geosites, there was a special emphasis on geosites with increased educational and touristic interest. Therefore, the complexity of the geology required a strategy of interpretation recognizing the different needs of the geopark’s main target groups: schools, geologically advanced visitors (experts), geotourists and general tourists and inhabitants. The TCAG prepared a set of programs, routes and infrastructures designed for the knowledge and interests of each group: educational programs for different school grades, tour packages for tourists and geotourists, interpretative panels at the geosites for the general public, an interpretative center to support the field trips of schools, as well as a geological route for the experts.

Presented in Theme 4

The Sardinian Geopark: a microplate and people’s connections

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This overview provides the basic information on the geological history of the Sardinian microplate (Italy). Examples of the relationship between inhabitants and geology will be considered in order to establish the role of natural resources as an element of people’s connections through time. Finally, some peculiar geological features will be exposed as representative of their high scientific-educational value and good practice for preservation and valorisation, both inside and outside of the “Core Areas” of the Geomining Park of Sardinia.

Sardinia shows an extraordinary array of geological features in a relatively small area. The Cambrian to Devonian succession, interrupted by the tectonic “Sardinian Phase”, shows a Mid-Ordovician widespread gap. The Variscan orogeny strongly characterizes the basement structure; extended outcrops of intrusive and effusive rocks and reduced Permo-Carboniferous sediments crops out in several areas. The repeated Mesozoic transgressive/regressive cycles, mainly represented by carbonate deposits, mark the landscape. The unconformities are well exposed and easily understood by non-specialists. The Cainozoic tectono-stratigraphic evolution of the Corsica/Sardinia microplate represents a well-known example for explaining continental drift with the associated suite of volcanic and sedimentary rocks. Quaternary deposits testify to the climatic changes and the settlement of *Homo* since Palaeolithic time.

How did geology and natural resources influence and, in past and present day, connect people? Early exploitation of Miocene flints date back to Lower Palaeolithic while obsid-

ian, jasper and copper was exploited during Bronze Age. All these primary resources, carved in the island, have been found outside of Sardinia and testify to the connection with many Mediterranean regions. Later on (phoenician and roman times), exchanges grew considerably, and in later centuries reached a worldwide connection between foreign managers and simple workers. Today geoconservation and the cultural heritage related to the mining exploitation, serve to again link engaged communities and tourists, and represent an important sustainable resource.

Presented in Theme 2

The Geopark Safaris of the Hondsrug area

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The Hondsrug region is a unique geological area where the cultural heritage is closely linked to the land. Although the Hondsrug name is well known, people often know little about the region's historical origins and its rich cultural heritage. Our challenge is to help visitors experience the area and its history. To this end, we developed the concept: Geopark safaris. The Hondsrug is a geological complex of linear till ridges of about 60 km in length. It was formed during the Saalian glaciation, about 150,000 years ago. Around 5,500 years ago the first farmers built 47 prehistoric monuments made from big boulders dating from the Ice Age. The strong relationship between geology, nature, cultural history and contemporary culture is visible through thousands of landscape objects all around the area. The Hondsrug Geopark tells the story of the landscape in many different forms. These include: museum exhibitions, educational programs, geosites open to the public, hotspots, a website, tourist programmes, books, new walking and bicycle tours, smart phone apps and many other activities and products. Both tourists and the local population are the target groups for Hondsrug Geopark. Today, more than ever, tourists want to "experience" things, so that is precisely why, together with nature conservation organisations and entrepreneurs, we have developed the Geopark safaris. These trips offer a link to ancient Drenthe: its genesis, its rich cultural history and beautiful nature. We are trying to attract visitors to the local area by offering special arrangements. Once settled in a hotel, holiday park, or bed and breakfast, they have a choice of what to do. This paper will provide detailed description of how visitors can experience the Hondsrug area.

Presented in Theme 1

The east border region of Ireland: a new landscape

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The Mourne Cooley Gullion geotourism region straddles the Northern Irish – Irish border, midway between the cities of Belfast and Dublin. Geologically, it sits close to the Palaeozoic Iapetus suture and the Caledonian-Appalachian mountain belt, and hosts three distinct Cenozoic igneous complexes associated with the opening of the North Atlantic. Geomorphologically, the landscape was shaped by ice during the last glaciation and archaeologically, the region has an unusually high concentration of well-preserved Neolithic monuments as well as a richness of medieval fortifications and churches.

Much of Northern Ireland and the border areas lag behind the rest of Ireland and Europe in tourism development and marketing due to their late twentieth century history, but peace has brought an appetite for cross-community, cross-border development and tourism. Located within an hour of international airports and ports, our obvious markets are Europe and North America, but the beautiful north of Ireland is still not seen as a holiday or leisure destination by many in Ireland. The Geotourism project is funded by a section of the European Regional Development Fund specifically aimed at cross-border structural and trade improvements. In the past two years, we have established a strong geotourism presence and in addition to community tourism events, we have active education, Geoambassador training and Geoconservation volunteer programmes. Our capital investment programme is ongoing and we hope to have Geoparks developed throughout the region by 2015.

Inspired by the three Geoparks on the island, including the cross-border Marble Arch Global Geopark, we aim to achieve Geopark status. We have many similarities and there is much to learn from their work, but our narrative is unique to us. We hope to develop a tourism product that works well with our communities, our relatively new physical landscape and our new political landscape.

Presented in Theme 4

Community education for achieving West Java Aspiring Geopark

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Ciletuh area is located in the southwestern part of West

Java, Indonesia. It is one of three places in Java where pre-Tertiary rocks crop out. The pre-Tertiary rocks were regarded as melange complex rocks, and are evidence of pre-Tertiary subduction in Java. Therefore, Ciletuh area holds important sites for geological science of Java Island and Indonesia. The geological setting and the nature's beauty make Ciletuh an area with potential to become a geopark. Thus, the Geological Agency of Indonesia has made some effort to make Ciletuh area part of West Java Aspiring Geopark.

The West Java Aspiring Geopark has to involve the community as a part. In fact, The Ciletuh people are part of West Java community that have inherited the Sunda culture of their ancestors. They are generally aware of their nature's beauty. However, most of the people are unaware about geological importance and the tourism potential of their region.

Therefore, we as geology students have a concern to help the Geological Agency achieve their goals, by giving such geological education to Ciletuh people. The education is done through schools and a community group. It involves experts from the Geological Agency, geology students as educators under the supervision of Institut Teknologi Bandung Lecturers, and the Ciletuh people. The education methods are socialization for the general community and geotourism practices in a community group. The materials provided in the socialization are knowledge of general geology, geological setting and natural resources of the area, and the importance of the people's role in a geopark such as protecting geological sites. More knowledge and skills are given in the geotourism practices to those who are more interested to become a tour guide or an interpreter. The expected results of this education are community awareness and pride of their region's uniqueness.

Presented in Theme 4

The requirement to specific codes for vernacular accommodations for Geoparks

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Visitors survive geoparks. Geoparks represent the quality of connection between the geological features and human life in order to prove the importance of protecting the geological heritage in the fate of the earth that is already the fate of the mankind. In this occasion, Geoparks need visitors for empowering the local economy. The more contact between visitors and locals, the more responsibility for the visitors, but this requires well-established accommodations to encourage tourists to spend more time with locals in their residences, as well as inspire them to visit the Geopark again.

Visitors rely on the logo of GGN and/or the National Geopark, and naturally have expectations to receive a predictable quality, security and peace during their stay. We are also responsible to raise up the brand of geopark, so creating specific codes for inns, hostels, resorts and all places, is a vital step in this way. All geoparks need some specific formal detailed codes and guidelines to supervise and check the quality of partners' services. On the other hand, there are many other codes ordered by the authority that should be respected. We have recently begun to provide it for Qeshm Island Geopark by reviewing the similar codes of local and international tourism organization for hotels, local hostels, and hotel-apartments. The next step is to localize the codes with our special circumstance. The outcome will be presented during the conference. The future of the network depends on the quality of our services.

Presented in Theme 2

The mode selection and the practicable approaches of Ningde Global Geopark's sustainable development

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A Geopark's sustainable development relies on the coordination of three inter-related and inter-promoted aspects; geopark construction, relics protection and economic development. For each geopark, how to keep a good balance of these three aspects is the key problem to the geopark's sustainable development. The thesis sets the practice of Ningde Global Geopark as the study case, introduces its three-dimensional exploitation mode, and presents four effective approaches for the sustainable development of the Geopark. The three-dimensional exploitation mode, that is; plate partition, space division, and time segment, is adopted by Ningde Global Geopark on the basis of the scientific research value and aesthetic value of its abundant geological relics including the rocks, minerals, landforms and so on. The effective approaches during the implemented process can be concluded by at least four aspects. They are the improvement of the environmental protection measures, the reinforcement of the research and science education, the perfection of administration modes, and the establishment of tourism industry system. Both the mode selection and the practicable approaches balance the relationships among the geological relic's protection, geological relic's propaganda and economic development, to serve for the sustainable development of Ningde Global Geopark.

Presented in Theme 1

On local participation in the development of Geoparks: a case study of Wudalianchi Global Geopark

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Wudalianchi Global Geopark became a member of GGN on February 13, 2004. During development over the past ten years, the Geopark has been attaching much importance to the participation and integration of the local residents, and realized the harmonious development with the local society. The integration embodies the following aspects: the local residents have priority to be employed by the Geopark; the local primary and high schools invite the experts of the geo-museum to teach geo-science for the students; the local residents sponsor a patrol team to supervise the geoheritage resources and environment; the local residents run restaurants and hotels to provide service for tourists; the folk craftsmen create tourist souvenirs featuring the volcano or mineral spring; the Geopark cooperates with the local government to hold the “Holy Water Festival” in each lunar May to promote the influence of the Geopark.

Presented in Theme 2

The role of geological museum to support geoconservation and geopark development in Indonesia

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Museums have an important role in collecting, preserving, conservation, documentation, and exhibition of tangible and intangible natural and cultural heritage for education, research, and geotourism. Geological Museum in Bandung preserves geological collections, either they are written as fieldwork notes or laboratory works, as well as records in term of landscapes as natural heritage. Geological Museum is one of the favorite destinations for many people. There were 400,000 visitors in 2011 – about 85% were students of all levels. The museum also disseminates geological knowledge to school teachers and students through seminars and exhibitions, as well as conducting cooperative research. Research with other institutions has made two spectacular findings: the largest coal reserve, and the most complete fossilized skeleton of elephantidae. It is important to note that Geological Museum stores collections of rocks, minerals, and fossils that have been collected since the end of 19th century reaching hundreds of thousands in number up to this day. Those rocks and fossils were found in many places/locations in Indonesia and, unfortunately, most of the places were destroyed or damaged either naturally or by human activities. Therefore there

might be no evidence for the next generations to witness the existence of the locations. Thus, the collections of the Geological Museum become an authentic proof for geo-conservation and geopark development in Indonesia.

Presented in Theme 4

Celebrating 200 years of the paroxysmal eruption of Tambora by promoting the area as the global geopark in Indonesia

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Tambora volcano in Sumbawa Island, West Nusa Tenggara Province, Indonesia, is very famous in the world due to its paroxysmal eruption on 10 to 11 April 1815. This eruption which was 7 scale in the VEI (*Volcanic Eruption Index*) threw an amount of 100–150 km³ of volcanic materials into the atmosphere with an umbrella high of the eruption estimated at 30–40 km. It produced a caldera about 7 km in diameter, with a depth of 1.1 km. This fierce eruption also buried three small empires in its slope and resulted an extreme winter and a year without summer in some parts of the world. The total victims in Lombok Island and Sumbawa Island caused instantly by the eruption reached 92,000 inhabitants. Now, the region of Tambora volcano has potential geoheritage in Indonesia, and even in the world. These include volcanic peaks, the caldera, a new lava dome of Doro Api Toi, and artifact remnants from the three empires in the form of ceramics, cookware, human skeletons, etc., now some of them is still buried by the pyroclastic sediments. In the context of education of disaster mitigation, geoheritage conservation, and local economic growth through geowisata, Tambora region deserves to be proposed as member of Global Geopark Network (GGN). This GGN status is expected in year of the 200th anniversary of the eruption. For the purpose, now the area is being processed as the National Park and National Geopark.

Presented in Theme 4

Introducing Persian Gulf's sea attractions as reinforcement factors for the Qeshm Geopark

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In 2006, with an area of approximately 320 km², Qeshm Geopark was established. The Geopark boundary then became fivefold bigger and changed to 1560 km² in 2012. A variety of important features such as the World's Longest Salt Cave, which is located in Namakdan, and also beautiful Chahkoooh Canyon, Statues Valley, Star Valley and Shour Valley geosites are within the Qeshm Geopark's property. While the Geopark has much potential, it has come across many obstacles during the past years because of uncertainty of responsible supports and the head managers of the area. We believe that we can introduce two factors for improvement of Qeshm Geopark, which are: the local community living inside the Geopark boundary which is keen on the issue and is trying to conserve the Geopark, and second is the natural potential of the area.

This paper focuses on sea factors which include: sea mammals, sea turtles, especially critically endangered species of hawks bill, and coral reefs and to showcase how these factors can affect the Geopark positively. Coral reefs beside tropical pluvial jungles and ponds are the most important and the most valuable ecosystems of the world. In the north of the Persian Gulf in Iran, the main spread of coral reefs is around the islands, but unfortunately this important and sensitive ecosystem is not managed. In this paper, in addition to a brief introduction on coral reefs, Tonbe Bozorg Island is suggested to be added to the Geopark's boundaries because of its adjacency. In this manner, it can be managed and conserved under the world criteria's and standards, under support of the Global Geoparks Network (GGN) experts.

Presented in Theme 1

Integration of UNESCO mercury heritage into Geopark Idrija

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During its five-centuries-long mining history Idrija was always a top player in mining technology development. The process of enlisting mercury-mining heritage on UNESCO started in 2006 and was completed in 2012 with the successful nomination of Spain and Slovenia with 'Heritage of mercury, Almadén and Idrija'. Enlisted heritage sites in Idrija comprise the town centre with the entire mine complex, the mercury ore deposit, underground galleries and shafts, the water channel Rake with the Kamšt water pump system, the smelting plant and four preserved water barriers Klavže which bear evidence of immensely sophisticated technology of timber supply for the mine.

No more than one year later, in 2007, the striving for protection of the geological and other natural and cultural heritage in Idrija Municipality within Geopark Idrija began. We firmly believed that beside the technical heritage, the natural endowment that enabled such large-scale expansion of mining and the intangible heritage are essential, too. Geopark Idrija was established in 2010. It encompasses the entire municipality territory. We strived for a complementary content of both nominations running simultaneously.

Geopark Idrija successfully joined the EGN and the GGN in 2013. The parallel combination of UNESCO heritage title and the geopark status offers an incredible opportunity to participate in preservation, protection, presentation and promotion of cultural, natural and intangible heritage. All managers and caretakers of UNESCO sites are also Geopark Idrija partners. Slowly Idrija's recognition being a UNESCO destination increases and simultaneously it expands its offer to the countryside together with other Geopark Idrija partners, emphasising protection of nature combined with sustainable development. All of this also provides progress to the countryside as such and to the offer of Geopark Idrija.

Presented in Theme 6

Sardinia's historical and cultural heritage of mining exploration

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In Sardinia, the exploitation of mineral resources began in the Early Neolithic age (6000 BC) with the mining and processing of obsidian, followed in the late Neolithic period (3000 BC) by the extraction of talc (steatite variety). With the development of bronze metallurgy during the Nuragic age (1200 BC) began the exploitation of metallic ores, in particular copper bearing minerals for the production of bronze. In 1000 BC, the Phoenicians took an interest in the Sardinian silver and lead bearing ores. Following this, the Punics also intensely exploited the mines in the Iglesiente region (SW Sardinia), where evidence of their excavations persisted until the middle of the XIX Century. In 238 BC Sardinia passed under Roman rule. The evolved mining and metallurgical techniques of the Romans were applied to the Sardinian mines. Following the end of Roman rule, mining exploitation was only resumed in the XIII Century, thanks to Count Ugolino della Gherardesca from Pisa, who founded Villa di Chiesa (today Iglesias), a thriving mining town and the second most important metallurgical center of Europe after Bohemia.

With the extraction of granite and mining of mineral deposits of lead, zinc, silver, copper, iron, nickel, cobalt, antimony, tungsten, molybdenum, manganese, cadmium, germanium, mercury, gold, carbon, fluorine and barium, mining finally developed with varying success until the industrial age, marking the following major seven periods, here in chronological order: (1) prehistoric, (2) Phoenician-Punic, (3) Roman, (4) Judicial and Pisa; (5) Aragonese-Spanish; (6) Savoy; and (7) Modern.

With the end of their industrial cycle (1980), all the Sardinian mines saw their role changed, essentially assuming sufficient cultural importance today to be declared "World Heritage" sites. The almost total abandonment of mining in Sardinia left an important and unusual heritage of historic and highly distinctive environmental values, documents and archives, infrastructure, machinery, buildings, skills, and human values, within a context of really extraordinary natural landscapes that represent a unique cultural identity to be preserved and transmitted. This is one of the main tasks undertaken by the Geological, Mining, Historical and Environmental Park of Sardinia from its institution.

Presented in Theme 1

Trails and connections of geosites throughout the geological, mining, historical and environmental Park of Sardinia, Italy

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An internationally recognized Geopark is a territory that has a particular geological heritage and a sustainable development strategy. It must have well-defined boundaries and sufficient extension to allow an effective economic development of the area. Geoparks represent a special category of territories that are gradually establishing themselves nationally and internationally for the implementation of specific policies for the protection and enhancement of geodiversity and geological heritage. The geological, mining, historical and environmental Park of Sardinia is a Geopark developed throughout the island with a strong propensity for the development of a local economy. Sardinia's geology is one of the most comprehensive in Europe and the entire circum-Mediterranean area. In just 24,000 km² is documented a geological history spanning over 500 million years, which houses the testimony of extraordinarily diverse events belonging to different geological cycles occurring in an interval of time from Paleozoic to Quaternary. This geodiversity is didactically well illustrated in the sequence of sedimentary, igneous and metamorphic rocks present throughout the Sardinian territory distributed in roughly equivalent different areas.

With the aim of helping to create the conditions for sustainable development in the context of environmental and of industrial archaeology tourism activities the Consortium of the geological, mining, historical and environmental Park of Sardinia formalized with various Sardinian institutions, a multi-year partnership to define common strategies to realize the Regional Network of trails. This planned network should be shared, interconnected, uniform and furnished with hiking maps specifically made for hiking and trekking, also downloadable from the Web.

The park will lay out new trails in Sardinia in the territory falling within its competence, winding across important natural and environmental scenery through mining areas of stated big historical and cultural importance. The objective, connected to this network, is to bring the general public, including experts and lovers of hiking and trekking, not only to the knowledge of the natural environment, but also to those traits derived from years of industrial archeology of mining activity in the region that has left tangible signs of a great culture. In particular, this refers to the geological and geomorphological assets denominated geological sites. In this context, specific places or parts of the territory characterized by paleontological, mineralogical, petrological, geochemical, volcanological, structural or morphological peculiarities or related to deposits or cli

mate, may be of big geological interest and stand out from others to constitute in some cases even real uniqueness within the Mediterranean area. These, defined by the term Geosite, are decreed an opportunity for conservation. The geological sites are thus clear examples and testimonies of geological events that occurred in the past and help to define the geological heritage of a given territory or region.

As part of the geological heritage of Sardinia, the geological sites are important elements in the territory planning and environmental protection. These activities belong to the policies for the protection and enhancement of history, culture and environment, with particular reference to that part of natural heritage defined as geo-sites and / or geomorphosites, with the aim of supporting sustainable development by the spread of the values of industrial archaeology as well as environmental and cultural tourism activities.

Presented in Theme 1

Connecting: the Aspiring Imbabura Geopark, Ecuador

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The Provincial Government of Imbabura together with other State bodies is backing the bid for a Geopark in the region of Imbabura, Ecuador. Ecuador covers an area roughly equivalent to the State of Arizona and is the smallest of the Earth's mega-diverse countries, occupying only 0.19% of the world's surface area. The region is named after the Imbabura volcano, an inactive stratovolcano in North Ecuador that is not considered extinct, although it has not erupted in 14,000 years. Taita Imbabura (Father Imbabura) is considered to be the sacred protector of the region which is rich in geological features such as the Mojando volcano and inter-caldera, (according to myth, Imbabura's rival for the favours of the nearby Cotacachi volcano, the only female volcano in the region according to the Andean cosmivision), the thermal springs at Yanayacu, Nangulvi and Chachimbiro, the Valle del Chota (home to Ecuadorian football prodigies and part of the Afro-descendent population) and the Lakes and Lagoons of Yaguarcocha, San Pablo, Cuicocha and the waterfalls at Peguche. Imbabura as a region is home to the Otavalo, Natabuela, Zuleta, Cayambe, Caranqui and Awa people, together with the significant Afro-descendent population in the Valle del Chota, with the language of Quichua the only survivor of the original existing native languages. It is an area of cloud forests and outstanding orchid families, plus significant flora and fauna reserves, including the ecological park of Cotacachi/Cayapas. The area has received attention under the PPD projects of the UNDP. The reason for positing the proposal of a Geopark at this given time is that the Government has been investing heavily in the area and tourism will soon take off

on an unprecedented scale, due to the fact that Yachay, the City of Knowledge is to be located in the region at Urcuquí, the former textile factory of Imbabura is to be reopened as a cultural centre housing four museums, an auditorium and capacity for 1,500 people in conference installations (imminent, in March 2014) at Atuntaqui, and the railway line between Otavalo and Ibarra will be re-opened in May 2014. The Geopark is, thus, an attempt to ensure that quality of life will be enriched for the native populations through Responsible Tourism (turismo consciente under the overarching framework of Buen Vivir, Good Living, as defined by the Ecuadorian government) within the Nature Tourism positioning of the Ministry of Tourism for Ecuador. The Imbabura Government and the Town Councils have been working hard to bolster community tourism ventures that would receive added credibility if accepted into the GGN. The Geopark is original in that it places the restored Industrial Heritage, the textile factory, run on hydroelectricity, and the railway line (originally serving the factory with the raw goods) at the heart of the management plan for the preservation of socio-cultural and natural identity. It is hoped that other partners in the RECINATUR network, Colombia (trans-national Carchi/Pasto), Chile (Corral on the coastline and the Lake region around Valdivia) and Mexico (The Huasteca Potosina region) will accompany us with parallel or later bids, allowing us to bring an already existing network hopefully into the GGN and to be more effective/efficient in our financial resource and management plan development.

Presented in Theme 4

Connecting: the Aspiring Trans-National Park of Carchi, Ecuador, Department of Nariño, Colombia

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The bid for a trans-national geo-park between Carchi in Zone 1 in Ecuador (the same zone to which Imbabura belongs) and Nariño in Colombia is a bid for peace in an area subject to many UNDP (ART) initiatives, including UN-WOMEN empowerment projects, as a result of the long-standing conflict (due to FARC activities etc.) in the region. It also responds to an initiative for a geo-park that reflects a geographic and geological unity, although geo-political frontiers have been traced to divide two cultures and two regions that share so much in common. Both regions share, therefore, the same problems in eradicating poverty and creating employment, producing peace through welfare. This bid is in its first steps since it involves extensive negotiation between both sides and should, by all rights, be presented by Colombia, who are the instigators although the Ecuadorian side, at present immersed in local elections, is well-disposed towards pursuing the same as of March. Both

areas are active in the RECINATUR network (and, thus, this bid is to be considered together with Imbabura and Huasteca Potosina).

The region of Carchi is divided into six cantons: Bolívar, Espejo, Tulcán, Montúfar, San Pedro de Huasca and Mira. Mira in particular is famous for having been the centre for the studies of the French Geodesic Mission in 1766. The province is located in Ecuador on the northern border with Colombia, bordering the southern Colombian department of Nariño. Only 8% or so of the whole province is flat. The most important elevations are the Chiles volcano (at 4,270 metres), El Pelado (at 4,149 metres), Chiltazan (3,967 metres), Mirador (3,831 metres) and Cerro Negro (3,674 metres). The upper part of the province is mild with a cold-damp climate but with a hot area in the South in the Valley of Chota. Areas such as El Ángel ecological reserve are extremely cool, with temperatures dropping below 10°C. The Reserve is an extensive system of moorland and wetlands with a forest of ancient *Espeletia pycnophylla* (Frailejones) some up to 10 metres tall. In San Gabriel, there is a 16 hectare-forest of arrayanes, a rare tree with legendary magic properties whose bark is cinnamon in colour. In Bolívar, there have been the remains of a mammoth found. The province is also home to the Lagunas Verdes, three sulphur-water lakes of volcanic origins and the Tufiño hot water springs. The Guanderas scientific station at Huaca carries out biological research.

The bordering Colombian Department of Nariño is participating through the international relations of Pasto municipality in promoting the area surrounding the South-West skirts of the volcano Galeras, known as El Santuario, which includes seven municipalities: Pasto, Nariño, La Florida, Sandoná, Consacá, Yacuanquer y Tangua, some 8,886 hectares with altitudes ranging between 1,950 and 4,276 metres and temperatures of, on average, between 3 and 13°C. The ecosystems of this protected area are similar to Carchi's and are volcanic in nature due to the proximity to the Galeras volcano, one of the most active in Latin America.

The Sanctuary is home to many of the descendents of the original tribes, the Quillacingas: Agua Pamba, Chargualyaco, Mapachico and San Cayetano still maintain the ethnic and cultural traditions of their forefathers and work the land according to the ancestral customs and ways. The area is famous for its New Year celebrations (Blancos y Negros) and for the Carnivals.

The areas share many geological features and, thus, it is important for them to work together to strive to promote wealth and welfare for the local people through responsible tourism in a climate of peaceful co-habitation.

Presented in Theme 4

Tools to promote the extension of the Arouca Global Geopark borders

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The national and international success of the Arouca Global Geopark, recently enhanced with the “green card” for the 2013–2017 quadrennium, generated a great consensus regarding the possible extension of the geopark territory to the area of ADRIMAG - Local Action Group (Arouca municipality and six neighboring municipalities): the Montemuro and Gralheira territory, located in the north of Portugal. The geological inventory is concluded and it consists of eighty geological interest sites (sixty nine geosites, nine mining areas and two paleontological collections). The geological heritage inventory of the Montemuro and Gralheira territory involved five main steps: (i) bibliographical research; (ii) meetings with technical / councilors of the municipalities; (iii) fieldwork; (iv) filling the inventoring form for geological interest sites; and (v) production of geological heritage maps. This study will serve as the scientific basis to justify the extension of the Arouca Global Geopark. At the same time an Action Plan for the 2014–2020 period was proposed in order to assure the implementation of actions related with geoconservation, geoeducation and geotourism. The action plan main goals are: (i) raising awareness about the importance of geological heritage; (ii) developing a territorial geoconservation strategy; (iii) improving an educational strategy based on local heritage; (iv) ensuring that the geological tourism and the geotourism are a differentiated offerings in the territory; and (v) promoting the increase of scientific literacy. The implementation of this action plan in articulation with local makers as ADRIMAG and the seven municipalities could be decisive for create the best conditions to prepare the territorial extension of the Arouca Global Geopark.

The Montemuro and Gralheira territory was recently certified by the Europarc Federation, as a destination for sustainable tourism within the CETS - European Charter for Sustainable Tourism, already an important tourism strategy that will contribute to the Arouca Global Geopark territorial extension.

Presented in Theme 1

Discursive semiotic analysis of the female indentity representation in Colina do Horto Geosite, Geopark Araripe, Brazil

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Culture comes from the human capacity of communication. Thinking and acting inside a social group implicates in a feature of identity in the symbols, meanings, ideas, abilities, and relationships in general (family, work, etc.). These particularities just reflect the culture as a catalyzing instrument in the transmission of values about the environment, linking themselves directly to the postures, attitudes and behaviors of the individual in its socio-environmental space. Based on the discursive-semiotic analysis of the oral narratives, it is possible to identify effects on meaning that denounce the anchoring of these values. For this study, we considered the *Colina do Horto Geosite*, because it manifests the religious and cultural introspections in a dense way through the traditional and/or more contemporary languages. The evidences are extended to the music, chant, poetry and festivities, as well as to the words, gestures, beliefs, means and forms. This diagnostic was systematized from a definition of the groups that characterized the community involved in the *geosite*. The group chosen for the initial research application was formed by adult women belonging to the urban low-income class, who are inhabitants of the local community and therefore, maintainers of these cultural traditions. Based on their personal reports, differences of values expressed in their narratives were perceived, due to the geographical location from the *geosite* center: defining the center as the core of concentration of the religious-cultural manifestations, it is perceived that the closer the pilgrimages events are, they are more likely to be actants of a making-believe (in the miracles ascribed to *Padre Cícero*, who was popularly elected Saint). And the farthest they are, they tend to be addressees of a making-known (to transmit cultural aspects and local customs), which consolidates effectively, from these dispersion centers.

Presented in Theme 7

Connecting: recinatur and the proposed Geopark in Huasteca Potosina, Mexico

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The state of San Luis Potosí, in the centre-North of Mexico is made up of 58 municipalities, distributed over four

geographic areas, known variously as Región Media, Centro, Altiplano and Huasteca. Huasteca Potosina, the area proposed here, is second in importance from the socio-economic perspective. The region covers some 11,409.46 km² (18.31% of the total State of SLP) with a population of around 667,000 (30% of the total State population). The climate is tropical with an average 26°C all year round, apart from May when temperatures of over 50°C are registered. The Huasteca Potosina is made up of the following 20 provinces: Aquismón, Xilitla, Huehuetlán, Coxcatlán, Tampamolón Corona, Tanquián de Escobedo, Tancanhuitz de Santos, San Antonio, Axtla de Terrazas, Tampacán, Matlapa, San Martín Chalchicuautla, Tamazunchale, Tamasopo, El Naranjo, Tamuín, Ebano, Tanlajás, San Vicente Tancuayalab and Ciudad Valles.

The Huasteca Potosina is in the extreme East of the State, in full midst of the Sierra Madre Oriental and concentrates 94.8% of the native speakers of Náhuatl and Tenek. The main attractions offered by the area are the archaeological sites at Tamohí (the place where the figure of the God Quetzalcóatl as a youth was discovered) and Tamtoc, where a 30-ton monolith was excavated. Micos is a series of seven stepped waterfalls with their corresponding pools; El Sótano de las Golondrinas, one of the deepest and most beautiful abysses in the world (512 metres) that offers the incredible spectacles of thousands of swifts emerging and returning each day; Tamul, the largest waterfall at over 100 metres; La Cueva del Agua, the cave lagoon together with the caves at Mantetzulel, divided over four different caves full of spectacular rock formations; El Jardín Surrealista, the Surrealist garden created by Sir Edward James, full of exotic vegetation with three-stepped waterfalls and sculptures based on magic symbolism; Tamasopo with its three-stepped waterfalls and the Puente de Dios, the cave with a blue lagoon the waterfalls at Minas Viejas and El Meco; El Puente de Dios del Sidral y Aquismón; the rivers el Salto and Tampaón, El Sótano de las Guaguas, various natural water springs and the protected nature reserve of Sierra del Abra de Tanchipa, by way of mention of only some of the natural attractions.

The natives of the region maintain many of their ancestral traditions. Their cosmovision is based very strongly on astronomy and they use the stars to guide them in their day-to-day life. The huastecos are direct descendents of the Meso-American civilisations. Tenek in their mother tongue means *los que viven aquí en el campo con su lengua y que comparten costumbres*: those who live in the country and share customs and a common language. The whole community participates in collective tasks. Indeed, this is an obligation to form part of said communities.

However, the area is riddled with pockets of marginalisation and poverty. To that end, the national government in State Development Plan 2009–2015 has proposed various axes along which to work to eradicate poverty, promote and preserve the natural resources and the cultural heritage mainly through community employment in responsible

and inclusive tourism, with the creation of competitive tourism products based on identity and natural landscape, ranging from geo- to adventure tourism.

This proposal forms part of the RECINATUR bid to set up a network of geo-parks within an existing network based on responsible tourism and preservation of natural identity to join the GGN. All of the areas involved in the various parts of Central and Latin America are regions where native traditions and cosmovisions are being disrupted or are in danger, due to developments arising from geological extractions. RECINATUR, as the name indicates, is working in the field of responsible tourism to train trainers and strike scale economies in operations such as, in this case, the design of management plans that will work in each of the applicants within the network. This bid, which is still in its earliest stages but designed to be presented in October 2014 (together with Imbabura, Ecuador, Carchi (Ecuador)/Pasto (Colombia) trans-national geo-park and Corral/Zona de los Ríos (Chile) is designed to offer a sustainable future for the excluded native populations, through their geological and archaeological heritage and their sociocultural traditions, that will stem the migration of youth from the area. Although the proposal is presented by the University, the State and popular support exists and will be built up before the bid is formally presented in October.

Presented in Theme 4

**Geotourism in caverns of México:
a proposal for the protection of geomorphological
heritage in a sustainable development context**

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Caverns are common in Mexico. About 40% of the Mexican territory is covered by limestone and other soluble rocks, where karst features including caverns are present. Some outstanding examples include the Huautla and Cheve systems (Cuicateco) with -1,545 m and -1,484 m depth, respectively, being among the deepest in the world. Furthermore, the second longest cave system worldwide is also found in Mexico, the Sac Actun Nohoch Nah Chich system, in the Yucatan Peninsula being 310 kilometres long. The Grotto of Cacahuamilpa, the best known and visited cavern in Mexico (more than 350,000 visitor per year), the Sótano de las Golondrinas and the Sótano de El Barro, may be also mentioned.

Mexican caverns are usually associated with archaeological vestiges and represent an important tourism resource for local sustainable development, particularly in areas where indigenous communities have limited alternatives to improve their living standards. However, the promotion of this valuable geoheritage is far from being properly exploit-

ed. The lack of scientific information and the limited educational skills of the guides, coupled with the lack of materials (booklets and maps), have prevented the use of the high potential of caverns from both tourism and educational points of view. The implementation of geotourism activities, according to models set by the UNSECO assisted Global Geoparks Network, would contribute to the knowledge, conservation and protection of this natural resource in a sustainable development.

This work refers to the speleological resources in México, giving some representative examples of their actual status and context regarding management, present situation and future perspectives.

Presented in Theme 1

**Geology, geotourism as definite factor for Geopark
Ciletuh Indonesia**

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The Geopark concept that integrates the preservation of geological heritage into regional sustainable economic development is becoming popular in Indonesia since the first Indonesia Geopark was inaugurated in 2012. Ciletuh is the only region that has a very unique geological diversity and the oldest in West Java. The rock formation of this region is very complex and unique where the ophiolite (peridotite, gabbro, pillowed basalt); metamorphic (serpentinite, phyllite, schist); sedimentary (greywacke, nummullite limestone, black shale, red clay), and volcanic rock complex are side by side in harmony as a tectonic remnant of subduction between Eurasia and Indo-Australia plates in the Cretaceous age. The spectacular geomorphological landscape of the region resembles a giant amphitheater that opens directly to beautiful blue ocean of Ciletuh Bay. These fantastic geological heritages have become famous as geotourism objects when viewed from seaside along from Ciletuh Bay to Ujung Genteng Cape. The presence of green turtle breeding places makes Ciletuh and surrounding region a very good destination for geo-education and geotourism. In addition, part of Ciletuh region also includes Cibanteng Nature Conservation. The northern side of Ciletuh Bay is the famous tourism area of Pelabuhanratu Bay. Within this region, the Cisolok Geyser is another best heritage geo-site. The beautiful geology, landscape and beach sand along the Pelabuhanratu Bay in combination with the myth of Nyi Roro Kidul as Queen of Southern Ocean, makes Pelabuhanratu the best side for development of sustainable geo-tourism and economic activities. Those mentioned above are definite factors to establish a Geopark that

would extend along Ujung Genteng, Ciletuh Bay, Pelabuhan Ratu, and Cisolok as the best candidates for Geopark Region in West Java. However, there are other important factors need to be inventoried as supporting factors in the establishment of Ciletuh Geopark such as cultural heritage and activities.

Presented in Theme 4

Geoscience education in the Czech Republic on the example of the Železné hory National Geopark: Iron Mountains National Geopark

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Students are getting to know an animate and inanimate nature for the first time in the 3rd and 5th year of primary school in the Czech Republic. A more complex form of geology they obtain in the 9th year of primary school in Natural science. Pupils are learning about mineralogy, petrography, palaeontology, and general and regional geology. In secondary schools students are getting knowledge about geology in physical or socio-economic geography, but there is not Geology as an individual subject. Geology is the science that cannot be learned and understood without quality learning materials. Collections of rocks, minerals and fossils do not exist in many Czech schools, or they are too old and small and they do not have any localization.

The Železné hory National Geopark defines the territories that are formed from many large geological units, and which, with a little exaggeration, combine geology of the entire Czech Republic. In a relatively short period of time it is possible in the area of the Geopark to see something, what would on the whole territory of the Czech Republic take several weeks when traveling thousands of kilometres.

In the last five years a number of the touring exhibitions with geological topics have been realised in cooperation with the Vodní zdroje Chrudim Company. The educational activities focus on the organization of tours and lectures for primary and secondary schools. Three or five geological trips, and about ten educational events with geological topics are regularly organised every year. Gained experiences during educational activities in the Železné hory National Geopark have been used to implement projects *Geosciences* and *The stones and water*, which are made for teachers and students. The projects respond to the necessity of learning the theoretical information in practice and the ability to pass on this information to other people.

Presented in Theme 3

The activities of Japanese Geoparks Network (JGN) in cooperation with private companies, academic societies and individuals

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In Japan, geopark activity has spread rapidly in the last few years. As the numbers of Japanese Geoparks increase, it is key to have a solid network with the support of companies, academic societies and individuals in order to establish real Geopark success in Japan. Japanese Geoparks Network (JGN) is a unique organization that was established in 2009 and approved as a specified non-profit organization (NPO) by the Japanese government in 2011. JGN provides support and a networking platform for Japanese Geoparks and aspiring Geoparks in Japan.

As of 2014, 33 Japanese national geoparks, including 6 Global Geoparks, are listed as the member of JGN. There are 17 aspiring Geoparks listed as associate members. The network also has about 400 supporting members. Some of the supporting members of JGN are private companies. One reason why these companies support the geopark network is because of CSR (Corporate Social Responsibility) concerns, but more importantly, because they can make profits from geopark activities. For example, a map company made profits by selling bird's-eye views of all the Geoparks in Japan. An automobile company is planning to include the information on Geoparks in their car navigation system in order to promote charging stations for electric vehicles all over Japan. These examples show that the key for creating sustainable relationships with the business sector is offering companies new business opportunities. When people participate in Geopark activities, it is important to achieve the target without being excessive. In that way, we can have sustainable activities.

Presented in Theme 2

The role of community in developing Varkala Coastal Cliffs, exhibiting the Tertiary sequence of Warkalli Formation, India, as an ideal hotspot for geotourism

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Varkala has a unique place in the geology and geomorphology of peninsular India because of the presence of coastal cliffs that expose the entire sequence of the Miocene Pliocene Warkalli Formation, and is declared as the type

area for the same. The Geological Survey of India has recently declared the entire cliff as a 'Geoheritage Site'. These cliffs, edging the Arabian Sea, run for a length of 5.5 km. Unconsolidated sands, variegated clays, white plastic clays and carbonaceous sandy clays enclosing impersistent seams and lenses of lignite, are the lithology present in this area. The carbonaceous clay beds and lenses of peat have yielded a well-preserved palynoflora that includes pteridophytic spores, fungal remains and angiospermous pollen grains. There are numerous waterspouts on the sides of these cliffs. The presence of variegated sandstone endows beauty to these cliffs. The cliffs together with confined beaches make Varkala a beautiful tourist destination with a lot of tourist influx. The area is surrounded by historic, traditional and cultural centres. The backwaters of Paravur and Kappil, the protected fort at Anchuthengu, the pilgrim centres at Sivagiri and Papanasham, the TS canal (the once most important inland navigation system), the traditional coir products and fishing harbours and finally the proposed performing arts centre, centre for ayurvedic treatment and dolphin view point are the other major attractions of this area. Though the area fulfills all the criteria to be declared as a 'Geoheritage Site' of UNESCO, this highly urbanized area can be upgraded to the full potential of a geopark only by community involvement. This paper explains how the involvement of the community was won through a process of strong consensus to form a geoheritage site.

Presented in Theme 2

CPD program for improvement of guide skill in the San'in Kaigan Geopark

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San'in Kaigan Geopark is the largest global geopark in Japan, with thirty guide groups in the geopark. Some group members have received training programs and are registered as official guides of the geopark. The training includes: (1) principles of the geopark and outline of the San'in Kaigan Geopark, (2) geology, geography, biology, history, etc, of the area, (3) guiding principles and techniques, (4) conservation and related ordinances; and (5) emergency resuscitation methods and system of insurances. The license of the official guide is renewed every three years. They must participate in least fifteen seminars and events, and improve their guiding skills during the valid period of the license.

It is not easy to develop programs for all official guides considering the large size of the geopark. On the other hand, there are many educational facilities represented in the San'in Kaigan Geopark. They have many lifelong educational programs independent of the guide training of the geopark, some of them available to upgrade the guide's

skills. Accordingly, a CPD (Continuous Professional Development) system has been adopted as the improvement program of the official guides in the San'in Kaigan Geopark. Through this program and other outreach events (symposium, caravan, festival and others), and participation in national and international geopark conferences (GGN, APGN, EGN, JPN and others), the guides are awarded CPD points. In order to renew the license of official guide, they must have fifteen CPD points in three years. The CPD program has following effects: (1) sustain the improvement programs for guides, (2) exchange between people and geopark guides, (3) enhance the interest of guide activities; and (4) development of lifelong education in the geopark.

Presented in Theme 3

The Geoparks Project of the Geological Survey of Brazil (CPRM)

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The Geoparks Project of the Geological Survey of Brazil (CPRM), created in 2006, represents an inductive role in the establishment of geoparks in Brazil and in the conservation of its geologic heritage. This project has as its basic premise the identification, surveying, description, diagnosis and broad disclosure of areas with potential for future geoparks in the country. The project also developed a web application named GEOSSIT for registration and quantification of geological heritage sites, which also will be used for inventory of geosites nationwide and operated through a database system. Brazil has a great potential for creating geoparks for its huge territory, allied to a rich geodiversity with representatives of almost the whole geological history of the Planet. For this work contributes the large volume of existing geological data and the experience of the staff of the geological survey, in addition to the contribution made by the geoscientific community. In some cases, this inducing work is done in conjunction with universities, governmental agencies or private entities that have common interests, in line with local communities. So far several proposals of geoparks were presented by the project. The inducing action developed by the Geoparks Project is however only the initial step for the future geoparks. The subsequent creation of a management structure of the aspiring geopark and other complementary initiatives is essential and should be proposed by public authorities, local communities and private interests acting together. Some proposals are already being addressed accordingly.

Presented in Theme 4

Geo-education in cooperation with school and local residents

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In Muroto Global Geopark, we are promoting cooperation with educational institutions such as local schools. We include a wide range of knowledge and experiences as well as geology in our educational program. School children and local residents can learn global earth science by understanding what is going on in the area they live in. For instance, when they learn and understand how the land has been formed in Muroto, they learn tectonics. Also, they can find scientific connections and reasons as to why certain kinds of agricultural products or industries have been developed successfully in the area.

In Muroto city, schools have a policy to implement disaster prevention education programs and community study programs. Muroto Geopark Promotion Committee has been supporting schoolteachers with those programs. When one of the elementary classes studied 'Local Production and Local Consumption,' we organized for their field study to visit some members of the local community for discussion with the students. Some students in Muroto High School are working on a disaster prevention program and we have provided some information and ideas to the teachers and students. They are having interviews and communicating with local senior citizens who are hesitant about tsunami evacuation.

Muroto Geopark Promotion Committee has also had some original educational programs, with support from schoolteachers sympathetic to geopark activities.

Presented in Theme 3

Azores Geopark infrastructures through an effective partnership with the regional centres of environmental interpretation and science education

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In an ultra-peripheral archipelagic region such as the Azores, the non-continuous nature of the territory and the

dispersion of the population among the islands is one of the limitations for a sustainable regional development. As a way to overcome this situation, the Azores Global Geopark promotes an effective partnership between different institutions, dispersed through all the islands.

Regarding the three main pillars that support its strategy - geoconservation, environmental education and sustainable regional development - the communication through the environmental awareness is nowadays a large part of the Azores Geopark action. The 19 Environmental Interpretation Centres and the 6 Science Centres are key partners of the Azores Geopark strategy, along with the 20 Museums, 9 Ecotecas and other institutions that promote the natural and cultural heritage among the local population and the tourists.

The integration of all these institutions allows the Geopark to fulfill objectives of promoting environmental awareness and cultural and tourism animation actions, and also to carry out measures of protection, conservation and dissemination of the natural heritage, especially the geological heritage. It also fosters the sustainable regional development, by promoting the economy through ecotourism, and especially through geotourism.

This strategy reflects a diversification in subjects, actions and organizations, as well as the optimization of human and financial resources dispersed in all the 9 islands.

The environmental and science centres are focused on a wide range of subjects, some being dedicated specifically to the geological heritage and geodiversity, such as: the interpretation and visitor centres of the volcanic caves, centres dedicated to geosites or volcanic landscapes, and science centers on volcanology and geothermal issues. Other environmental interpretation or science centers are devoted to experimental sciences, astronomy, Azorean biodiversity, etc. This work presents the important partners of the Azores Global Geopark and enhances their contribution to the promotion and valuing of the Azores geological heritage and geotourism.

Presented in Theme 3

**“GEA -Mother Earth”:
international cooperation between Geoparks**

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The Geoparks are areas of excellence for research and education in Geosciences. In this sense, UNESCO in its Scientific Programs proposes the mobilization of Science and Education for issues such as sustainable use of natural resources, reduction and mitigation of natural disasters. It is in this context that the issues related with the sustainable use of potable water and water systems at risk are of great importance to be investigated and used in educational programs of Geoparks. With this purpose, the *Portuguese National Committee for the International Program for Geosciences of UNESCO - IGCP* in partnership with the *Portuguese National Forum of Geoparks* and with the support of the *Portuguese NatCom for UNESCO*, has developed an educational program entitled “GEA- Mother Earth”, aiming to promote schools contests such as “*The water that unites us*”. This includes an itinerary exhibition and training courses among Geoparks and Biosphere Reserves from Portugal, and also includes an international cooperation with Araripe Global Geopark (Brazil) and the Biosphere Reserve of Príncipe Island, in S. Tomé and Príncipe (Africa).

For the school year 2013/14 the chosen theme is *desertification*. This choice aims to promote research in this area of knowledge and to promote awareness of students and teachers for a problem that is already a troubling reality in the Geopark Araripe and begins to affect significant parts of the Portuguese territory.

This educational program aims also to develop cooperation in water related issues, promoting networking and exchange of knowledge, human and institutional capacity building, educational initiatives, monitoring, North-South and South-South cooperation and to raise awareness among political decision makers and the public in general to scientific issues related with Earth Sciences, under the motto “*Geosciences in the service of Society*”.

Presented in Theme 3

**Nioaque Core Area building skills for locals,
Bodoquena-Pantanal Geopark, Brazil**

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Bodoquena-Pantanal Geopark is located in centre west of Brazil in the state of Mato Grosso do Sul. Nioaque is a municipality, in the south of the Geopark, with 14,338 inhabitants and 3,923 km², that every year loses population, with low source of income, with 7 landless settlements (from the agrarian reform) and 3 indigenous settlements.

It was established as a bottom-up partnership between Nioaque municipality and the Geopark whose main actors are local people. There is a Statement of Cooperation and a Work Plan and the municipality delivers financial resources to the Geopark that is returned to Nioaque Core Area in material and actions. These resources return to the municipality in a decentralized way, once the bureaucracy hinders its use. Nioaque Core Area has its own blog with the information of their activities. The staff has been preparing didactical material and they organized the Meeting of the Nioaque Core Area – Bodoquena-Pantanal Geopark in December 2013. The local team got a Parliamentary Amendment of R\$20,000 to equip the project.

The Geopark provides scientific and technical advisory and monitoring and is permanently capacitating the local team with a specific Training Course but also with actions in other municipalities and states (II Brazilian Symposium on Geological Heritage); there are also technical meetings and joint fieldwork. The Geopark promoted Scholarships for Junior Scientific Initiation, including indigenous students. The new Visitors Centre will be open in few months, where local rangers will welcome students, tourists and local habitants, and will make presentations about Geosciences.

When the first studies were made a single geosite in Nioaque with dinosaur footprints from the Jurassic was inventoried. Nowadays due to the dynamic of this Core Area more studies are being made to find more geosites such as the evidences of the break-up of the African and South American continents.

Presented in Theme 2

Geopark Travelling: itinerant geosciences in Bodoquena-Pantanal Geopark, Brazil

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The promotion of scientific knowledge is a basic assumption for development for any society or nation and presupposes cognitive skills from the person who teaches and from the person who learns. So the learning process will be more or less pleasant if there is from both (educator and learner) a major or minor “enchantment” about the theme. This is the challenge that the geoeeducators constantly face in huge countries like Brazil that require more creativity to show that “rocks” can be so interesting such as animals or plants.

With this aim the Geoeducation Sector of Bodoquena-Pantanal Geopark (BPG) idealized the Geopark Travelling (= Geopark Móvel). It is a van equipped with didactical materials, laboratory and field tools, and projecting resources for open-air films and presentations. Geopark Travelling can bring geosciences to any city, village or indigenous settlement inside the BPG, promoting the recognition and the appreciation of their “place” through the knowledge of geological, social and cultural heritages. This strategy is extremely important for the building of sense of belonging to the territory of BPG with a very large area (39,000 km²) and with isolated traditional communities.

The Geopark Travelling has a portfolio of activities with talks, workshops, temporary exhibitions, scientific and didactical films. The activities are destined to schools, local communities and companies (specially related to tourism). The travelling team has two members; one of them is a geologist. Even with few time of existence, the Geopark Travelling has been showing an essential tool for integrate communities in BPG.

Presented in Theme 3

Community participation project in Zigong Global Geopark

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Since becoming a member of the GGN in 2008, Zigong Global Geopark has been known for its rare fossils, salt industry heritage, cultural historical sites, and also its beautiful environment. The Park is built within Zigong City, in

close contact with the community. It is essential to communicate with community people, and cooperate with them. To protect geological heritage, practice “green tourism”, and support sustainable use and development for natural resources, Zigong Global Geopark carried out the Community Participation Project for local community.

The Community Participation Project includes detailed plans for different community groups. For the residents, we invite them to visit our museums and geological sites, prepare popularization lectures, exhibitions and family interaction activities for them; we also bring special exhibitions into the community or countryside. For schools, we sign cooperation agreements, offer internship opportunities for students who can complete graduation projects under specialist guidance. With the support of local government, we improve our geopark infrastructure, finish road construction, and lead system and environmental improvement etc. As for local enterprises, we contact with advertising agencies, travel agencies, transport companies, media, hotels, and Internet companies to perfect our tourism services. To encourage community tourism, the geopark nominated several farmhouses as tourist attractions, developed souvenirs with local craftsmen, and put souvenirs into shopping centers.

So far, indications are the Project really works. Community people began to realize the importance of geological heritage, as they discover any fossils or other heritage they call the geopark administrator office immediately. Shopping centers and farmhouses are willing to cooperate with the geopark, display and sell geopark productions. Thanks to the local craftsmen, several featured geopark crafts have been developed. On the other hand, the Geopark has offered 122 occupations since 2008, as well as a large number of employment opportunities for the society, including tourism service, R&D and sales for tourism commodities, as well as the construction, communication, printing industry and logistics industry indirectly. It has realized local community involvement.

Presented in Theme 2

Significance of beachcombing and fossil collection for geoscience education on coastal geosites: a case study of the Ishikari Ecomuseum Area, Hokkaido, Japan

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The Ishikari area is located on the Japan Sea-side of Hokkaido in northern Japan. The area, which is character

ized by long sandy beaches in the south and rugged rocky shores in the north, has tentatively been designated part of the Ishikari Ecomuseum Area as it contains several unique geosites along the coast. Preliminary studies, geosite observations, fossil collection, and beachcombing are all useful techniques for beginners and students to familiarize themselves with the fundamentals of geoscience education. At the rocky shore geosites, Neogene marine sequences containing exposed molluscan fossils can be seen in the steep cliffs. The age and paleoenvironment of these sequences have been clarified based on molluscan paleontology and diatom biostratigraphy, illustrating the importance of fossil collection for understanding the taphonomy and paleoecology of molluscan fauna in relation to environmental changes in the Paleo-Japan Sea. Two characteristic molluscan fauna are recognized in the area, one is the cold-water shallow marine fauna from the Bannosawa Formation (10 Ma) and the other is the chemosynthetic cold-seep fauna from the Morai Formation (8 Ma). In pocket beaches between rocky headlands, numerous pebbles (rocks, minerals and fossils), extant shells (bivalves, gastropods and paper nautilus), and bones can be collected by beachcombing without a hammer. The pebbles that are washed ashore are primarily composed of red chert and black shale (Cretaceous), coal and amber (Paleogene), agate and quartz (Neogene), concretions with fossils (Miocene), pumice stone (Pleistocene), etc., which vary depending on their origin. These finds also illustrate the geohistory of the Ishikari area over the last 100 Ma. Consequently, beachcombing at coastal geosites is considered to be an effective method for geoscience education as the activity is safe for beginners. Further, since sample collection can be performed without a hammer, the geosite itself is not damaged.

Presented in Theme 3

Izu Peninsula Geopark: a museum of geological diversity Izu Peninsula Geopark, Japan

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The Izu Peninsula Geopark explores the theme: 'Volcano gifts from the South.' This theme explains how the peninsula, now a seemingly integral part of the Tokai region in Japan (close to the capital city of Tokyo) was a submarine volcanic island a few hundred kilometres south of the Japanese archipelago. This area is situated at the northernmost tip of the Izu-Ogasawara arc formed by the subduction of the Pacific Plate. The Izu block drifted with the northward motion of the Philippine Sea plate and collided with Honshu about 1 million years ago. Thus, the peninsula is located at a unique geophysical intersection, where the relatively stable

Eurasian and North American Plates are pushed upon by the Philippine Sea plate, whereas the Pacific Plate, located to the East of the archipelago, subducts under the Philippine Sea and North American Plates.

In the Izu Peninsula Geopark, visitors can enjoy a large diversity of volcanic landforms, from old submarine volcanic landforms (West and South), large complex terrestrial volcanoes (central part), monogenetic volcanoes including beautiful cinder cones (Eastern part), as well as landscapes carved by erosion of wind and water (notably in the south and the central highlands). In addition, the geology of the peninsula is closely associated with the Hakone Volcano situated to the Northwest and Mount Fuji, which unleashed lava flows from time to time. Also the peninsula is a geological laboratory for research on tectonic movement and landform generation, volcanic eruptions, earthquakes and tsunamis, disaster management and springwater resources (notably from Mount Fuji). Our poster gives a visual tour of this exciting and dynamic peninsula, which can justly be called a geological museum in itself.

Presented in Theme 4

Creation of a museum network in the Itoigawa Global Geopark

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The Itoigawa Global Geopark is home to a number of museums¹. In the past, these museums have operated with no strong sense of cooperation or shared purpose. However, since Itoigawa's certification in 2009 as a Global Geopark, a number of close partnerships have been developed. We discuss here two outcomes of this new network.

The first is increased tourism and employment. The privately owned Tanimura Museum of Art (Buddhist Artwork) and the Gyokusi-en and Hisui-en Gardens (Japanese Traditional Gardens) had been forced to close as a result of decreasing tourists. However, after certification, these facilities were able to reopen in 2011 as a new "Garden Museum" and they now enjoy renewed interest as tourist attractions. Guided tours, discount museum network passes, and shuttle buses are some of the new programs in place to increase the number of visitors.

The second result is the development of Geopark awareness and educational programs. Itoigawa is home to an ancient road that runs along an extensive fault. This road was used in the Neolithic era to transport jade and starting in the Middle Ages was used to transport salt and maritime products. This history provides an opportunity of connecting activities of various museums: At the Fossa Magna Museum visitors learn geology while at the Chojojahara Archaeological Museum and the Salt Trail Museum they can

learn the cultural history. In addition, educational workshops have been created to fuse geology and history, which have proven very popular for school field trips.

¹*In accordance with the International Council of Museums (ICOM) a museum is defined as any facility or organization which exhibits either tangible or intangible heritage and its environment (including art museums, gardens, and historic sites).*

Presented in Theme 3

Geo-gashi: a 'sweet' way of interpreting geological features

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This Poster Presentation explains the Geogashi Ryokodan—the Bitesize Landscape Creator and Geotour Promoter from Izu Peninsula Geopark in Japan. The word Geogashi is a combination of 'Geo' and 'Okashi'—the Japanese term for sweets, and Ryokodan means travel group. Our group designs sweets that look exactly like the rocks, lava flow, geological features and other beautiful landscapes found in the Izu Peninsula Geopark. Local children take part in the 'Geogashi Kitchen' where our idea takes the form of tasty sweets. As registered guides of the geopark, we also conduct Geogashi Tours explaining the unique landscape features and the story behind their formation and change through time. Geo-sweets are sold as a part of the tours, as well as in workshops and geopark booths in places like Tokyo. Our sweets are varied in appearance and taste just like the landscape of the Izu Peninsula, and are hand-made from local ingredients. The visitor can take the geogashi back with him/her, and can use it as a gift/souvenir. Each sweet pack contains a small paper map with explanation of the land feature, printed in both Japanese and English. The visitor has an idea of our geopark by buying a collection of these sweets as the package contains an explanation of important geosites. In this way Geogashi acts as a trip guiding tool spreading education about geological and cultural heritage, and geohistorical background of the area. We believe that by actually taking up a geogashi on the hand, by tasting it, or just by looking at it, one can have an idea of the land features in our geopark. The sweets also encourage visitors to visit and experience the actual landscapes. Today, the Geogashi Ryokodan is highly popular among visitors and appreciated by local communities for its unique way of interpreting geological landscapes.

Presented in Theme 3

Raising awareness of Dong Van Global Geopark in primary and secondary and upper secondary schools

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Objectives: (i) Improving some basic understanding about the values of the Dong Van Global Geopark for school children (at primary, secondary and upper secondary schools); and (ii) Making children realize their rights and duty in management and conservation of the DVG values.

Target group: (i) Children of Primary school; (ii) Children of Secondary school; and (iii) Children of Upper secondary school.

Methods of dissemination: (i) Intergration of DVG information into school extra curriculums by using lively informative posters and photos of DVG; (ii) Making and showing a documentary film about DVG (in vietnamese and in some main ethnic languages of the Hagiang province) for school children in some school extra curriculum activities; and (iii) Organizing discussions and competitions of DVG...etc...in some extra curriculum activities for school children to raise their understanding about the DVG.

Achieved results: (i) Since 2011, The Management Board of DVG in close collaboration with authorities of the 4 districts of the DVG to disseminate basic information about DVG (the values of natural resources, cultural heritages, the history of the earth and the geoheritages and how to preserve the values of the DVG) for students of 142 schools, the future owners of the geopark. (ii) At present, the management board of DVG has closely worked with education and training department of Ha Giang Province to compile suitable teaching curriculums of DVG (by simple language and lively informative specific illustrations) for students in different levels.

Presented in Theme 3

Magma Geopark, a sustainable Geopark: "Less philosophy more money"

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Magma Geopark (MG) is a non-profit organization supported by 5 municipalities and 2 Counties. 90% of the budget actually is coming from public funds: it will change in 2016 when MG needs to be economically sustainable and run independently from the public money. Then is time for less philosophy and more money! Last year MG developed

a strategy plan, which includes the marketing strategy from 2014–2020. Essentially the strategy is developing into three main directions: developing products, building up a strong tourist offer and increase the fund raising practices. Magma products consist mainly of T-shirts, Poster Presentations, pictures and the MG honest guide, available at MG web shop. The establishment of an efficient tourist offer in MG includes: the guide trips; the food offer; the exhibition; the outdoor activities; the visibility and the use of the ICT technologies. MG is working to implement all of these aspects: raising the number of the guide trips thanks to the Geoguide project that allow it to educate more than 20 people as a Geopark guide; increasing the Geopark visibility building up 32 panels since 2010. Through the MG app and its contents (TurffHunt and Smart Guide) MG aims to make the Geopark more attractive, the food offer and the Virtual exhibition are in the plan for next year and they will make the visit in MG even more attractive for tourists. The outdoor activities and itineraries are promoted through tailored channels like: Region Stavanger, Northern Georoutes and MG web pages, and the most common social media. Participation in ITB will increase the MG marketing possibilities. MG has successfully applied to several international and local funds and the fundraising action will be furthermore strengthening in the future. Among the main funds: NORA, Nordplus, CIP, RUP, Bank Fudnation and the Ministry of Local Government and Regional development.

Presented in Theme 5

Developing local menus: the GEOfood project

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In March 2014 Magma Geopark received a grant from the Norden Fund- KreaNord program for developing GEOmenus in the Nordic Countries. The idea came from the will to combine local specialties and geo-tourism activities. Magma Geopark is the leader together with 4 other partners: Odsherred Geopark project in Denmark, Rokua Geopark in Finland, Reykjanes Geopark project in Iceland, Suðuroy Island Geopark project in Faroe Island, Stonehammer Geopark in Canada, Fernando de Noronha Aspiring Geopark, Brazil, Shetland Global Geopark, Scotland, Subbéticas Geopark, Spain.

The project aims to: (i) boost local food as unique Geopark experience; (ii) valorize the local SME's in the food and tourism sector in the Nordic Countries; (iii) promote the creative industries, like local chiefs and local video makers; (iv) expand the Geopark's tourism offer with specialized packages including local food; and (v) increase the visibility of the Geoparks through tailored booking channel (GEO2NOR booking system).

Project's specific goals are: (i) developing three local menus in each Geopark; (ii) developing one common

menu between the Nordic Countries; (iii) setting up strong business relations between local SME's in food and geo-tourism; and (iv) providing the EGN-GGN with common standards for GEOfood menus development.

Each Geopark will investigate local food possibilities and finalises the SMEs experiences in combining GEOmenus served in a chain of selected restaurants. Several local actions have been planned: three workshops will be organized by each partner in order to share ideas and suggestions for the menus constitution. The cooperation with the local producers and local small enterprises aims to create partnership that will last over the project duration.

The GEOmenus will be included in the local Geopark's activities, increasing the competitiveness of the Geopark's tourism offer in the market. Food and tourism will be linked together for the valorisation of the geological, cultural, natural heritage. Common quality standard will be defined for the GEOfood brand supported by the experience of Stonehammer, Shetland and Subietica Geoparks. Other Geoparks could benefit from the project results and promote the GEOfood through the European and Global Geoparks Network.

Presented in Theme 2

The Norwegian Committee of Geoheritage and Geoparks

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Since last October 2013, Pål Thjømmøe the manager of Magma Geopark, has been the Coordinator of the Norwegian Committee of Geoheritage and Geoparks (NCGG). The NCGG was established following the mandate of the Geological Survey of Norway (NGU) for 2014: "NGU will develop and assist with geological knowledge for better management and visualization of geological diversity as a value in Norwegian nature", and taking into consideration the aspiring Geopark projects in Norway among these: Trollfjell Geopark, Geopark North, Hamar Mjøsa area, Rondane Geopark and Longyearbyen. The Committee consists of representatives from the following institutions: NGU; PROGEO; Norwegian Geological society; the Global Geoparks from Norway; UNESCO Norwegian Commission; Environmental Department; Museums engaged in geoscience issues. The network has a fairly broad mandate where the main tasks are: (i) support and provide quality assurance for applications to the European / Global Geoparks; (ii) establish a national Geopark network, and develop criteria for membership in a national network; (iii) develop characterization and value criteria for geological localities in Norway. The intention is to develop it further with a PhD

proposal that aims to develop guidelines for the Management plan of the cultural and natural heritage in Geoparks; (iv) promote and enhance the geological diversity: NGU has started to develop a database for geological diversity (http://geotest.ngu.no/kart/naturarv_94/); and (v) focus on the educational aspects of the promotion and valorization of the geological diversity.

The intention of the Committee is to act holistically and connect “geo” with all geosciences (GEA “Earth”). The “Committee” will support Geopark processes and stimulate the projects development. At the same time the NGU’s expertise will support all initiatives and the candidates aspiring Geoparks.

Presented in Theme 3

A sustainable society in the Itoigawa Geopark through education

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School-based education that includes geopark studies can become a permanent mechanism in which to promote the development of human resources for the continuing maintenance of sustainable regional societies. Children who learn from an early age about the nature of sustainable societies are better prepared to maintain their own future societies in a sustainable manner. When Itoigawa received certification as a Global Geopark in 2009, it began concerted efforts in the development of a sustainable regional society. That same year, the Itoigawa City Board of Education established a new education plan called the Unified Education Policy for Children Aged 0 through 18.

The Board of Education, immediately recognizing the value of the Geopark’s role in education, included a Geopark Studies program to be implemented as part of the compulsory education (elementary and junior high school) curriculum. Since then, the City Board of Education’s continuing support of Geopark Studies has provided the following results: (1) Supplementary textbooks for grades 3 through 9 have been published and distributed, providing an invaluable resource for the study of earth science and history as well as regional culture. (2) Training programs (outdoor and indoor) have been held, showing educators how geoparks can be used for classroom education. (3) Citywide Geopark Studies Conferences have been held to give students a chance to share what they have learned. (4) The Geopark has become a valuable tool in the teaching of disaster prevention, with a local elementary school receiv-

ing a national award for its efforts. (5) And finally, an exchange program has begun for elementary and junior high school students with Itoigawa’s Sister Geopark in Hong Kong. In these ways, the inclusion of the Geopark has had a tremendous influence on school education.

Presented in Theme 3

The model site to learn long-term ecological succession even for short-term visitors

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Mount Usu, northern Japan, is one of the most active and unique volcanoes in the world, and therefore has been assigned as the Toya Caldera and Usu Volcano Global Geopark since 2009. The geopark contains numerous sites for education, tourism, science and culture in terms of geology (*sensu lato*). Of these, we introduce a model case to learn real long-term ecological succession for short-term visitors through the geopark. Because the major eruptions occurred in distinct locations in 1910, 1944 and 1945, 1977 and 1978 and 2000 on Mount Usu, various successional stages for a century are provided in a convenient-sized area for worldwide visitors to realize successional sere, even if the visit duration is short.

The networks of footpaths and mountain trails have established access to each geosite. For example, we see well-developed broad-leaved forests in the late stages of succession along the footpath of Mount Yosomi that was created by the 1910 eruptions, and baregrounds-grasslands in the early stages along the footpath of Mount Kompira that was formed by the 2000 eruptions. These two sites, and more, can be visited within a day if desired. Volcano meisters and other tour guides, selected from the residents, properly introduce the geological and ecological characteristics of geosites with commentary boards, textbooks and/or guidebooks. In addition, the observations of successional sere can be incorporated in the education for students.

The landscape is not only for the learners of succession but also for everyone interested in diverse nature in Japan, in particular, Hokkaido. Everybody will understand the nature and succession without the sufficient knowledge of geology by the eyes. In conclusion, the Toya-Usu Global Geopark is a convenient and outstanding tool for learning the Ever-changing Earth through the succession.

Presented in Theme 1

The investigation for geological relics in Badain Jaran Desert Geo-area of Alxa Desert Global Geopark

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The investigation for geological relics in Badain Jaran Desert Geo-area of Alxa Desert Global Geopark, not only did protect and exploit the geological relics' resources and use the desert resources more reasonably, but also promoted local economic development. Using modes and methods such as Normalized Difference Vegetation Index, Digital Elevation Model, Supervised Classification and Un-supervised Classification et al, the report focused on the investigation for desert morphology and type statistics, the geological background of all types of relics' and formation, and the registration and description for all the relics' information which is based on field survey. The preliminary conclusion indications are as follows. Firstly, the geological relics in Badain Jaran Desert Geo-area included the high megadune, the barchan dune and barchan chain dune, the megadune (including high megadune, middle megadune and low megadune), the longitudinal dune, nebkha (including fixed nebkha and semi-fixed nebkha), sandy land (including fixed sandy land and shifting sandy land), saline land, lake and dry salt lake. Secondly, the aeolian landform and water landscape respectively accounted for the areas of 96.33% and 3.67%. The areas of aeolian landform in descending order were: barchan dunes and barchan chain dunes, the high megadunes, the longitudinal dune, sandy land and nebkhas. However, the areas of water landform in descending order were: dry salt lake, lake and saline land. Finally, generally speaking, nearly all aeolian landform's strike was northeast to southwest, and the lakes (including dry salt lakes) located in the leeward side of the high megadunes. The nebkhas and saline land mainly situated the lateral side of the lakes (including dry salt lakes).

Presented in Theme 1

Classification of the Cilento, Vallo Diano and Alburni National Park - European Geopark Coastland, Italy

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In order to address innovative approaches for best conservation practices and sustainable use of marine and coastal geosites, this paper proposes a classification scheme and distinctive evolutionary model for representative carbonate, terrigenous and clastic rocky coast and marine nearshore

geosites of the Cilento, Vallo Diano and Alburni National Park-European, based on original analysis and international standards (e.g., UNESCO, IUCN Protocol, Council of Europe). This proposal is possible as the Cilento has one of the most fascinating and appreciated coastlands in the Mediterranean countries, and thus contains many coastal and marine geosites. Nonetheless in the last decades, this coastland has suffered an increasing human pressure due to civil settlements as well as tourist infrastructures, resulting in a hazard for humans, in damaged habitats, and in losses for the landscape heritage. In addition, Global (Climate) Change and related level sea variation induce further disturbance in a very large space-time span. All the previous considerations help in a better understanding of the coastal system in order to perform appropriate actions for coast protection, conservation, sustainable mitigation and remediation. In this direction, major efforts have been lavished by scientific and public institutions in research and intervention on shorelines, and beach erosion remediation, because of their great economic importance in tourism and recreation. Particular attention has been given here instead to the rocky and cliff coast, for their spatial extension, hazardous characters and scenery relevance. Rocky coastlands constitute relevant areas of the network of protected areas as Marine Reserves. Assessment of rocky coast landscape characters, natural ecosystem resources, and specific hazardous areas has become more essential to increase studies and research in rocky coast environments.

Presented in Theme 1

Odsherred, a key location of Danish geological science

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The landscapes of Odsherred inspired the early Danish geologists, and several key models of glacial geology and coastal dynamics have been formulated based on studies performed in Odsherred. The intriguing geology and landscape still inspires geologists - new knowledge being elucidated, new theories being formulated and old models revised.

The relatively small area of the Odsherred peninsula is a rather unique subject for scientific studies. It is an iconic site for the development of the science of glacial geology in Northern Europe, as it has been a disputed subject for generations of geologists how the landscape was actually created. Vigilant geologists still open discussions on the glacial geology of the region based on studies in Odsherred. The Odsherred formations have been the subject of scientific research since the beginning of the 20th century when Milthers (1900) interpreted the hills as end moraines. This was a new and modern explanation, which was not accepted in general by the scientific community. Milthers made refer-

ence to the landforms shaped by Alpine glaciers and argued that they were moraines rather than eskers.

Our knowledge has been deepened by studies of geological profiles in coastal cliffs and open mines and pits. Stratigraphic analyses provide sedimentary and environmental archives that can provide information on the development of the glacial landforms in the ice margins. For instance, today it is accepted that the simple model of Milthers is inadequate, and that Odsherred's end moraines are the result of several different colliding ice streams that reached the fringes of the West Baltic Basin during the late Weichsel.

Presented in Theme 4

Outstanding geological sites and geopark projects in Quebec

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The geological mapping, research and prospecting carried out for several years throughout the Province of Quebec have given several geological sites of exceptional character. At the beginning of the century, the Quebec earth sciences community became increasingly aware of the importance of Quebec's geological heritage and the threats to this heritage.

Around the same time, the Quebec government tabled its "Strategy for Protected Areas". The Ministère des Ressources naturelles decided to contribute to this strategy by including in its mining act the protection of outstanding geological sites. The Ministry is about to designate legally his first three Outstanding Geological Sites in the coming months and possibly five more sites during this year.

At the same time, communities throughout the province started to look for new ways to promote their area by introducing activities related to their natural environment. And some of them discovered that geoparks constitute an attractive development model for their area. Initiatives from mainly three communities have developed into geoparks projects in the last two years: Charlevoix, Haute-Gaspésie and Percé.

The Charlevoix geopark project focuses on the meteoritic impact that profoundly affected and still gives Charlevoix its typical landscape with a central peak and annular depressions. Impact structures and rocks can also be observed within the astrobles.

The Haute-Gaspésie geopark project highlights the history of the Appalachians from mountain building to the glacial landscaping and erosion processes. The area is blessed with breathtaking landscapes and glacier features that are only present here in Eastern Canada.

The Percé geopark project is built on its landmark landscape that is the Rocher Percé and the Bonaventure Island.

The history of the Appalachians will also be highlighted as well as the erosion processes that sculpted the Rocher Percé. The historical heritage will also be developed.

Presented in Theme 4

Cultural diversity of Mount Taishan Geoparks

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Mount Taishan is located in the territory of Tai'an City. It rises up above the plain in the center of Shandong with a relative height difference over 1400 m. Mount Taishan has research value of natural, historical, and cultural interest. The glorious culture in Mount Taishan is closely related to the features of geological landforms. In ancient time, emperors and great scholars considered that Mount Taishan is the highest peak under heaven. In addition, Mount Taishan is mostly composed of the metamorphic rocks, due to the complicated geological history, distinct tectonic processes, the fractures, faults and joints are very developed, which become natural objectives for great writers, poets and calligraphy, poems and stone inscription. Over many generations, the unique Mount Taishan Culture has been created, which is called the epitome of the "Chinese Culture".

Mount Taishan has a long history, high spirit and brilliant culture, the Mount Taishan Culture is an epitome of the "Chinese Culture". This is an idiosyncrasy of Mount Taishan. The discoveries of Dawenkou Culture and Longshan Culture indicate that Mount Taishan is one of the birthplaces of the Chinese Nation. Since the first emperor of Qin Dynasty (221 B.C–207 A.D), a total of 12 emperors of successive dynasties had held grand ceremonies of worship of heaven to pray and say thanks for peace and prosperity on the summit of Mount Taishan. This is a unique cultural phenomenon in the world. Beside, Mount Taishan has been a famous place to integrate various religions together, such as Taoism, Buddhism and Confucianism. At the same time, many great writer and poets, from Confucius of the Spring and Autumn Period (770 B.C–476 B.C), Tang Dynasty (618 A.D–907 A.D), Song Dynasty (960 A.D–1297 A.D) to recent and modern times, climbed on Mount Taishan, wrote a lot of excellent papers, articles and poems, which have become a part in the Chinese cultural treasury. The architecture on Mount Taishan integrates the painting, sculpture, wood and gardening into a whole, with exclusive art enchantment. Mount Taishan is also a natural museum of stone inscription, which are incomparable with other famous mountains in China, even in the world. These stone inscriptions are the treasures in the Chinese and world culture.

Presented in Theme 7

Geopark promotion of Hexigten Global Geopark

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Through the office of GGN (Beijing), broadcasting, television, newspaper, magazine and other media at all levels, the Hexigten Global Geopark has organized and designed many activities to promote its beautiful and magic geoheritage in various ways.

A variety of geopark advertisements and special reports have been shown on the CCTV, Hong Kong Phoenix TV, Inner Mongolia Satellite TV, Hunan Satellite TV, Xinhua Net, Tongcheng Net and other media, and the reputation of Hexigten Global Geopark has been greatly promoted. The live weather forecast of Hexigten Global Geopark has been opened on Inner Mongolia Satellite TV and Travel TV; The geopark advertisement has been broadcasted in the interval of CCTV Morning News program; Cooperated with CCTV, the science popularization TV program “Mysterious boulders – Hexigten Global Geopark Special” has been produced and broadcasted on the China Geography of CCTV-10 (Science and Technology Channel); Cooperated with the CCTV science and education program production center, the geopark produced the geopark promotion video program – Hexigten Global Geopark of China and 4D movie – story of Mammoth.

A total of 17 fixed geopark promotion boards along the Beijing to Shenyang and Beijing to Chengde express ways has been set up; the lamp box advertisements and boards have been set up in Chifeng Railway Station, Chifeng Airport and Chifeng Cultural Square; a total of 35 geopark promotion LED screens has been set up four railway stations in Beijing, Shanghai and Dalian Cities.

Presented in Theme 2

Dunhuang Geopark of China is striving to be a member of GGN

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With an area of about 2067 km², Dunhuang geopark is located in Dunhuang, Gansu Province, where the climate is extremely droughty. Special geological history and natural environment have created the amazing geological wonders. Yardang landform looks like fleets on voyage or mysterious castles. The crisscross gullies appear like streets, the stone pagodas and pillars like building clusters. Also some Yardang landforms are lifelike. However, when the monsoon blows, the voice sounds like roaring of numerous horrific beasts, so this area is named as the “Ghost City”. Mount Mingshashan, composed of a series of lofty sand peaks,

when climbed up, the sands slide down with huge sound. Crescent Moon-shaped Lake Spring is clear and quiet, surrounded by sand peaks of Mount Mingshashan, it will never be buried by sands. The coexistence of Yardang landform, singing sand and clear spring in the heartland of vast desert constitutes the wonderful landform composition in the extremely droughty area in west China.

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

To establish Dunhuang Global Geopark of China is the best way to make full use of natural and cultural resources. It has great significance in geoheritage protection, geoscience popularization, Dunhuang resources promotion and local sustainable economic development. With the infrastructure continuously improving, Dunhuang geopark will leave no stone unturned to be a member of UNESCO.

Presented in Theme 4

Six years of the Japan Geopark Committee

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Japanese earth scientists started to promote geopark activity in 2004. Through the symposiums and workshops held by scientists, strong movement to establish geoparks in Japan gradually activated from 2006 to 2007 by local people in several areas where they had been making an effort to conserve and promote geological heritage for years. Responding to the request of these people, Japan Geopark Committee (JGC) was established in 2008 to evaluate aspiring geoparks in Japan by academic societies. The GGN guideline is translated into Japanese by JGC to help people understand the concept of GGN.

The members of the JGC were composed of earth scientists, specialists of nature conservation and interpretation and science communicators from mass media. JGC decided first three candidate areas to apply for GGN from Japan in October 2008 and endorsed first seven national (domestic) geoparks including the above-mentioned three candidates for GGN in December 2008. JGC made its decision based on evaluation of dossiers and two-day field evaluation.

JGC played a crucial role to expand the concept of geopark and to launch geopark projects in Japan. It was top-down movement from the academic side. On the other hand the bottom-up network activity of the Japanese Geoparks Network (JGN), which was established in February 2009 by the

seven national geoparks, is becoming active in the last few years. Now evaluation of geoparks are conducted both JGC and JGN members. JGC and member geoparks of JGN have been playing an important role in conserving geodiversity, promoting geoheritage, dissemination of knowledge for disaster prevention, and also sustainable economic development through geotourism. Both top-down academic movement and bottom-up local movement now work together to establish sustainable local society.

Presented in Theme 5

**A new university/community alliance:
the Mt. Arrowsmith Biosphere Reserve experience**

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The Mount Arrowsmith Biosphere Reserve (MABR) is one of two UNESCO designated Biosphere Reserves in British Columbia, Canada. Successful Biosphere Reserves elsewhere in Canada and the world have developed best practices often in tandem with local universities and researchers. In order to move forward at the MABR, a new partnership between the City of Parksville, unique among cities due to its location within a Biosphere Reserve, and Vancouver Island University has been developed. In keeping with the mandate and goals of the UNESCO designation, this new governance and management arrangement aims to enhance the regional benefits that derive from such a designation including the promotion of cultural, economic, environmental and social health of the region. This relies on identifying community engagement opportunities and research program development that expands the mutual interests of MABR partners, including but not limited to local First Nations, Regional Districts, resource users, landowners and other key stakeholders who have an interest in the MABR. The purpose of this presentation is to share this new MABR governance structure and partnership with Geoparks and Biosphere Reserves interested in innovative management models.

Presented in Theme 2

**Udo Island:
a new potential geosite cluster in Jeju Island Geopark**

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Udo Island, which may well be called a “Mini-Jeju Island”, includes a variety of geoheritage sites. Various volcanic landforms were produced by the Late Pleistocene phreatomagmatic eruptions and lava effusion. The essential elements of the island are a tuff cone and an overlying lava shield. Udo Island has been connected to Jeju Island and has become isolated as an island due to sea-level fluctuations during the Pleistocene Epoch. Various coastal landforms are also present. About 6,000 years B.P. when sea-level rose almost to the present position due to deglaciation since Last Glacial Maximum, carbonate sediments were formed and deposited in the shallow marine environment around Udo Island. A very shallow broad shelf, less than 20 m in water depth, between Udo Island and Jeju Island, has provided perfect conditions for the formation of rhodoids. Occasional transport of these rhodoids by typhoons produced the unique beach environment whose sediments are entirely composed of rhodoids. Additional features are the Hagosudong Beach with white carbonate sands, the Geommeolle Beach with black tuffaceous sands and Tolkani Beach with basalt cobbles and boulders. Near the Hagosudong Beach, wind-blown sands in the past produced carbonate sand dunes. On the northern part of the island, special carbonate sediments are present, deposited by complicated processes such as beach-forming process and transportation by typhoons. Several lava tube caves are present on the island and several sea caves are another interesting feature, and they have been formed by wave and typhoon erosion within tuffaceous sedimentary rocks. Especially, one sea cave found at the 10 m deep is very special because it indicates the sea-level fluctuations in the past. Shell mounds in Udo Island may well represent the mixed heritage feature on this island. The high geodiversity make a good condition as an additional geosite cluster (meaning a geographically isolated area with several geosites) in Jeju Island Geopark. However, proper programs for geotourism have been developed and sustainable socio-economic development is necessary to be a good potential geosite cluster.

Presented in Theme 5

**Cabox geopark:
exploring the Galapagos of Plate Tectonics**

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The International Appalachian Trail Newfoundland & Labrador (IATNL) is the primary proponent of a Canadian and Global Geopark in Western Newfoundland, focused on the Bay of Islands Ophiolites, and the region's rich history of exploration, as epitomized by famed maritime explorers Jacques Cartier and James Cook. The name "Cabox" refers to the highest point on the island of Newfoundland and Lewis Hills, the most southerly of the four large tectonic mesas which form a series of ophiolite complexes of mafic and ultramafic rock high in magnesium and iron. The other three – Blow-Me-Down Mountains, North Arm Hills, and Tablelands – extend north to Bonne Bay, with the latter being contained within the boundary of Gros Morne National Park, a UNESCO World Heritage Site. The mafic rocks are composed largely of gabbro and derive from the Earth's oceanic crust, while the ultramafic rocks are composed mostly of peridotite, and come from the earth's mantle below. Both heaved to the surface during tectonic collisions hundreds of millions of years ago, and are some of the best examples on the planet. They serve as evidence for the theory of plate tectonics, one of the most important ideas in modern science. Each also supports tens of thousands of hectares of boreal, subalpine, alpine, and serpentine wilderness. The area was explored by famed French explorer Jacques Cartier in 1534 during his first voyage to the new world, and subsequently surveyed in 1767 by renowned explorer and cartographer James Cook, the year before his first voyage to the Pacific Ocean.

In addition to the IATNL, the Geopark committee also includes the Western Newfoundland Destination Management Organization, Corner Brook Pulp and Paper Ltd., and 15 municipalities in the Bay of Islands and Bonne Bay. It is also anticipated that the local campuses of Memorial University of Newfoundland and the College of the North Atlantic will participate and provide academic and artistic interpretation of the area's natural and cultural heritage.

Presented in Theme 4

**Visitor satisfaction with interpretive signs:
a case of Fangshan Global Geopark of China**

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The purpose of this study was to evaluate visitors' per-

ception of the importance and performance of various attributes of interpretive signs and to assess the visitors' satisfaction and their willingness to revisit. Data collected from on-site surveys in the Bailixia Gorge, Fangshan Global Geopark of China were analysed. The results of importance-performance analysis (IPA) of 13 attributes of the interpretive signs in the geopark show: 3 attributes with good quality of service; 6 attributes with high priority need of to of improvement ; and 4 with low priority need for improvement. Notably, the Bailixia Gorge has provided satisfactory interpretation services, not only in the text structures and graphics of the interpretive signs but also in their sizes, materials and styles. However, these signs need to be enhanced with respect to the presentation of the headings, text and content. In addition, the text should be lively, interesting and easy to understand. There were a high percentage of visitors showing intention to revisit and to recommend the Bailixia Gorge to others. Implications for the geopark's managers and researchers are discussed from the visitors' perspective, which may help the park's managers and researchers to have a better understanding of visitors' satisfaction with respect to interpretive signs.

Presented in Theme 3

Linkages among geoconservation, rural livelihood and tourism: a case of Xingwen Global Geopark of China

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The purpose of this paper is to explore the relationships between geoheritage conservation, livelihood improvements, and tourism development using the appreciative inquiry approach as a research tool. The research was conducted in five communities representing different levels of tourism development around Xingwen Global Geopark in China. The results indicate that tourism helps change local people's attitudes toward geoconservation and reduce people's dependence on natural resources. Tourism, particularly small-scale and locally owned geotourism ventures, is also identified as a tool to enhance the livelihoods of people around geoparks. The paper also developed a framework to help understand these linkages.

Presented in Theme 1

The innovative product of Geoparks: Geological Edutainment Centre

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Geotourism is a segment of tourism that has been developed worldwide in recent decades, but most geotourism products are still traditional activities such as geological heritage site visits, guided walks, lectures and talks. With the growth of demand for diversified recreational and experience activities, geoparks as high quality destinations should offer new products for visitors, especially for young people. Funiu Mountain World Geological Park is located in the Central Orogenic Range of China and owns dinosaur egg fossils, a world biosphere reserve, granite landform landscape and humanities attractions. In 2010, the park planned its new museum as a Geological Edutainment Centre (GEC) which is the best creative practice integrated education with amusement, performances, interactive experience, Cosplay, 4D film, spectra vision, Space-time Tunnel Technology, multimedia technology etc. The GEC covers a land area of 11ha and is divided into five theme function areas with indoor and outdoor parts, including “Science Main Street”, “Earth Science Museum”, “Rescuing Earth Disaster”, “Exploring Dinosaur Era” and “Home Earth”. Science Main Street is the distribution area with geological theme plaza, ticketing, shopping, catering and tourist information services. Earth Science Museum has conservation, exhibition, education, scientific research and entertainment functions, is the most important part of GEC. Guided by the principles- “scientific, enlightenment, participatory and interesting”, the museum sets up four permanent theme exhibition halls- “Earth Mysteries”, “Life Evolution”, “Mineral Stories” and “Geological Relics” to interpret the geological connotation and formation. Four special effects theaters, a scientific lab and an auditorium are also planned. In the other three areas, visitors will experience various geological and geomorphic environment scenes and interactive amusement equipment to learn knowledge about rocks, strata, earth crust, geotecture, geological age, and evolution of ancient creatures in fun, informal ways. This new geotourism product focusing on comprehensive experience will be a developing trend in the future.

Presented in Theme 1

Jingpohu Global Geopark: a unique Geopark for education and natural resources sustainability

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Jingpohu Global Geopark is located in Ning'an in south-eastern Heilongjiang Province, northeastern China. It was listed as a Global Geopark Network member by UNESCO in 2006. It has three major attractions - the Jingpohu Lake, the volcano crater forest, and the relic capital site of ancient Bohai Empire. The Geopark covers a total area of 1,400 km². The Jingpohu Global Geopark includes seven geological wonders, the relic capital site of ancient Bohai Empire, and a designated area for horse riding and expedition. The seven geological wonders include Crater Forest, Lava Flow River (with caves), Lava Terrace, Hamatang Volcanic Cone, Waterfalls Villa, Jingpohu Lake, and Xiaobeihu Lake.

The Jingpohu Global Geopark has great geological scientific value. This paper presents the well-preserved volcanic geologic and geomorphologic features such as volcano craters, lava plains, lava tubes, lava mounts, lava dams, steam caves, collapsed tubes (caves), fumarolic cones and dishes, and all kinds of lava flows that provide geologists a great natural laboratory for scientific study. Study of the lakes, ponds, waterfalls, and wetlands that are generated by geologic and geomorphologic processes in the region helps understand volcanic history of eastern China and formation mechanisms of landforms and biologic and ecologic habitats.

Today, the Jingpohu Global Geopark is a resplendent and brilliant star that makes our life beautiful. Let's take care of it and make it sustainable for future generations.

Presented in Theme 3

The Geopark as a school curriculum

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Starting in 2013, first-year high school students in Aso region have taken part in a class on 'Aso Geopark' as part of their compulsory curriculum with the aim to raise awareness of students on regional resources and their promotion as unique character of the region. The curriculum is implemented by a joint effort between a local high school science teacher with a deep understanding in geopark activities, curators at Aso Volcano Museum and Aso Geopark Pro-

motion Council staffs.

At the beginning of the educational program, curators at the museum and the council staff provide students with lectures on basic knowledge in geopark activities, regional resources as well as natural bounty and disasters. Then self-directed learning is carried out by students in small groups throughout their summer vacation time. After the research, students present their own materials using PowerPoint in regular lessons. Finally the materials are designed and utilized to distribute to local communities and tourists as a student's geopark guide materials. Of course, the students guiding tool differs from other promotion or educational materials, but tells the unique character of regional resources from students perspective.

From the leading curriculum, we boost student's awareness and emotional attachment to regional geological resources as well as environmental awareness on the need of their preservation.

Presented in Theme 3

Geopark activities being conscious of the realization of a sustainable society: promotion of 'Geo-story' with geographical point of view in Japanese Geoparks

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One of the aims of Geopark activities is to realize a sustainable society. Guidelines state that Geoparks should take into account the phenomenon of Humanities such as history and culture, including intangible heritage, as well as the conservation and protection of geological heritage. However, it cannot be said that the present situation of the Geopark activities based on this idea are sufficient. Currently, Japanese Geoparks are asked to put more importance on Geo-stories during on-the-spot evaluation. Rather than just listing attractions, it is considered to be more important to show the connections of the attractions. Also, at the Japanese Geoparks' National Conference, workshops of Geo-story that include the intangible cultural heritage are held.

In this presentation, we introduce the idea of 'Geo-stories' with a geographical point of view that the Japanese Geoparks Network (JGN) put great importance on, and also introduce the activities of JGN in promoting 'Geo-stories' with a geographical point of view.

Presented in Theme 7

Geopark ecotourism development in Indonesia and perception of international tourists

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Indonesia is a country rich with natural and cultural resources, which have the potential to be developed further in the tourism sector. Although tourism offers high economic benefits for the country, at the same time it can cause a decline in environmental conditions. Extensive travel using transportation vehicles and human interaction with nature can damage local ecosystems and contribute to global climate change. Geopark is a new tourism product that can educate tourists about environmental protection, develop the local economy, and deepen the understanding of geological heritage resources. One of the geoparks developed in Indonesia is the Merangin Jambi Geopark which is divided into four groups, as follows: Kerinci Highland Park, Merangin Paleobotany Park, Sarolangun Gondwana Park, and Suku Anak dalam culture Park. The study attempts to explain following aspects: development of the Geological park for ecotourism, the ecotourism resources of the Merangin Jambi Geopark, and tourist's perception on ecotourism. The study is descriptive type of research and conducted using a survey on international tourists. Findings reveal the Geoparks development taking into account protection of geological heritage resources based on ecological thinking, if the development ecotourism products are to meet different needs of tourism. The study results also showed international tourists have a preference for ecotourism, and several factors were found that influence their intention to visit geoparks in Indonesia. The findings can used for better design and planning practices for further development of the Geopark Merangin Jambi and ecotourism resources development that will have impact on tourist's intention to visit the Geopark. The paper presents a new approach to sustainability by capturing the dynamic assessment and identifies Geopark ecotourism development and tourist's perception in Indonesia, using the Merangin Jambi Geopark as a case study. It also presents a new analysis that should be of interest to users, the local authority and stakeholders to develop better policies for a more sustainable future.

Presented in Theme 1

Challenges and opportunities of Geoparks as an instrument of regionalization

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In the last decades globalization and demographic changes have led to newly defined regions everywhere in Europe. On one hand it is necessary to find new ways for sustainable and affordable administrations, on the other hand, it is important to provide the region with an attracting image outwards and a respected identity for the inhabitants. While the changes in administration is often causing tough political processes between municipalities, counties, cities and states in different ways, Geoparks can do a lot for the image and the attraction of a region. The Geopark Harz. Braunschweiger Land. Ostfalen is a good example, of how Geoparks clearly differ to structures like nature reserves, national parks and biosphere reserves, and how they can help to find particular ways to a future-oriented regionalization.

Geoparks are not a new class of extra reserves, but comprise the entire range of natural and cultural development of a geographically and geologically defined region. This includes cities, business and industrial areas, which are related to the regional resources and dependent cultural development. Describing these relationships is the way a Geopark is able to summarize the full potential of a region.

Although Geoparks support the protection of geological sites, biotopes, monuments, etc. on the basis of existing laws, they also allow the participation of active economic ranges subsumed in the overall network. Geoparks promote sustainable economy in particular. They collect and pool the information about a region on the basis of their geological foundations. Here, the focus is set on the field of education (kindergartens, schools, universities, adult education, environmental education, tour guide training) as well as on the tourism and leisure industry (infrastructure, events, exhibitions, tourism offers).

Presented in Theme 2

Community involvement: keys to promote sustainable development

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Sustainable development is one of the three main objectives of geoparks. China has the world's largest numbers of both national and global geoparks. The understanding of community involvement in the sustainable development of Chinese geoparks can be used to assess the effectiveness of application of geopark as a tool to enhance sustainable

development. This paper investigates the various forms of participation of local residents in management and protection of Chinese geoparks by using Sanqingshan National Geopark as a case example. Personal interviews and focus group meetings were conducted to assess the types, forms and time of involvement the community had undertaken after the establishment of the national geopark; educational materials were distributed and special training and lectures were organized for local residents. The improvement in the livelihood, as a result of effective sustainable development of the geopark, apparently incites support and encourages further participation and involvement by local communities. Results show that such participation has initiated positive cyclical impacts of mutual development with the application of geopark concept.

Presented in Theme 1

Discussion on the popular science education function of Geopark museum and its scientific significance

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The geological museum of Geopark is an important place in popularizing natural science knowledge, and also is indispensable to the Chinese Geopark construction. Based on the strong geological academic atmosphere, it shows us abundant earth science connotation in the most intuitional and effective measures, condenses nature essence with a minimum of space occupied, spreads geo-scientific knowledge by using the biggest capacity and the least amount of time, as well as fully integrates with abundant animal and plant resources and rich and colorful regional culture features. Therefore, the geological museum, as a kind of organization that inherits and spreads the natural evidence and environmental information of the past, present and future, gives full play to communication, sciences education and service function. According to the statistics from Chinese Geoparks Network (CGN), in the past 10 years the National Geoparks of China have totally received about 667 million visitors, and in 2012 the number has reached about 169 million. The Geopark museum should attach great importance to science education, it improves the quality of national science, culture patriotism with the capability of independent innovation, promote the comprehensive development, led enhance the cultural quality of the whole nation, as well as to promote the development of science and technology, culture has an important significance. The museum is not only a symbol of Geopark, or a symbol of a city and region, but also a symbol of a country and a nation.

Presented in Theme 3

Analysis of geology feature and development of Fangshan Global Geopark of China

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Fangshan Global Geopark of China, the first Global Geopark in a capital city of the world, was approved in September of 2006. The Geopark lies in Fangshan District of Beijing and Laishui County, Laiyuan County and Yixian County of Hebei Province with a total area of 1045 km². It consists of eight geoareas, i.e., the Zhoukoudian, Shihua Cave, Shidu, Mount Baihuashan-Baicaopan, Mount Shangfangshan-Yunju Temple, Mount Shenglianshan, Yesanpo, and Mount Baishishan.

Fangshan Global Geopark has a long geological history of a billion years with rich geological heritage. It is one of the most typical places for researching evolution of ancient humans, orogenic movements and Karst development in North China. The Geopark boasts fabulous karst landforms, crystal-sparkling underground palaces, and profound culture, regarded as the cradle of Geoscience.

Fangshan global Geopark enjoys 6 exclusive features: (1) the Geopark had been the ideal homeland for the ancient human beings; (2) the Geopark possesses the multiple patterns of orogenic features; (3) the Geopark has owned the fabulous karst landforms; (4) the Geopark has hidden the crystal-sparkling and resplendent underground palaces; (5) the Geopark has recorded the profound and panoramic historic accumulates; and (6) the Geopark has cradled the celebrity-gathering generations of Chinese geoscientists.

Fangshan Global Geopark of China, integrating the scientific research and popularization, ecotourism, religious pilgrimage, cultural enjoyment and vacation into a whole, is striving to build a world famous tourist destination.

Presented in Theme 1

Sustainable development of Geoparks

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We should pay more attention to promote the sustainable development of Geoparks from three aspects, respectively they are scientific research, local socio-economic development and environment protection. The sense of a regional system should be brought into the development of Geopark, in order to realize the win-win prospect of resource, economy, society and environment. The concept of "PRED" was introduced into Liujiang Geopark research by Qiao Xiaohong. It combined the theory of human-earth

system, including population, resource, environment and development, and many other aspects. UNESCO and the GGN established guidelines for geoparks in 2004, which emphasized that valuable geoheritage on the earth should be preserved and its environment should be protected, combining with strategies of regional socio-economic development. P (people) are the human beings participating in the Geopark, including the managers, developers, local residents and tourists. R (resource) represents geoheritage resources. E (environment) represents the garden and the whole environment of its apanage, including natural and cultural environment. D (development) means coordinated development of economy, society and environment in the park system. The PRED system of Geopark was made based on relationships above.

The relationship between human beings, nature, environment and development are closely linked, which can be seen from the PRED system. Human beings are the protector and the destroyer of Geopark, and also the consumer, playing multiple roles, whose activity maybe good or bad. But once the geoheritage resources and the ecological environment were destroyed, social and economic development of the Geopark and even the local places would be restricted in return.

Presented in Theme 1

Assigning Geosites' management to local communities in Qeshm Geopark

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The aim of a Geopark is to conserve and promote geological heritages through empowering and participating locals. Our experience is that this conservation method is wiser and the results are more reliable in comparison with other methods.

Local communities' participation in Qeshm Geopark is satisfying so that the locals established eight vernacular inns and restaurants, five handicraft corporations, four boatman corporations, six local travel and tour agencies under the encouragements of Geopark. These projects have made more than 1740 direct and non-direct job vacancies. However, it is predicted that the quantities rise more than two times until the end of this year which would create about 1300 new jobs. Focusing on the power of local communities and experiences, we strongly believe that we should go

ahead and persuade local communities to participate in geosite management very soon. It means that Geopark management should only play the role of a legislator.

By changing this management attitude, we will yield these results in near future: (1) The responsibility of locals for geological heritages will be increased. Thereupon they would work hard for utilizing, promoting and protecting the heritages, self-movingly; (2) Local community's participatory management and Geopark management in geosites would result in synergies and increased efficiency that would finally reduce the expenditures; and (3) Local community practices the skill of management, or we can say it will be empowered in both aspects of management and economy. Three geosites were chosen for tentative assignment and we begin to negotiate with inhabitants of the related villages. The result was as unbelievably willingness and we decided to establish rural Cooperatives Corporation for each geosite in advance. We understand that some obstacles can be expected with approaching the goals in practice, but we believe that we can overcome them all by good cooperation.

Presented in Theme 2

Territorial sustainable development strategy and community involvement in Lesvos Geopark, Greece

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Lesvos Island, located in NE Aegean Sea, is one of the largest Greek islands, with a population of 90,463 inhabitants. Lesvos is characterized by a complex geology and rich geodiversity dominated by Miocene volcanoes and the Petrified Forest, its biodiversity and protected areas presenting

a variety of birds and wildflowers, the ancient olive groves, pine forests and unique landscapes. Lesvos presents important archeological sites and monuments, medieval castles, traditional villages, industrial architecture, monasteries and churches.

The Petrified Forest (15,000 ha) declared as Protected Natural Monument in 1985, was recognized as a Geopark in 2000 and included in the Global Geoparks Network in 2004. After an extension in 2012, the whole Lesvos Island (1630 km²) became a Global Geopark. The Natural History Museum of the Lesvos Petrified Forest in collaboration with the Lesvos Municipality and University of the Aegean are responsible for the Lesvos Geopark. The Geopark's management plan is the main tool for the operation of the Lesvos Geopark, linking geoconservation and promotion of geosites, natural and cultural heritage with geotourism, environmental education and sustainable local development.

Although geotourism was initially focused in the Lesvos Petrified Forest, the planning and implementation of Geopark activities including interpretation and promotion of geosites, guided tours, exhibitions and events spread to the whole island. A broad variety of educational activities in Lesvos Geopark make it an ideal destination for environmental education.

Community support is expressed by the Municipality and various social organizations fostered through the holistic development strategy of the Lesvos Geopark. The Geopark collaborates closely with women's agrotouristic cooperatives and local organic food producers to promote local gastronomy and local food products. Lesvos Geopark contributes to the local economy by creating new employment opportunities directly but also in tourist enterprises, hotels, guesthouses, restaurants, local artisans and handicrafts that are permanent Geopark collaborators.

Presented in Theme 2