



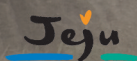
# The 3<sup>rd</sup> Asia-Pacific Geoparks Network Jeju Symposium

*For the Innovation of the APGN*

September 7-13, 2013

Jeju KAL Hotel, Jeju, Republic of Korea

Hosts :



APGN Advisory Committee

Organizer :

The 3<sup>rd</sup> Asia-Pacific Geoparks Network Jeju Symposium Organizing Committee

Partners :



MINISTRY OF  
ENVIRONMENT  
REPUBLIC OF KOREA



유네스코한국위원회  
Korean National Commission for UNESCO





# LEGEND

## COLOR CHART BY CONTENTS

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- Plenary Session ■
- Concurrent Sessions ■
- Poster Session ■
- Author Index ■

## SESSION TYPE

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- PL - Plenary Session
- S - Concurrent Sessions
- P - Poster Session

## SESSION TOPICS

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- A. Management, communication and networking in geoparks
- B. Education and geotourism for sustainable development
- C. Conservation and interpretation of geoheritages
- D. Community involvement and economic development in geoparks
- E. New and aspiring geoparks

## SESSION NUMBER

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SA101 →

**S**  
Session Type

**A1**  
No. of Topic

**01**  
Speaker No.



# The 3<sup>rd</sup> Asia-Pacific Geoparks Network Jeju Symposium

For the Innovation of the APGN

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# PROGRAM AT A GLANCE

	Sep. 7 (Sat)	Sep. 8 (Sun)	Sep. 9 (Mon)					
08:00		Registration	Registration					
09:00			Registration					
10:00		APGN Coordination Committee Meeting (Rose)	Opening Ceremony & Plenary Session I (GBR)					
11:00			Lunch					
12:00			Lunch					
13:00			Lunch					
14:00	★ APGN Advisory Committee Meeting (Gunjaran)		SB1 (GBR-A)	SC1 (GBR-B)	SD1 (Rose)	SE1 (Mugunghwa)	★ GGN Bureau Meeting II (Gunjaran)	
15:00		★ GGN Bureau Meeting I (Gunjaran)	Korea National Geoparks Symposium (GBR)		SB2 (GBR-A)	SC2 (GBR-B)		SD2 (Rose)
16:00			Poster Session / Coffee Break (Lobby, 2F)					
17:00			New GGN Member Ceremony & Conference Dinner (GBR)					
18:00			New GGN Member Ceremony & Conference Dinner (GBR)					
19:00			New GGN Member Ceremony & Conference Dinner (GBR)					
20:00			New GGN Member Ceremony & Conference Dinner (GBR)					

★ Invited only \*GBR: Grand Ballroom

- The Programs are subject to change without prior notice.

	Sep. 10 (Tue)	Sep. 11 (Wed)	Sep. 12~13 (Thu~Fri)			
08:00		Registration				
09:00	Mid-conference Excursion	Plenary Session II (GBR)	Post-conference Excursion			
10:00		Coffee Break				
11:00		SA1 (Rose)		SB3 (GBR-A)	-	SD3 (Mugunghwa)
12:00		Lunch				
13:00		SA2 (Rose)		SB4 (GBR-A)	SC3 (GBR-B)	SE3 (Mugunghwa)
14:00		SA3 (Rose)		SB5 (GBR-A)	SC4 (GBR-B)	SE4 (Mugunghwa)
15:00		Coffee Break				
16:00		SA4 (Rose)		-	-	SE5 (Mugunghwa)
17:00						
18:00				Closing Ceremony & Farewell Party (GBR)		
19:00						
20:00						

※ Geopark Fair: September 9-11. 09:00 ~ 17:00

## I . Plenary Session

## UNESCO and the GGN: The Way Forward

Patrick MC KEEVER<sup>1</sup>

<sup>1</sup>UNESCO, France

At its 161<sup>st</sup> meeting in 2001, the Executive Board of UNESCO decided against adopting a new Geoparks programme and instead opted to provide “ad hoc” support to Geoparks upon requests from individual Member States. At the time, the Geoparks initiative was only starting following the launching of the European Geoparks Network. It wasn’t until 2004 that the Global Geoparks Network, the GGN, was launched with the coming together of the EGN and 8 national Geoparks in China. Since then, while the Global Geoparks Network has rapidly expanded and grown in reputation, the nature of what is meant by “ad-hoc” support from UNESCO has remained unclear. As a result, in 2011, at the 36<sup>th</sup> General Conference of UNESCO, Member States requested that UNESCO once again look at the options for formalizing the link with Geoparks. This talk outlines the discussions that have taken place since then and considers the options that UNESCO’s Member States, in consultation with the GGN, are presently considering with regard to the possible creation of an official UNESCO Global Geoparks Initiative.

\* Contact person email: [pj.mckeever@unesco.org](mailto:pj.mckeever@unesco.org)

## Geoheritage Values of Jeju

Kyung Sik WOO<sup>1</sup>

<sup>1</sup>Department of Geology, Kangwon National University, Republic of Korea

Jeju Island contains a variety of volcanic landforms and more than 120 lava tube caves of international geoheritage significance. Among them, the geosites of the World Heritage Status consist of **one major shield volcano**, Mt. Hallasan, with satellite cones around its flanks, **the parasitic cone** (Seongsan Ilchubong Tuff Cone), which shows Surtseyan-type underwater volcanic eruption; and **a variety of lava tubes** (Bengdwi, Manjang, Gimnyeong, Yongcheon and Dangcheomul caves), which show a complete flow system and display perfectly preserved internal structures despite their old age. Other geosites showing various types of geological features are Jeju Jungmun Daepo Coast (Columnar Joints), Mt. Sanbongsan (lava dome), Yongmeori and Suweolbong (tuff deposits), the Seoguipo Formation (fossil site) and Cheonjiyeon Waterfall. Several aspects are identified which demonstrate the congruence of geoheritage values of Jeju as World Heritage and Global Geopark status. 1) The volcanic exposures of these features provide an accessible sequence of volcanogenic rocks formed by at least three different eruptive stages between 1 million and a few thousand years BP. 2) The geoheritage features include a remarkable range of internationally important volcanic landforms that contain and provide significant information on the history of the Earth. The environmental conditions of the eruptions have created diverse volcanic landforms. 3) Eroded by the sea, Seongsan Ilchubong Tuff Cone discloses the inner structure of the volcano of the Surtseyan-type eruption, which provides immense scientific value illustrating a large variety of sedimentary and volcanic characteristics of phreatomagmatic eruption, in addition to its magnificent natural beauty. 4) Geomunoreum Lava Tube System contains a parasitic cone and five significant lava tubes with various dimensions, shapes, internal morphology and speleothems. 5) The significance lies in the abundant secondary carbonate mineralization to be found in Yongcheon and Dangcheomul caves. They are acknowledged to be the best of this type of lava tubes in the world.

Yongcheon and Dangcheomul caves are typical lava tube caves showing well preserved lava tube features. However, ceiling, wall and floor of both dark colored lava tube caves are spectacularly adorned with various white carbonate speleothems. The caves are located only a few meters below the surface. Wind-blown carbonate sediments transported from beaches nearby have been present and become soil above the cave, and are entirely composed of late Holocene carbonate sands. Calcium and



## Plenary Session I

carbonate ions responsible for the formation of white carbonate speleothems were supplied from overlying carbonate sand dunes. Dissolution of the carbonate sediments by meteoric water and the supply of calcium carbonate through plant roots and joints are responsible for supplying calcium carbonate into the cave. As a result, most of carbonate speleothems do not show typical morphology of the speleothems as shown in common limestone caves, instead they display erratic shapes. The stalagmites of Yongcheon and Dangcheomul lava tube caves show that the carbon isotopic variation clearly shows the record from the Dark Age Roman Period to Current Warm Periods. It is also notable that the Yongcheon Cave has significant cultural heritages.

\* Contact person email: [wooks@kangwon.ac.kr](mailto:wooks@kangwon.ac.kr)

## Recent Progress and Future Perspectives of Geological Research of Jeju Island, Korea

Young Kwan SOHN<sup>1</sup>

<sup>1</sup>*Gyeongsang National University, Republic of Korea*

Jeju Island, Korea, has been a site of diverse geological studies for almost a century because of excellent exposures of geological formations in addition to ready accessibility, favorable climate, and beautiful sceneries. The need for freshwater resources has also propelled an ongoing study of the subsurface geology and groundwater hydrology. Major advances in the understanding of the island's geology were made by the studies of a few geologists between the 1990s and early 2000s. These include 1) an understanding of the hydrovolcanic or phreatomagmatic processes that formed the coastal tuff rings and tuff cones of the island, e.g., Ilchulbong, Udo, Suwolbong, Songaksan, and Yongmeori, which are either current or future geosites of the Jeju Global Geopark, 2) completion of the geological map sheets of whole Jeju Island, which have served and will serve as a basis of further geological research of the island, and 3) an understanding of the subsurface stratigraphy and groundwater hydrology of Jeju Island, which was accomplished by the compilation and analysis of thousands of rock cores that were drilled to develop groundwater all around the island for decades. Magmatic evolution of Jeju Island in the context of the geodynamics of the East Asian region was also revealed by a recent international cooperative study. A future study is under consideration to compare Jeju with other volcanoes in East Asia and reveal the geodynamic and magmatic origin of these volcanoes. All these scientific studies will help promote Jeju Island as the most successful Geopark in the world.

\* Contact person email: [yksohn@gnu.ac.kr](mailto:yksohn@gnu.ac.kr)

## Asia Pacific Geoparks Network: Current Status and Future Direction

Ibrahim KOMOO<sup>1,2</sup>

<sup>1</sup>Asia Pacific Geoparks Network (APGN), Malaysia

<sup>2</sup>Universiti Malaysia Terengganu (UMT), Malaysia

Asia Pacific Geoparks is a part of the UNESCO Global Geoparks Network (GGN) system. The direction of the development, advisory and assessment of the geoparks is managed by the Bureau of the GGN. In 2007, during the First Asia Pacific Geoparks Symposium held in Langkawi Global Geopark, due to an overwhelming request from the Asian members, the Asia Pacific Geoparks Network (APGN) was established. The purpose of APGN is to help GGN promote the idea of geoheritage conservation and develop quality geoparks in the Asia Pacific region. One of its main tasks is to organise the biannual APGN Symposium. APGN has been accepted as a representative of GGN for the region. It is managed by an Advisory and Coordination committees. The Coordinators of APGN, who are currently members of the GGN bureau, play major roles in promoting the establishment of national geoparks and geoparks networks. They also act as the scientific/ technical advisors for new and aspiring global geoparks in the region. APGN is now six years old and it is time to explore new direction in line with the bigger role that it plays as the regional network system in further promoting the global geoparks development in the region. This keynote presentation will highlight current progress of APGN and the possible future roles that it can play to further enhance partnership in the UNESCO GGN initiatives.

\* Contact person email: [ikomoo@yahoo.com](mailto:ikomoo@yahoo.com)

## Plenary Session II

PL202

### Global and National Geopark Activity in Japan

Mahito WATANABE<sup>1</sup>

*<sup>1</sup>Geological Museum, Geological Survey of Japan, AIST, Japan*

As the earthquake and tsunami on March 11<sup>th</sup> 2011 clearly showed us, Japanese islands are situated in one of the most active areas on the earth. It is absolutely necessary for geologists to attract people's interest to geology by means of geopark in Japan. From this point of view, Japanese earth scientists have been engaged in the promotion of geopark in 2004. Through the effort of the scientists, the concept of the GGN had been widely accepted by local governments in various areas. By these local governmental officers, the Japan Geopark Liaison Council was established to prepare the Japanese Geoparks Network in December, 2007. The response to this movement from scientists was the establishment of the Japan Geopark Committee (JGC). JGC started its activity in May, 2008 to evaluate prospective areas and authorize as national geoparks. The Japanese Geoparks Network (JGN) was established in February 2009 by the seven national geoparks which is authorized by JGC in 2008. The number of members of the GGN and JGN geoparks is now five and twenty respectively.

JGN is receiving attention from wide range of Japanese society because this bottom-up movement of geoparks in Japan are expected to resolve the problems in Japan such as depression of local economy or economic disparity between major cities and rural areas. Geoparks in Japan will play an important role to empower local community, to disseminate geo-scientific information that is vital for those who live active island arc, and also to conserve geoheritage produced active tectonic processes.

\* Contact person email: [mht.watanabe@aist.go.jp](mailto:mht.watanabe@aist.go.jp)

## Measuring Progress in Global Geoparks: Contribution for a Smart, Sustainable and Inclusive Growth

Nickolas C. ZOUROS<sup>1,2</sup>

<sup>1</sup>Department of Geography, University of the Aegean, Greece

<sup>2</sup>Natural History Museum of the Lesvos Petrified Forest, Greece

The Geopark concept was introduced at late 90's following the declaration of the Digne Conference in 1991, aiming to protect and promote Earth heritage sites through the sustainable local development of territories containing abiotic nature of significant value.

Geoparks address the strong need for effective management of important geosites and sustainable development of rural areas through the development of geotourism.

The Geoparks initiative adds a new dimension to the 1972 Convention concerning the Protection of the World Cultural and Natural Heritage by highlighting the potential for interaction between socio-economic and cultural development and conservation of the natural environment.

A broad range of activities combine the main components for the operation of an active and effective Geopark, including scientific research, the creation of the geosite inventory and map, the protection, interpretation and promotion of geosites, the conservation of fossils, the creation of visiting parks, the establishment of a network of walking trails linking geosites to ecotourism infrastructures, the development of environmental education programmes on geosites, the organisation of scientific and cultural events, and the promotion of monumental geosites.

After one decade of successful establishment, the Global Geoparks Network (GGN) represents today a growing network of excellence, including 92 territories with significant geological heritage facing a series of new challenges towards their operation as effective tools for the implementation of the strategy for a smart, sustainable and inclusive growth leading to economic and social local development.

In order to measure the progress made in each territory and to achieve high quality standards in Geoparks operation and services provided to visitors, the GGN established an evaluation procedure for all new applicants for membership in the GGN.

GGN membership is limited to a period of 4-years after which a revalidation procedure leads to the renewal or not of the membership. The revalidation follows similar procedures as the evaluation.

Applications after submission need to be checked and reviewed by the Network. IUGS is carrying out a desk top evaluation on value of geological heritage. Evaluation missions are undertaken by two Geopark experts who are sent to the applicant territory to evaluate the application and to discuss the

## Plenary Session II

application with the relevant national and local authorities as well as stakeholders and local communities. Furthermore, the evaluators are also requested to make comments on the integrity and future management of the proposed Geopark. These recommendations have been, in many cases, critical to strengthening the success of applications in the long run.

GGN membership review takes the form of a revalidation process involving the submission of a revalidation dossier and progress assessment document. An inspection visit is carried out by two evaluators from two different countries from the revalidating Geopark, nominated by the GGN Bureau and UNESCO. The revalidation process involves an examination of progress in geological heritage protection and promotion within the geopark as well as the development of sustainable economic activity within the territory. However it will also take into account the geopark's degree of active participation in common activities with the network members. A quantitative assessment methodology is performed to assign a numerical value to the main elements in the operation of a Geopark.

As a result of this evaluation/revalidation process Geoparks can present concrete and measurable results.

Geoparks contribute significantly to smart growth by developing, experimenting and enhancing innovative methodologies for preserving the geological heritage and supporting the development of scientific research in the various disciplines of Earth Sciences through the Geopark's management plan which is the main tool for the operation of a Geopark. Geoparks are operating as open air classrooms to improve public knowledge and raise public awareness on climate change and natural hazards (earthquakes, tsunamis, volcanic eruptions, landslides, liquefaction phenomena). Geoparks became also excellent environmental education destinations with efficient and well organized educational activities implemented in open air parks, thematic museums and interpretation centres.

Geoparks support sustainable growth through geotourism development based on Earth heritage resources that define the identity of each territory. Geoparks develop a range of tourist infrastructures to serve their visitors. A Natural History Museum or Interpretation Centre lies at the core of their infrastructures becoming a key factor in attracting visitors. Open air parks and interpreted geosites within the Geopark territories are attracting thousands of visitors each year.

Another main infrastructure for each geopark is the network of pathways linking the different sites of interest. Equipped with information panels that explain the various geosites, these footpaths link the interpreted geosites, visiting parks, wetlands, sites of natural beauty and ecological value, as well as cultural monuments and other sites of interest throughout the Geopark. Along the main roads leading to the Geopark area, informative panels and road signs direct visitors towards the Geopark and demarcate their borders. Geoparks also establish information centres to inform visitors about the geotouristic and educational activities.

## Plenary Session II

Geoparks replay also to the request of an inclusive growth by creating new jobs directly and indirectly. But what is even more important for the employment in the area is the number of other job opportunities which are created in tourist enterprises, small hotels, guest houses, restaurants and other activities connected with the increase of tourist flow in the Geopark area. Several other local artisans, such as makers of handicrafts and ceramic fossil casts are permanent collaborators with the Geopark. Geoparks also collaborate closely with women's agrotouristic cooperatives and local organic food producers to offer their visitors the opportunity to taste and buy local food products (pasta, organic vegetables, wine, liquors, traditional sweets and marmalades etc.). Geoparks promote quality local products, food and drinks bringing local producers and potential customers together. In this way Geopark visitors experience not only the rich natural heritage of the area and sites of high ecological and aesthetic value, but also the culture, tradition, and local production of the region.

\* Contact person email: [nzour@aegean.gr](mailto:nzour@aegean.gr)

## II. Concurrent Sessions



SA 1: Management, communication and networking in geoparks

SA101

## Beyond Exchange and Promotion - Experience Sharing on Sister Geopark Activities of Hong Kong Geopark

Lai-mui AU<sup>1</sup>, Ka-ming YEUNG<sup>1</sup>

*<sup>1</sup>Hong Kong Global Geopark of China, Hong Kong*

To promote exchange of knowledge and expertise for the better operation and management of geoparks, Hong Kong Geopark has established partnership relationships with many Geoparks including the Geo-Naturpark Bergstraße-Odenwald, Yandangshan Geopark, Itoigawa Geopark, English Riviera Geopark, Kanawinka Geopark, Marble Arch Caves Geopark, Wudailianchi Geopark and Unzen Geopark.

Various activities had been conducted to facilitate collaboration, sharing and exchange of experience before we became a global geopark. As early as 2010, a one-week Geopark Ranger Training offered by Bergstrasse-Odenwald Global Geopark and an attachment program to Itoigawa contributed a lot to our preparation for the enlistment.

At present, Hong Kong Geopark takes on on-going interactive presentations with students of sister geoparks by adopting the global E-classroom. Besides, we are also facilitating our geopark schools to organize study tours to sister geoparks. This presentation will highlight our sister geopark activities as an important tool, which brings benefits beyond mere exchange and promotion, for geopark managers.

\* Contact person email: [laimui\\_auf@afcd.gov.hk](mailto:laimui_auf@afcd.gov.hk)

## SA 1: Management, communication and networking in geoparks

SA102

### East Meets West: Challenges and Suggestions for Geopark Managers

Ka-ming YEUNG<sup>1</sup>

*<sup>1</sup>Hong Kong Global Geopark of China, Hong Kong*

One of the most valuable aspects of the Global Geoparks Network is the benefit to each member of the exchange of knowledge, expertise and experience among global network partners. However, there has always been a gap between the East and the West, due to distance, language, cultural differences, and so forth.

Culture is one major challenge, as what is seen as appropriate on one side may not be taken in the same way by the other. Language is another major challenge when two sides communicate, in both written and verbal form, as the genuine meaning cannot always be expressed precisely by one side or understood completely by the other side. Different etiquette, attire and even food preferences may also present challenges when the two sides interact physically.

These differences above have been observed in many encounters between managers from Asian and European geoparks, and we will elaborate with practical suggestions during the presentation. To facilitate communication and cooperation between global geopark members from the East and West, it is important for geopark managers to understand these cultural and language differences, and adjust exchange activities accordingly and to make an effort to understand and appreciate the efforts and activities of their counterparts on the other side of the world. Specifically, effective communication and sharing can facilitate all network activities, such as assessment, conferences and mutual visits; in a broader sense, they are essential for the betterment of the Geopark Movement.

\* Contact person email: [kmycpa@afcd.gov.hk](mailto:kmycpa@afcd.gov.hk)

SA 1: Management, communication and networking in geoparks

SA103

## East Meets West: Communication Blockage of Geoparks Interaction

Chun Yeong NG<sup>1</sup>

*<sup>1</sup>Association for Geoconservation, Hong Kong, Hong Kong*

Global Geoparks Network (GGN) is an effective international platform for geoparks around the world to establish dialogue with each other for the exchange of knowledge and experiences in managing geological heritage. At present, 58% of all global geoparks are from Europe and 40% are from Asia. English is the common language used by all geoparks to communicate. Unfortunately, it is not the first, nor the preferred language used by most geoparks except those from English speaking countries. Misinterpretation of the meaning of information can be in various forms and aspects during communication. This often leads to misunderstanding, misuse of valuable financial and human resources, waste of time and continual disappointment. Together with the cultural and other differences, particularly between western and eastern countries, such communication hindrance can be serious and extensive. This may significantly affect the application, inspection and revalidation of aspiring and current geoparks as required by the GGN. To address this issue, this paper begins by highlighting the six major differences between East and West: language, culture, knowledge, territory, individual and expectation. It is followed by evaluating the potential problems these differences may create and to what extent they may negatively affect the chance of acquiring and maintaining the GGN branding. It is then concluded by suggesting several practical hints to avoid such miscommunication and minimise their negative impacts they may have on GGN assessment

\* Contact person email: [young@rocks.org.hk](mailto:young@rocks.org.hk)

## SA 1: Management, communication and networking in geoparks

SA104

### Establishment of an Integrated Management System for UNESCO Protected Area in Jeju Island

Kilrim KO<sup>1</sup>

*<sup>1</sup>Jeju Island Geopark Team of Korea, Republic of Korea*

Jeju Island is a world-renowned environmental conservation area designated by UNESCO as internationally protected, such as a Global Geopark, Biosphere Reserve and World Natural Heritage. Accordingly, Jeju has started to work on establishing an integrated management system for UNESCO-protected areas for both conservation of natural ecosystems and sustainable improvement of life for the local people. Jeju is also a representative tourist destination in South Korea with about ten million people visiting Jeju annually. However, the increasing number of visitors could make it more difficult to manage the protected areas scattered around on the island and allow damage to nature, so a more systematic and consistent management is required. An integrated management system is thus needed, reinforcing the correlations among the programs.

A resolution was adopted at the 2012 World Conservation Congress (WCC) for “Establishing an Integrated Management System for UNESCO Protected Areas,” and Jeju is currently developing management plans for an integrated management system. Also, there are certain complications in integrated management; different countries have their own laws, via whatever ministries or departments, to deal with internationally protected areas. This is why an integrated management system is necessary for more systematic conservation management for those protected areas. An integrated management system for the protected areas is a clear way for conservation of the natural environment and preservation of history and culture, and it will contribute significantly to sustainable usage.

\* Contact person email: [kgr7766@korea.kr](mailto:kgr7766@korea.kr)

## SA 2: Management, communication and networking in geoparks

SA201

## The Role of National Geopark Committee for Sustainability of Geopark Development in Malaysia

Mohd Shafeea LEMAN<sup>1</sup>, Ibrahim KOMOO<sup>2</sup>, Che Aziz ALI<sup>1</sup>, Tanot UNJAH<sup>1</sup>,  
Kamarulzaman Abdul GHANI<sup>1</sup>, Yunus Abdul RAZAK<sup>3</sup>

<sup>1</sup>*Universiti Kebangsaan Malaysia, Malaysia*

<sup>2</sup>*Universiti Malaysia Terengganu, Malaysia*

<sup>3</sup>*Department of Mineral and Geosciences, Malaysia*

Since the inception of Langkawi as the 52nd member of UNESCO supported Global Network of National Geoparks (GGN), Malaysia failed to register new Global Geoparks. Despite of having expertise in geopark development and advance geoheritage research, the absence of national coordinating body has hindered geopark development in Malaysia. In 2012, Malaysian National Geopark Committee (NGC) was established under auspices of the Ministry of Natural Resources and Environment (MoNRE). This committee is responsible in organizing and partially funding initial geopark development and in facilitating activities pertaining to networking between geoparks at national level. The committee will assist selected national geoparks in getting endorsement from GGN Bureau and monitor activities within Malaysian Global Geoparks. Malaysian NGC is headed by Secretary General of MoNRE and is supported by relevant Heads of Departments and the National Geopark Coordinating Committee (NGCC). The later is an expert committee spearheaded by Malaysian Geological Heritage Group and Mineral and Geoscience Department. Among tasks of this committee are to provide criteria and guidelines for establishing national geoparks, and most importantly in identifying potential geoparks, advising and when necessary coordinating the geopark preparation systematically. Malaysian NGCC also responsible in national evaluation process to be endorsed by NGC as well as advising NGC in their tasks pertaining to GGN application process and monitoring that our National and Global Geoparks are sustainably developed. Presently there are 14 potential geopark candidates to be developed in Malaysia. Malaysian NGC is involved at various stage of preparation for these candidates to become proper National Geoparks.

\* Contact person email: 1mshafeea@gmail.com

## SA 2: Management, communication and networking in geoparks

SA202

### The Role of National Geoparks Secretariat

Youngchan CHOI<sup>1</sup>, Yonghee MOON<sup>1</sup>

<sup>1</sup>*National Geoparks Secretariat, Republic of Korea*

The national geoparks is geologically important and magnificent landscape area which is validated by Ministry of Environment to conserve and use for education and tourism. The Geoparks system, legislated by the Natural park act which is revised on January 29th, 2013, was trigger to invigorate domestically. Also Exclusive organization for geoparks which is National Geoparks Secretariat was installed within Korea National Park Service on February 1st, 2012 has been formed and performed its regular duties. Especially National Geoparks Secretariat performed diversity of work such as research and examination for management and operation of geoparks, research and scientific investigation of geoparks, R&D of knowledge and information about geoparks, international cooperation, geoparks guide training.

\* Contact person email: river77yc@daum.net

SA 2: Management, communication and networking in geoparks

SA203

## Introduction of Activities of Japanese Geoparks Network (JGN)

Seiichi SAITO<sup>1</sup>, Hiroko MATSUCHI<sup>1</sup>

<sup>1</sup>*Japanese Geoparks Network, Japan*

Japanese Archipelago at the northwestern Pacific Ocean is active deformation zone of island arc type. The distinct four seasons created a rich diversity in the island bringing countless natural hazards. These geological factors and accompanying human interaction have created close relationship between people living in Japan and Japan as the territory. This is why Japan has many excellent candidates for the development of geoparks.

Japanese Geoparks Network (JGN) is a unique organization which was established in 2009 to promote geopark project and approved as NPO by the Japanese government in 2011. As of 2012, twenty five Japanese national geoparks including five Global Geoparks are listed as the member of JGN.

JGN provides a platform for further growth of JGN members which is in line with UNESCO's guidelines. Several meetings have already held so far. Especially the 3rd Japanese Geoparks Meeting held in Muroto Global Geopark in 2012 attracted approximately 500 participants. Issues especially on sustainable development and regional promotion were discussed and useful information was exchange. Moreover, August 22nd, the day the first Global Geopark in Japan was designated, was established as the Geopark Day in order to raise national awareness toward Geopark. Various promotional activities have been held by national geoparks around this day.

In Japan, geopark activity has spread rapidly in the last few years. As the numbers of Japanese Geopark increase, it is going to be a key to build more solid network with the support of companies, academic societies and individuals in order to establish real Geopark success in Japan.

\* Contact person email: s-saito@city.itoigawa.niigata.jp

## SA 2: Management, communication and networking in geoparks

SA204

### Progress Report of Taiwan Geopark Network

Jiun-Chuan LIN<sup>1</sup>, Shew-Jiuan SU<sup>2</sup>, Wen-Chern WANG<sup>2</sup>, Shyh-Jeng CHYI<sup>3</sup>,  
Kuan-Chung LEE<sup>4</sup>, Ying-Shan LIU<sup>4</sup>, Chein-Tang LEE<sup>1</sup>

<sup>1</sup>Department of Geography, National Taiwan University, Taiwan

<sup>2</sup>Department of Geography, National Taiwan Normal University, Taiwan

<sup>3</sup>Department of Geography, National Kao-Shiung University, Taiwan

<sup>4</sup>Department Natural Resource and Environment, Tongh-Hua University, Taiwan

Taiwan Geopark Network was launched at 2011. The purpose of Taiwan Geopark Network is trying to (1) establish a national network for promoting the concept of geopark; (2) exchange the experience of management of the sites; (3) educate visitors to protect the landscape for the purpose of sustainable development during visiting the geological/ geomorphological/ ecological and cultural heritage.

This presentation is trying to explain the progress of geopark network in Taiwan. According to the management plan, education plan, landscape resource evaluation of potential sites evaluation and local involvement, six national geoparks was designed at first face. A series of publications such as books, pamphlets, book marks, posters and web sited were published and designed for visitors will finish in the first three years. The concept of landscape conservation, geotourism, geohazard, geodiversity and geoheritage are trying to introduce to most of the visitors including school children.

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

From this study, some conclusion should be stressed as below:

1. Six geoparks has been launched as a network and three network meetings have been carried out with supporting from six local communities.
2. A web site as a platform is also established.
3. Local involvement and local industry will be an important work for geopark activities.
4. Taiwanese Environmental Education Act has been passed. Education program for all visitors and local people is part of the geopark management plan.

\* Contact person email: jclin@ntu.edu.tw



SA 3: Management, communication and networking in geoparks

SA301

## Application of Strategic Environmental Assessment and Environmental Impact Assessment and its Positive Impact on the Sustainable Development of Geo-parks - A Case Study on the Eco-tourism Planning of the Hexigten Global Geopark of China

Fei HAN<sup>1</sup>, Mingzhong TIAN<sup>1</sup>

<sup>1</sup>*School of Earth Sciences and Resources, China University of Geosciences, China*

Listed as one of the global geoparks, the Hexigten Geopark still has got a series of problems on the level of management and operation though, among which ignoring the sustainable development of the environment and society is the most crucial one. This paper addresses and analyzes the contents of SEA and EIA from the perspective of legislation, implementation measures, indicator system, public participation, and tourism carrying capacity. Thus, a comprehensive assessment analysis from both the strategic level and micro environmental assessment level on the potential environmental impacts in the planning of sustainable development of eco-tourism have been carried out, which filled the gap of the incomprehensive environmental impact assessment and thus reduced the negative environmental impacts from the absence or failure of Strategic Environmental Assessment.

\* Contact person email: fayehan0731@126.com

## SA 3: Management, communication and networking in geoparks

SA302

### The Exploration of Zigong Global Geopark Development

Hong TAO<sup>1</sup>

*<sup>1</sup>Zigong Global Geopark Administration Office, China*

Zigong Global Geopark conserves the sedimentary strata among Triassic and Cretaceous which indicate the sea-land changes. The park includes Jurassic dinosaur fossil sites, Triassic well salt making industry sites, rare fern flora called living fossil, some amazing natural and historical relic sites, with incredible scientific, aesthetic, historical and cultural values. During the past years, Zigong Global Geopark made a great progress through a series measures. We strengthened geoheritage conservation, improved the geopark management, made effective conservation policy, increased investment in infrastructure, and also speed up scientific research and popularization, promoted exchanges and cooperation with other parks. Meanwhile, we also take into account of our park's the main problems and put forward the corresponding countermeasures.

\* Contact person email: 307695037@qq.com, 57152716@qq.com

SA 3: Management, communication and networking in geoparks

SA303

## The Future of Geoparks: Learning from the Experiences of Biosphere Reserve and World Heritage

Eun-Young KIM<sup>1</sup>

<sup>1</sup>*Korean National Commission for UNESCO, Republic of Korea*

As part of the UNESCO Executive Board's ongoing discussions of ways to improve cooperation between UNESCO and the Global Geoparks Network, the UNESCO Global Geoparks Network Initiative will be addressed at the 37th session of the UNESCO General Conference in November 2013.

For more than forty years, UNESCO has had two categories of designated natural areas - Biosphere Reserves and World Heritage sites - each of which has its own operating mechanism. According to the World Heritage Convention, our invaluable cultural and natural sites around the world are inscribed on the World Heritage List by the World Heritage Committee, composed of 21 Member States of UNESCO. Biosphere Reserves, however, are established by the UNESCO MAB (Man and the Biosphere) Programme, which is not legally binding to Member States, unlike the Convention. New designations of Biosphere Reserves are endorsed at the MAB International Co-ordination Council meeting, composed of 34 Member States. By preserving outstanding heritage sites, the World Heritage Convention works to unite nature and culture, while the MAB Programme promotes the harmonious co-existence of humanity and nature through sustainable development.

In order to secure the credibility and visibility of both Global Geoparks and UNESCO, the experiences of World Heritage and Biosphere Reserve would be helpful to explore the operating mechanism of the Global Geoparks Network Initiative, particularly in light of UNESCO's current economic situation.

\* Contact person email: heidi@unesco.or.kr

## SA 3: Management, communication and networking in geoparks

SA304

### **Geopark, Biosphere Reserve and World Heritage: Building Brands to Build Constituencies**

Lisa Marie KING<sup>1</sup>

*<sup>1</sup>Curtin University Malaysia, Malaysia*

Governments and communities increasingly expect park brands not only to act as conservation cornerstones, but to use tourism as a catalyst to deliver a broad range of social and economic benefits. As the brand assigned to a park plays a key role in determining visitation levels to any property, building the geopark brand at the local, national and international levels is of strategic importance. This talk presents preliminary findings of an ongoing study initiated in 2013 within Langkawi Geopark and eight other Malaysian sites, regarding UNESCO's World Heritage, Geopark and Biosphere Reserve brands and applies findings from previous studies conducted in Australia and the United States by the author to the geopark brand. The author recommends how to best build constituent awareness and appreciation for these brands and their values.

\* Contact person email: [lisa.m.king@curtin.edu.my](mailto:lisa.m.king@curtin.edu.my)

## SA 4: Management, communication and networking in geoparks

SA401

## Proceed with Distribution and Routing of Visitors (to Separate Posts) to Conserve Landscape in the Handling of Tourist Requests and Chaos out of Order

Chin-Chien YANG<sup>1,2</sup>, Chao-Hui SHIH<sup>1,3</sup>, Szu-Hsien LEE<sup>1,3</sup>, Mei-Hsiu CHEN<sup>1,3</sup>

<sup>1</sup>Manage team of Yehliu Geopark Taiwan(*aspiring*), Taiwan

<sup>2</sup>Neo-Space International Inc., Taiwan

<sup>3</sup>North Coast and Guanyinshan National Scenic Area Administration, Tourism Bureau, MOTC, Taiwan

According to statistic, the number of tourists visiting the Yehliu Geopark from 2003-2013 has grown with increased investments from the management team which indicated a signal of change. Since 2003, the number of tourists has raised for more than 2 million comparing to the past. In the recent 4 years, the increase has been more prominent with approximately 140.70% to 380.27% of visitor growth comparing with number of tourists prior 2003. However, as increasing tourists visit the geopark, the effect of overcapacity on the quality of the environment became a major concern with local society.

Using modern technology, the process of visitor counting became more precise. In accordance with several research and studies, the peaks of tourist distribution appears in March to May, and October to November. During long-term observation, the majority of tourists are composed of groups managed by travel agencies. This may be the key to regulate the amount of tourists visiting the geopark.

We established a public reservation service and developed a smartphone application aids for tour guidance which is very convenient and useful. We have also worked in conjunction with the government to reinforce the control of visitor inflow. All tour guides were notified with the new regulations and incompliance will be dealt with serious penalties. As a result, the distribution of visitors across the year was normalized and hence the quality of the geopark can be improved.

\* Contact person email: martiy@gmail.com

## SA 4: Management, communication and networking in geoparks

SA402

### **From Centralised Management to Community Involvement: Transforming Management Style to Open up New Ways for Sustainable Development in Sanqingshan Global Geopark**

Xilai ZENG<sup>1</sup>

*<sup>1</sup>Management Committee of Mt. Sanqingshan National Geopark, China*

There are growing concerns and demand on a global basis for knowledge on environment and resource protection. One of the major objectives of Global Geoparks Network is to provide an effective platform for national geoparks to exchange knowledge in protecting valuable natural and cultural heritage. The challenge facing, however, is to find a way to address the conflict of interests of usage and protection of valuable resources, particularly when geological heritage are concerned. In the past few years, Sanqingshan Global Geopark had been exploring and seeking a unique and appealing way to suit its special environment and situation in order to properly utilise, protect and manage its valuable geological heritage. By regularly reviewing and upgrading its overall management, it has transformed from a centralised control system to a more opened, community involvement management system which has placed Sanqingshan in a better position to deal with new opportunities and challenges presented by the global geopark branding. In the long run, it will also assist the geopark to handle its conservation and sustainable development issues more effectively. This paper will introduce this newly transformed management system and discussed about the problems encountered during such management transformation for sharing with other geoparks around the world.

\* Contact person email: xilaizeng@163.com

SA 4: Management, communication and networking in geoparks

SA403

## Huangshan Geopark Seeks International Partnerships

Wei LI<sup>1</sup>

<sup>1</sup>Huangshan Global Geopark Administrative Committee, China

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.

- **Seeking memberships in world renowned organizations**

- The Huangshan Scenic Area 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.

- **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.
- "Securing Biodiversity Conservation and Sustainable Use in Huangshan Municipality" project was ratified by the Global Environment Facilities (GEF) in September, 2011
- Dr. Xu Jiwei, the director of Huangshan Geopark was invited to work at the Destination Stewardship Group of GSTC preparing for the drafting of the Global Sustainable Tourism Criteria at destination level (GSTC-D) in 2011. This year he continues to serve at the GSTC as one of the board members.

- **Competing for international awards**

- HSAC was one of the three finalists in 2010 for the Destination Stewardship Award organized by WTTC.

### Establishing sistership relations with international counterpart

\* Contact person email: chinahsgeopark@163.com

## SA 4: Management, communication and networking in geoparks

SA404

### **Introducing the Concept of Nature into Geo-Story -The Role of Geoparks in Japan within the Framework of GGN**

**Kazuhiro YUHORA<sup>1</sup>**

*<sup>1</sup>Muroto geopark Promotion Committee, Japan*

The aim of this presentation is to consider the role of Geoparks in Japan.

The GGN guidelines say that "the Geopark should take into account the whole geographical setting of the region, and shall not solely include sites of geological significance." The guidelines also state that the synergy between geodiversity, biodiversity and culture must be highlighted as an integral part of each Geopark. However, most Global Geoparks worldwide still tend to present only geologically outstanding sites. On the other hand, geoparks in Japan try to help visitors understand 'geological heritage' through geo-story. The Intangible Cultural Heritage Working Group of JGN has already started to find ways to introduce intangible cultural heritage into geo-story. Most intangible cultural heritage usually reflects locals' idea of nature. For example, some Japanese intangible cultural heritage sites express the concept of nature's ever-changing 'mutability', which stems from a sense of awe for nature. In order to understand the concept of 'geological heritage' deeply, it would be beneficial to explain local geology and geography from within Japan's unique concept of nature, wherein "human beings live as an always integral part of nature. It is believed that one of roles of geoparks in Japan is to show how the 'relationship between people and nature,' is different from the West.

\* Contact person email: yuhora@muroto-geo.jp



SB 1: Education and geotourism for sustainable development

SB101

## Geotourism's Contribution to Sustainable Development: A Global Overview

Ross Kingston DOWLING<sup>1</sup>

<sup>1</sup>*Faculty of Business & Law, Centre for Innovative Practice, Edith Cowan University, Australia*

Geotourism is emerging as a new global phenomenon which fosters sustainable development. It is a form of tourism that specifically focuses on geology and the landscape. It promotes tourism to geosites, the conservation of geodiversity, and an understanding of earth sciences through appreciation and learning. This is achieved through visits to geological features, use of geo-trails and view points, guided tours, geo-activities and patronage of geosite visitor centres. Geotourists can comprise both independent travellers and group tourists, and they may visit natural areas or urban/built areas wherever there is a geological attraction.

Geotourism is about creating a product that protects geoheritage, communicates and promotes geological heritage, and adds value, most usually economic, to local communities. It does this by fostering the geological elements of 'form', 'process' and 'time' combined with the components of tourism such as attractions, accommodation, tours, activities, and interpretation.

Geotourism attractions are now being developed around the world primarily as a sustainable development tool for the development of local and regional communities. A major vehicle for such development is through UNESCO's Geoparks.

This presentation showcases some leading geotourism attractions from around the world including The Trail of Time, in the Grand Canyon World Heritage Region, USA; Jewel Cave, the largest show cave in Western Australia; the Piton de la Furnace, one of the world's most active volcanoes on Réunion Island, France, in the Indian Ocean; and the Galapagos Islands World Heritage Region, Ecuador. It concludes with an overview of how geotourism is adding economic value to Iceland through specific attractions, activities, tours and amenities.

\* Contact person email: [r.dowling@ecu.edu.au](mailto:r.dowling@ecu.edu.au)

## SB 1: Education and geotourism for sustainable development

SB102

### Sustainability of the Geopark: Connecting Ecology, History and Culture to Geological Heritage in the Oki Islands Geopark

Kazuhiro NOBE<sup>1</sup>, Teresa SADKOWSKY<sup>1</sup>

<sup>1</sup>*Oki Islands Geopark Promotion Committee, Japan*

The geoparks program was commenced in Japan in 2008. There are currently 25 members of the Japan Geoparks Network (JGN), five of which are members of the Global Geoparks Network. There are also 17 aspiring Japan geoparks. This rapid increase of geoparks since their onset demonstrates that the geoparks program is regarded as an effective method of conducting regional promotion and education. On the other hand, Japan's geoparks have a large task to undertake. This task is appealing to those who do not have an interest in earth sciences. Appealing to a wide range of tourists is necessary to further economic development and maintain a sustainable geopark. Unfortunately, while Japanese geoparks have achieved great success in education and specialist geotourism, there has been an insufficient increase in their regular tourist bases. One reason for this is that geology is not part of the school curriculum in Japan, and is consequently perceived as difficult and uninteresting. Also, many in the tourism industry feel that geotourism is too specialist to appeal to a wide range of tourists, and are half-hearted about the production and sale of geo-products. As a way of tackling this problem, the Oki Islands Geopark is pursuing geotourism that incorporates the ecology, history and culture of the region. This presentation will outline the successes of this approach using examples from the Oki Islands Geopark.

\* Contact person email: [oki-geopark.n@pref.shimane.lg.jp](mailto:oki-geopark.n@pref.shimane.lg.jp)

SB 1: Education and geotourism for sustainable development

SB103

## On Experiential Tourism in Geoparks

Guo LIMEI<sup>1</sup>, Yao YU<sup>1</sup>

<sup>1</sup>Wudalianchi Global Geopark, China

Experiential tourism has become one of the most potential travellings in the 21st century. Experiential science is the extension of experiential teaching. Experiential science and experiential teaching which are energetic and vigorous will replace unilateral teaching.

Tourism and science popularization are inseparable in geoparks. The development of experiential tourism will be of great importance in the promotion local community involvement, the sustainable development of regional economy, the popularization of earth science knowledge, the protection of geoheritages and the intercommunication among the members of GGN.

\* Contact person email: gtjfhb@163.com

## SB 1: Education and geotourism for sustainable development

SB104

### Developing Geotourism Rinjani Area-Indonesia Supporting Geoconservation in the World

Heryadi RACHMAT<sup>1</sup>, Akbar CITA<sup>1</sup>  
*<sup>1</sup>Geological Agency-Indonesia, Indonesia*

Mount Rinjani (+3.726 m) is the second highest volcano in Indonesia. It located on Lombok Island, West Nusa Tenggara as the product of the collision of Eurasian and Australian plates. This setting creates a high geological diversity and provides an opportunity to be developed as geotourism and proposed to be a National Geopark. Geologist plays an important role to present accurate information about the volcanic formation and process, even the uniqueness of Mount Rinjani to support a geological conservation (geoconservation).

The geologists of Geological Agency carried out several activities to support these objectives since 2008. The programs consist of surveys, seminars, and preparation of the documents (dossier) to propose Rinjani as the next Geopark in Indonesia through the Global Geopark Network (GGN) of UNESCO in Jakarta Office. The Development of Geotourism and Geopark as alternative tourisms are a new paradigm in Indonesia.

The purpose in a short term is obtaining geological database over geodiversity in Indonesia while at a long term is contributing to the geological hazard mitigation through world-class geoconservation. The GGN UNESCO assessors have advised and visited in November 2012. They give some suggestions to improve the document (dossier) quality. This document will be fixed by the Geological Agency and will be proposed back in the end of 2013 as National Geopark.

\* Contact person email: [heryadirachmat220@gmail.com](mailto:heryadirachmat220@gmail.com)

## SB 1: Education and geotourism for sustainable development

SB105

## Communicating Geological Heritage Through Art - A Cooperative Project between Geologists, Artists and School

Kristin RANGNES<sup>1</sup>*<sup>1</sup>Gea Norvegica Global Geopark, Norway*

Gea Norvegica Geopark in Norway communicates a long and vivid geological story. The oldest rocks, more than 1100 million years old, have been involved in several mountain building cycles and ice-ages. Signs of all these processes are present; rocks tell their story like an illustrated book of history. Old myths are often connected to features in nature, related with origin, appearance and strange looking forms. Natural phenomena were often connected with superstition; structures, land forms; boulders connected to the mythological creatures trolls and their activities. These intangible memories and myths are parts of Norwegian folklore and cultural heritage and can be used as an opening-up tool for geological knowledge.

Knowledge of earth science is needed in society: management of natural resources, protection against floods, slides and other natural hazards are just few examples of areas where geosciences is important. Still, we see that a lot of young students opt out natural science. We wanted to try out use of the mythology, nature as an artist and the connections to geology, as a possible link between nature and art and by this make a new way into geosciences for young people. The material used in different art forms may be of geological origin (rocks, clay, and sand) and structures and landforms can be very inspiring. We made a project called "artists meet geologists". The aim was to test a different model of interdisciplinary subjects in schools. We focused upon combining mythological stories, the material, artistic techniques and earth science. Together with professional artist we implemented three different activities and tried out ceramics, drawing and painting, for three different age groups. Geologists and artists attended all activities and took active part in the lectures through the project.

\* Contact person email: [kristin.rangnes@geanor.no](mailto:kristin.rangnes@geanor.no)

## SB 2: Education and geotourism for sustainable development

SB201

### Conservation and Exploitation of Indigenous Cultural Values for Construction and Development of Dong Van Karst Plateau Global Geopark

Sen Chin LY<sup>1</sup>

<sup>1</sup>*Dong Van Geopark, Vietnam*

Dong Van Karst Plateau Global Geopark with 17 ethnic communities has cultural heritage values (In essence - the core, it is the survival art of the ethnic groups) that contain deep humanity. With the goal of conservation and promotion of the indigenous cultural values to build and develop the Geopark, Ha Giang province has performed:

**1. Conservation and promotion of indigenous cultural values by creating tourism products (such as: developing traditional cultural products of 17 ethnic groups) to develop community-based tourism:**

- The traditional craft villages actively produce handmade products of linen weaving, brocade pattern embroidery and make the traditional craft villages into tourist products.
- Scale up production of traditional craft villages such as: Mong's Khen, linen weaving, ethnic costumes, craft carving, corn liquor...
- Implement policies of supporting the establishment of the folk performance teams in the spots of tourism and ethnic cultural tourism to serve visitors.

**2. Conservation of indigenous architecture - the goal of developing community-based tourism, geological tourism and geo - culture tourism.**

Indigenous architecture is traditional soil & straw wall house combining with stone fences; Dong Van ancient town, the United Mansion, Lung Cu flagpole...

Ha Giang province is implementing the project of restoring Dong Van ancient town, developing resorts, building houses in traditional architecture, approaching ionization technology to endure earthen walls, restoring spiritual and cultural buildings, opening tourist routes to visit and explore the unique geo - cultural characters in this place.

**3. Conservation and promotion of local traditional food and festivals:**

Ha Giang is well preserveing "Kermis culture", unique culinary culture such such as dishes made from local agricultural products, the handicraft products such as embroidered cloths, canvas bag, dresses with brilliant, subtle patterns v.v...

Ha Giang has positively developed conservation policies of festivals: Mature recognition ceremony of Dao ethnic, Forest Shen worship ceremony of Pu Peo ethnic, "Gau Tao" festival of the H'Mong, ancestor worship ceremony (Ghà Lu Ngang) of the Lo Lo ...

## SB 2: Education and geotourism for sustainable development

### **4. Mount conservation of the cultural value of traditional farming method (farming in rocky niches) with geological heritage conservation**

To preserve geological heritage associated with conservation of the cultural value of traditional farming method, Ha Giang province do localize, identify boundary points of places, geological heritage clusters in order to help the communities understand, guide the implementation of "heritage protection regulations" and cultivate maize on stone grill without harming geological heritage; build model of "experience tourism of farming in rocky niches".

From the Spring of 2014, Ha Giang will organize annually the season of "Karst Plateau Spring Festival" with activities such as: cultural culinary festival of northernmost region; Festival of Mong's Khen - Khen of leaf; traditional sports (horse riding, archery, crossbow), cow confront, goat confront... and finished by Khau Vai love Fair festival with love story overcoming the fate.

Though the management board of Dong Van geopark was established since 2011, however, the concept of geopark and geo-tourism is still very new to us. Therefore, geopark management skills is very much limited. In order to preserve and develop the values of indigenous culture for sustainable development of the geopark, we call for the support and assistance of GGN, APGN in organizing training workshops on raising awareness of conservation and promotion of the traditional cultural values and geo-heritages of Dong Van Geopark for the sustainable development of Ha Giang province - a new way to eliminate hunger and poverty reduction in Dong Van Karst Plateau Global Geopark.

\* Contact person email: senchinlyhagiang@gmail.com, lilynguyen1605@gmail.com

## SB 2: Education and geotourism for sustainable development

SB202

### Geodiversity and Geotourism Development in Caoling Geopark, Yunlin County, Taiwan

Cheing-Tung LEE<sup>1</sup>

*<sup>1</sup>Department of Geography, National Taiwan University, Taiwan*

Caoling village is located in the east part of Yunlin County, Taiwan, and has been one of the most famous scenic sites in Taiwan for a long time due to its abundant natural landscape resources. In response to the international trend of geoconservation development, the residents of Caoling village decided to establish the Caoling Geopark in 2004 and focused on geotourism development to conserve their diverse landscapes and to support their economic development. The geodiversity of Caoling Geopark is very high. Based on the selective standards for geoconservation sites in Taiwan, 22 landscapes have been selected as geoconservation sites within the Caoling geopark for their academic, educational, or recreational values. The Caoling Landslide is most well-known among the 22 Caoling Geopark geoconservation sites. These geoconservation sites include landslide landscapes, fluvial landscapes, fossil layer and miniature landscapes. Various fluvial landscapes can be found in Caoling's rivers, in the valley, and on the river bed, among which the potholes, waterfalls, and incised valley are the most special. The geodiversity information was used as basic materials to publish propagation materials and to train residents as interpreter for geotourism development. The geodiversity of Caoling Geopark will first be presented, and then major progresses related to geotourism development will be illustrated.

\* Contact person email: [ctlee@ntu.edu.tw](mailto:ctlee@ntu.edu.tw)



SB 2: Education and geotourism for sustainable development

SB203

## Repeated Geohazards and Sustainable Development in Toya-Usu Global Geopark, Japan

Hiromu OKADA<sup>1</sup>, Saburo MIMATSU<sup>2</sup>

<sup>1</sup>Academic Committee Member of Toya Caldera and Usu Volcano Global Geopark Council, Japan

<sup>2</sup>Mimatsu Masao Memorial Hall, Japan

After thousands years dormancy, Mt. Usu started the 2nd eruptive epoch since 1663, and 9 eruptions had occurred in past 350 years. Because of the viscous magma nature, eruptions were explosive and accompanying the birth of "Shinzan" (lava-dome). Those repeated quick topographical changes, the regional scenery and hot springs attract millions of visitors to Toya-Usu Global Geopark every year.

Geohazards had repeated in the area. Because of the anxiety of possible damage to the local tourist business, the area had a difficult history, refusing volcano hazard map.

Very fortunately, the situation had dramatically changed through the regional close cooperation among people, officials, scientists and media, and the area accepted the 1985 hazard map. The consequent were clearly verified, as the 2000 eruption started. Despite of the proximal eruption, people had evacuated successfully prior to the eruption, resulting to no casualties nor injuries.

During the recovering period, the area started Eco-Museum program; preserving the damaged buildings, establishing trails, Visitor/Information Centers. Those efforts were smoothly transformed to Geopark program. After GGN participation, civilian participation became the main key for further development; such as the works by the 23 volcano Meisters, Geopark guidebook published by regional newspaper company, and Volcano Village facilities by the Ropeway company, Photo-Book/DVDs, Lake Wonders and Geofoods activities.

We strongly believe that such activities understanding the nature and the history are the key both for the sustainable Geopark-Geotourism development during the dormancy, and also for the future risk mitigation.

\* Contact person email: gensaiv@yahoo.co.jp

## SB 2: Education and geotourism for sustainable development

SB204

### San'in Kaigan Geopark Tourism Promotion by Female Bloggers

Kazuya ANDOU<sup>1</sup>, Hideaki NAKATANI<sup>1</sup>, Seiji OOE<sup>1</sup>, Nobuyuki ISHIGAMI<sup>1</sup>

<sup>1</sup>San'in Kaigan Global Geopark Promotion Office, Tottori Prefectural Government, Japan

While there is a strong trend among independent travelers to gather information and plan trips within Japan through the use of the internet and word-of-mouth information, there is a lack of information regarding geotourism available online. In response to this situation, a number of San'in Kaigan Geopark model tours were operated in Tottori Prefecture. These were promoted by female bloggers who are popular and influential in the independent tourism market. In 2012, a total of 35 female bloggers established their own themes and planned trips to the San'in Kaigan Geopark. Each blogger posted their travel reports on their blog sites and on twitter. At the same time, a "San'in Kaigan Geopark Model Tours for Women" facebook page was established so that each of the travel reports could be posted and shared. As a result of this continual availability of travel information, San'in Kaigan Geopark related pages received a high number of online hits, and increased awareness and popularity regarding the Geopark was achieved.

\* Contact person email: andouk@pref.tottori.jp

SB 3: Education and geotourism for sustainable development

SB301

## Geotourism, a Tool for Geo-Education in Science Societies

Maria-Luise FREY<sup>1</sup>

<sup>1</sup>Welterbe Grube Messel gGmbH, Germany

Societies in the stone, iron and bronze age, within the technical revolution as well as in agriculture dominated societies have a clear relationship to Planet Earth. It seems as if human beings have lost their link to the "Earth" since "IT-Society" exists. Will this change by the expected "Rare Earth Element Society" or what can be done to renew and activate this for a sustainable future on the Earth, a planet with changing climate as our society has already noticed.

Surprisingly it is being renewed already since the mid 1980's and 1990's up to today by geologists and others developing programmes in rural areas and at World Heritage Sites to enthusiast visitors by offering tourism programmes to discover geo-sites, geotopes and by this earth science processes and the value of their witnesses to prepare human's future societies e.g. on climate change. Which type of offers and programmes across tourism and here "Geotourism" is suitable to achieve awareness and Geo-education in a way that geological heritage, nature, history and culture as well as ethic and value aspects are communicated? Knowledge transfer for our Science Societies is based on a "Concept of Geo-Education, Tourism and Research" established in 1993 and diversified in 2002. The Geopark Gerolstein / Vulkaneifel (up to 2003) and the Messel Pit World Heritage Site's work in Germany (since 2004) support this concept. Data will be given on what is the core of content, quality and functioning necessary to make Geotourism be a tool for Geo-Education in Science Societies.

\* Contact person email: [frey@welterbe-grube-messel.de](mailto:frey@welterbe-grube-messel.de)

## SB 3: Education and geotourism for sustainable development

SB302

### Sustainable Tourism and Geoparks

Kamarulzaman Abdul GHANI<sup>1</sup>, Mohd Shafeea LEMAN<sup>1</sup>, Ibrahim KOMOO<sup>2</sup>

<sup>1</sup>*Universiti Kebangsaan Malaysia, Malaysia*

<sup>2</sup>*Universiti Malaysia Terengganu, Malaysia*

Conservation of nature heritage particularly geoheritage resources is prerequisite in establishment of a geopark. The move towards effective conservation can only be realized if the local community are convince that it would benefit them in the long term. One of the best ways to generate this benefit is through tourism. Hence sustainable tourism would ensure not only socio-economic well being of the community is enhanced but also the objectives of conservation are accomplished. The Asean Secretariat has developed the Asean Tourism Standards that provide comprehensive guidelines on tourism sustainability, covering various components that include ecotourism and tourism heritage. Therefore, it is essential for geopark managers to not only ensure sustainable development of the area but must also oversee the conduct of tourism activities. Tourism industry players must comply to guidelines pertaining to the provision and maintenance of accommodation and services provided as well as helping the management to reduce the adverse impacts to the environment. As for the community, they are encouraged to increase their corpus of knowledge towards heritage conservation, participate actively in geopark activities and capitalise on the opportunities brought about by the geopark. Consideration of all these elements will ensure sustainability of both the tourism sector and the geopark.

\* Contact person email: [kzamang@gmail.com](mailto:kzamang@gmail.com)

## SB 3: Education and geotourism for sustainable development

SB303

## Geo-heritage, Geo-tourism and Geo-conservation in Shennongjia Geopark, China

Jiangfeng LI<sup>1</sup>*<sup>1</sup>Administration Bureau of Shennongjia National Geopark, China*

Shennongjia Geopark is a typical structural landform type geopark covering a total area of 1,022.72 km<sup>2</sup> and it is located in west Hubei Province, China. Shennong Peak is also the highest peak in central China with an altitude of 3,106.2 meters above sea level. There are abundant geo-heritages with special scientific significance in Shennongjia Geopark, which accords with the conditions of world-level biological, geological, and evolutionary importance for a GGN member designated by UNESCO. These geo-heritages can be classified into seven types: typical geological profiles, geological structures, paleo-organism fossils, minerals, ore-deposits, landforms, and water body sceneries. Most of them are unique and popular with tourists from China or other places of the world. Geotourism is sustainable tourism with a primary focus on experiencing the earth's geological features in a way that fosters environmental and cultural understanding, appreciation and conservation, and is locally beneficial. In Shennongjia Geopark, geotourism is a synergistic form of tourism in which the elements of the landscape and landforms together create a tourist experience that is richer than the sum of its parts, appealing to visitors with diverse interests. The paper shows that the construction of Shennongjia Geopark will further promote the conservation of the biological diversity and increase the tourists' awareness of the ecological protection through science education and then finally achieve sustainable development of the environment in order to promote development, build consensus on conservation, and advance social harmony.

\* Contact person email: 76952670@qq.com

## SB 3: Education and geotourism for sustainable development

SB304

### Geo-Cultural Heritage - Interference of Geological and Cultural Heritages. Case of Dong Van Geopark in Vietnam

Luong Thi TUAT<sup>1</sup>, Do Thi Yen NGOC<sup>1</sup>, Tan Van TRAN<sup>1</sup>, Nguyen Le HUY<sup>1</sup>  
*<sup>1</sup>Vietnam Institute of Geosciences and Mineral Resources, Vietnam*

We live in Nature, which is divided into two components: biotic and abiotic. Having a mutual effect, these components change continuously through complicated and multidimensional relationships. People in their living process and history have obtained adaptive living skills in diverse specific environmental conditions and created a kind of product, which is so-called geocultural heritage.

What do we understand by "geocultural heritage" or "local knowledge of geoheritage"? That is the local treasure of knowledge and living skills about means of production, military arts, local rules and beliefs, folklores of the community etc, which depend on natural conditions and features of the land. Local knowledge of geoheritage includes intellectual and cultural treasures which reflect the perception of the community about their surroundings. This awareness results from high adaptation and harmonization between the human beings and nature. It also explains the human's desire to discover their surroundings, including geoheritages.

Hence, geocultural heritage is a mirror reflecting multidimensional, complicated relationships between PEOPLE - NATURAL ENVIRONMENT (including geological environment and heritage) - SOCIAL ENVIRONMENT AND CULTURAL ENVIRONMENT. On the other hand, geocultural heritage help people live adaptable and harmonious in that particular environment.

Series of geocultural heritage were discovered during establishing and developing of Dong Van Karst Plateau Global Geopark are persuadable evidences for the theoretical point above.

Geocultural heritage has become a powerful tool for geotourism and geopark development. By means of configurating and developing of geocultural heritage beside main geological heritage is the optimal solution to conserve and develop comprehensive values of geopark.

\* Contact person email: t\_luongthi@yahoo.com.vn

SB 3: Education and geotourism for sustainable development

SB401

## The Role of Geopark Guide in Enhancing Geotourism: The Recommended Geopark Guide System in Hong Kong

Mo-ching, Cindy CHOI<sup>1</sup>

<sup>1</sup>Association for Geoconservation, Hong Kong, China

Amongst various interpretation means, guide is regarded as playing an important and influential role in disseminating information, interpretation, managing visitor's behaviour and as conduits for natural resource management. This is especially essential for geotourism aiming at appreciating and conserving the geoheritage and landscape as well as interaction with the host communities.

In the past, Hong Kong did not have an appropriate channel through which interested visitors could find professional and experienced guides and neither a formal accreditation guide system. There are very few guides who really understand the true meaning of ecotourism, not even to say geotourism. With the opening of Hong Kong Geopark in 2009, the Recommended Geopark Guide System is established hoping to provide dedicated, professional and ethically competent geopark guides which can be recommended for both local and overseas visitors.

The accreditation system focuses on not only on the geological knowledge of the guides about the geopark. It emphasizes more on the skills in arousing the interests of the visitors in appreciating the geology and landscape that ultimately lead to their treasuring of the invaluable assets and understanding the need for geoconservation. Most important, the tourist must be happy and satisfied. The system helps current guides to upgrade their skills and knowledge to a higher level and in line with international standards. This is for the long term benefit of the guides as well as for the sustainable geotourism development in Hong Kong.

\* Contact person email: [cindy@rocks.org.hk](mailto:cindy@rocks.org.hk)

## SB 4: Education and geotourism for sustainable development

SB402

### Geoparks Commentator Training Program in Korea

Sung-rock LEE<sup>1</sup>, Se-won CHANG<sup>1</sup>

*<sup>1</sup>Korea Institute of Geoscience and Mineral Resources(KIGAM), Republic of Korea*

Since the Jeju Island was designated as a first Global Geopark Network Member in Korea from UNESCO in 2010, the central government newly established Geoparks Act and Rules by amending the Natural Parks Act and Implementing Rules in 2012. As a consequence of the Act and Rules, 2 National Geoparks were designated from the government in December 2012.

In the established Rules and Instructions, guidelines for geoparks commentator training and education are specified. The training curricula are classified into the literacy and specialized course to be a geoparks commentator for guiding visitors to the geosites in the Global or National Geoparks. The literacy course covers wide range of basic knowledges such as communicating skills, human relationship, story-telling, role of commentator, safety and so on. The specialized course covers to increase the geologic understanding of the area, including earth evolution, rock and minerals, geological history, geographic feature and geosites geology and so on. The local government which has designated their Geoparks should educate local communities to obtain the certificate for in-situ commentary of the geosites.

In the presentation, the authors would like to introduce the contexts of the training course and to share the experiences of better communicating with commentators to enhance their geological understanding of the geosites.

\* Contact person email: srlee@kigam.re.kr



## SB 4: Education and geotourism for sustainable development

SB403

## Educational Experience in Displaying Peridotite Samples in Mt. Apoi Geopark, Hokkaido, Japan

Kiyooki NIIDA<sup>1</sup><sup>1</sup>Hokkaido University Museum, Japan

The symbolic geology of heritage in the Mt. Apoi Geopark is 'peridotite' of Mt. Apoi, which is derived from the Earth's interior (upper mantle), 50-70 km deep. The peridotite massif forms a beautiful mountain range, which is composed of a variety of major peridotite types such as dunite, harzburgite, spinel lherzolite, and plagioclase lherzolite, showing a conspicuous layering. The rocks are all very valuable for science because of the freshness remaining their primary mantle signatures in textural pattern and chemical composition. The Mt. Apoi peridotite is one of well-studied peridotite in the world. In 2002, the 4<sup>th</sup> international lherzolite conference has been held at here in Samani.

It is essential to education in geoparks with hard-rocks and minerals how to display samples in the most effective, attractive, and useful way. Here, we introduce some practical displays of peridotite samples as follows:

- (1) Well-polished peridotite slabs: Peridotite Plaza 'Apoi-no-Kodo' in the front-garden of Samani town office, Symbolic gate stone of the Hokkaido University museum, Explanation key-stones of geosites in geopark, and Sign-stones at gate of public facilities and private companies.
- (2) Well-polished hand-specimen size peridotites: Memorial gifts for participants in the 4<sup>th</sup> international conference held in Samani, One-side polished sample for visitors, Well-polished 10 cm cubes for educational seminars.
- (3) Small-size peridotite samples used in town life: Pebbles for kelp-drying spaces, Electric light poles along streets.

\* Contact person email: [kiyo@museum.hokudai.ac.jp](mailto:kiyo@museum.hokudai.ac.jp)

## SB 4: Education and geotourism for sustainable development

SB404

### Unzen Volcanic Area Global Geopark Utilized by School Education

Kunihisa TERAI<sup>1</sup>

*<sup>1</sup>Unzen Volcanic Area Global Geopark, Japan*

The geopark is utilized for education in the school of the Shimabara peninsula. The 1st purpose of the education, protects yourself from a volcanic disaster. The 2nd one, to learn the history of the formation of the Shimabara peninsula. In the Shimabara peninsula, the volcanic disaster occurred 200 years and 20 years ago. 15000 persons were killed in the disaster of 200 years ago, and 44 persons were killed in the disaster of 20 years ago.

At an elementary school, these two volcanic disasters are learned by study in a classroom, and field observation. For example, schoolchildren climb the lava flow of 200 years ago.

In a junior high school, students study the history of the formation of the Shimabara peninsula made in the volcanic activity which continues 4 million years before. For example, junior high school students collect basalt, andesite, and dacite in the fields.

\* Contact person email: [teraikunihisa@gmail.com](mailto:teraikunihisa@gmail.com)

## SB 5: Education and geotourism for sustainable development

SB501

## Development of a Science High School Field Geology Explore Course Based on Field Trips in Hamori Formation

Kyo Hyeong CHOO<sup>1</sup>, Seok Hoon YOON<sup>1</sup>*<sup>1</sup>Dept of Earth and Marine Science Jeju National University, Republic of Korea*

Hamori Formation is located along the seashore near the Songaksan tuff ring, one of future geosites in the Jeju Island Geopark, Korea. The Formation consists of resedimented fine-grained tuffaceous sands and gravels in a shallow marine environment, and show a variety of sedimentary structures such as ripple marks, mudcracks, cross beddings and graded beddings. The outcrops section is clear enough "to speak for itself" and have enough space around the station for uninterrupted activity. Due to the fresh outcrops, students can easily observe various kinds of rocks and sedimentary structures which are included in the geologic units in the Earth Science textbooks for high or middle school students. The course of geological field excursion contains 7 stations which are about a 5-minute walking distance or less than a 10-minute driving distance apart.

The excursion courses have been developed by using field geology module that was designed to help teachers overcome some of the obstacles they may encounter on the development of field-related activities. In the preparatory unit, it offers concrete laboratory experiments to reduce three components of the novelty space to a minimum. The field trip unit offers observation-problems for geologic phenomena. In the summary unit, it includes more complex concepts which demand higher abstraction abilities and higher levels of concentration from the students. The learning cycle of these three units integrates the field geology explore course in the curriculum.

\* Contact person email: chu1218@hanmail.net

## SB 5: Education and geotourism for sustainable development

SB502

### Sugar Magma: Analog Experiment Useful for Volcanic Geoparks

Shintaro HAYASHI<sup>1</sup>

<sup>1</sup>*Akita University, Japan*

There are various volcanic ejecta in geoparks in volcanic area. Geopark guide must explain it to tourists or to children. However, explanation of volcanic products is usually difficult. I have developed analog experiments about obsidian, lava with many crystals, pumice, the Pele's hair etc. using sugar and water. For example, the experiment of obsidian (=candy) is as follows:

First, water is mixed with sugar in cake cup made with aluminum, then the cup is heated by hot plate, after ten or fifteen minutes, the cup is removed from hot plate and cooled rapidly. The candy breaks like obsidian. It is possible to make stone tool from the candy.

The experiment is attractive and impressive for children and tourist because the final experimental product is sweet. The sugar magma experiment will be demonstrated at the hall.

\* Contact person email: hayashi@ed.akita-u.ac.jp

## SB 5: Education and geotourism for sustainable development

SB503

## Earth Science Education in the Lichi Geopark, Taiwan

Ying San LIOU<sup>1</sup>*<sup>1</sup>Department of Natural Resources and Environmental Studies, National DongHwa University, Taiwan*

Lichi Geopark is located at the southeastern Taiwan and about 5 km to the northwest of Taitung City. Due to its outstanding and prominent geological and geomorphologic features, e.g., evidences of arc-continent underplating and collision between the Eurasian Plate and the Philippine Sea Plate, varying dimensions of exotic blocks, typical badland topography and so forth, Lichi Geopark has been assigned to be one of the Taiwan Geopark Network launched from 2011. It has long been considered that education plays an important role in learning knowledge and skills. In order to promote the concept of geopark and spread awareness of our geological heritage, educational programmes at a range of levels has been developed and operated in the Lichi Geopark for the past three years. The programmes organized by a combination of Earth scientists, local community, and government institutions offer education for school's children and teachers, undergraduate students, local people, and adults. Indoor and outdoor activities, including volunteer training courses, interpreter training courses for children, geopark week activities, and parent-child drawing competition, were operated successfully. In addition, propagation materials such as books, folders, brochures, posters, post cards, etc., were also published as supplementary to achieve the main purposes of Earth sciences education. After accomplishment of actions stated above, local people, school students, and volunteers have been enhanced to recognize the value and to appreciate and protect geological heritages of their area. Geotourism, moreover, is proceeding to reach sustainable development goals and to promote the economic well-being of the people who live there.

\* Contact person email: [yingsan@mail.ndhu.edu.tw](mailto:yingsan@mail.ndhu.edu.tw)

## SB 5: Education and geotourism for sustainable development

SB504

### Disaster Prevention Education on Geoparks

Setsuya NAKADA<sup>1</sup>

*<sup>1</sup>Earthquake Research Institute, University of Tokyo, Japan*

Since tectonically moving countries, like Japan, frequently face heavy natural hazards, education for their disaster prevention is important. A famous Japanese quotation is "a natural disaster strikes when people lose their memory of the previous one." This was repeatedly referred when large natural hazards brought huge disasters (tsunamis, earthquakes and big typhoons). However, sufferers from huge disasters transferred their experiences to the next generations by constructing monument of the disaster and leaving the documentation. Their attempts were being attained little by little, even in the March 11, 2011 tsunami event. The Shimabara Declaration in 2012 insisted the utility of geoparks for education of the natural phenomena including hazards and climate issue. Geopark has an effective function to tradition experiences, memories and lessons from those natural disasters to the next generations through education and geotour. However, emphasizing disasters prevention thoughtlessly may plunge new visitors into fear. Natural hazard and disaster issue should not be insisted thoughtlessly, but be involved in the course for visitors to enjoy and learn the nature, especially to understand its benefits beyond the demerit from natural hazards. It is not necessary that all geoparks are the places to learn disaster prevention issues. Geopark may be just the entrance for people, especially young students, to consider the natural hazards and disaster prevention in their lives. In geoparks, we can teach the dynamics and blessing from the nature first, and the story of natural hazards and disaster issues will come in the next step.

\* Contact person email: nakada@eri.u-tokyo.ac.jp

## SC 1: Conservation and interpretation of geoheritages

SC101

## New Conservation and Interpretation Approach for Korean Geoheritages

Jong-Deock LIM<sup>1</sup>*<sup>1</sup>Natural Heritage Center of Korea, National Research Institute of Cultural Heritage, Republic of Korea*

The National Research Institute of Cultural Heritage(NRICH) opened the Natural Heritage Center of Korea to research, exhibit, educate, and widely promote values of Korean Natural Monuments including plants, animals, and geoheritages. Korean Natural Monuments has a variety of geoheritages such as dinosaur eggs, dinosaur tracks, caves, basalt capturing peridotites, shelly fossils, lava tubes, volcanic cones, islands, mountains, columnar joints, cliffs, and waterfalls. The Natural Heritage Center of Korea has monitored major dinosaur tracksites with 3D virtualization techniques and recorded important geoheritages with aerial photography as new conservation tools. The NRICH and Cultural Heritages Administration(CHA) perform periodic monitoring for caves to conserve original condition and shape.

The Deokmyong-ri area of the Goseong County is one of the largest dinosaur tracksites from a single formation and one of the highest concentrations of track-bearing levels recorded in the world. The Goseong County provides importance and value of geoheritage to general public by the Dinosaur World EXPO and the Goseong Dinosaur Museum. Security guards and volunteers system is most effective to conserve and interpret the dinosaur tracksites.

All fossil collecting and excavation in Natural Monuments are prohibited and should be passed the reviews of Cultural Properties Committee. The Management Guideline for Fossil Sites is the only administrative rule for the protection and management. The guideline was made and run by the CHA.

\* Contact person email: [dinostudy@outlook.com](mailto:dinostudy@outlook.com)

## SC 1: Conservation and interpretation of geoheritages

SC102

### Protection Strategy for the Paleocene Mammalian Fossils in Tianzhushan Global Geopark, China

Wen HUANG<sup>1</sup>, Chendong WANG<sup>1</sup>, Guosheng YU<sup>1</sup>, Yangui ZHENG<sup>1</sup>, Weiping WU<sup>2</sup>

<sup>1</sup>Tianzhushan Global Geopark, China

<sup>2</sup>Anhui Institute of Geology, China

Tianzhushan Geopark has produced abundant and Asian endemic Paleocene mammalian fossils. So far, 31 species of fossil vertebrates, including 30 new species, have been reported within the geopark. The mammalian fossils found in Tianzhushan Geopark have great significance in understanding the evolution of early Cenozoic mammals, and the geopark is thus considered as "one of the origin places of Asian mammals and a treasure land of Paleocene vertebrates".

Fossil sites in Tianzhushan Geopark are not very fossiliferous and scatter in the rural area. Many of them lie nearby or even in the villages. In recent years, activities of local people, e.g. road construction, house building and wasteland reclamation for cultivation, do harm to some localities. Therefore, the protection, management and utilization of fossil resources are urgent requirement.

The establishment and operation of Tianzhushan Geopark provide a good way to solve the problem: the geopark networks at different levels (including global, Asia-Pacific regional, and national) provide an exchange and learning platform for the fossil protection and management; national geological relics protection project provides financial support; the cooperation of geoparks and relevant institutions provides technical support; the development of the geological tourism enhances the public awareness of fossil protection, and wins wide support; the geological museum provides necessary facilities for fossil exhibition and popularization of related scientific knowledge. Tianzhushan Geopark will realize the scientific use of precious fossils, by implementing the paleontological resources protection and management project, scientific research project, science popularization and culture industry construction project.

\* Contact person email: [tzsgeopark@126.com](mailto:tzsgeopark@126.com)



SC 1: Conservation and interpretation of geheritages

SC103

## The Introduction of the Geoheritage Geologically Sensitive Areas (GHGSA) in Taiwan

Shou-Fang CHANG<sup>1</sup>, Ben-Kang CHEN<sup>2</sup>, Ping-Shan CHOU<sup>1</sup>, Jiin-Fa LEE<sup>1</sup>

<sup>1</sup>Central Geological Survey, MOEA, Taiwan

<sup>2</sup>Association of Professional-Geologist, Taiwan, Taiwan

To effectively conserve the remarkable geheritages in Taiwan, the Geological Act promulgated in 2010 has proposed the term of "Geoheritage Geologically Sensitive Areas (GHGSA)" for those extraordinary landscapes. If the land development activities, such as land use, disaster prevention, or resource exploration, proposed by private agencies or the government sectors were overlapped with the GHGSA, the geological site surveys and geological safety assessments of Geologically Sensitive Areas should be accomplished as references for development permission.

According to the Geological Act, The competent authorities have to investigate the geologically sensitive outcrops, and determine whether these outcrops or scenery areas should be delineated as Geoheritage Geologically Sensitive Areas. For now, Three target areas are focused: 1. the river erosion landscapes in Jilong River; 2. the volcanic scenery in Penghu Islands; 3. the marine-erosional and igneous landscapes in north and northeast coasts of Taiwan. By the end of 2013, 3 GHGSAs (about 15 hectares totally) may be allowed to be delineated.

\* Contact person email: sfchang@moeacgs.gov.tw

## SC 2: Conservation and interpretation of geoheritages

SC201

### Strengthen the Protection of Geoheritages, Promoting the Sustainable Development of Geopark

Zhixing JING<sup>1</sup>

*<sup>1</sup>Office Director of Fangshan Global Geopark Administration Committee, China*

Fangshan Global Geopark is well-known for its karst landform, which is the typical representative of semi-arid area in North China. It boasts abundant, typical, rare geoheritages and geological landscapes, playing an important role and being of far-reaching significance in term of ecological cultural construction, Beijing world-class city construction, and local economy sustainable development.

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; (6) the Geopark has cradled the celebrity-gathering generations of Chinese geoscientists.

Protecting well the geoheritages of Fangshan Global Geopark is the first priority of Administration Committee of the and is of critical importance of sustainable development of Fangshan.

\* Contact person email: happyjzhx@126.com

## SC 2: Conservation and interpretation of geohéritages

SC202

## Interpretation of Cultural Differences between San'in Kaigan Geopark and Lesvos Island Geopark

Atsuko NIINA<sup>1</sup>*<sup>1</sup>Tottori University of Environmental Studies, Japan*

The presentation aims to explain the interpretation of cultural differences between San'in Kaigan Global Geopark and Lesvos Island Global Geopark. Although the two have been twin geoparks since 2011, there is no daily exchange between its residents due to the huge geographical distance between Japan and Greece. Researchers, however, work to strengthen the relationship and promote information sharing and effective collaboration between the two international geoparks by holding the San'in Kaigan Geopark International Conference and participating in the summer school at Aegean University. The role of researchers as information distributors is very important to let its residents know not only geological information but also the regional identity.

Interpreting the cultural differences while introduction Lesvos island Geopark to residents of San'in Kaigan Geopark poses a major challenge, since regional characteristics and philosophy distinguish every cultural phenomenon, including language and the way people live and think. Indeed, the geological history of the world is vast and varied with its own characteristics and structure and knowledge about geological phenomena is more common, as it has its own framework, unlike cultural differences that have varied interpretations. This presentation is a case study of prevalent customs in San'in Kaigan Geopark, and the interpretation of cultural differences based on geology and geography between the two international Geoparks.

\* Contact person email: niina@kankyo-u.ac.jp

## SC 2: Conservation and interpretation of geoheritages

SC203

### Importance of Scientific Knowledge on the Development of Special Landforms in Zhangjiajie Global Geopark of China

He Qing HUANG<sup>1</sup>, Lianqun XIANG<sup>2</sup>

<sup>1</sup>Zhangjiajie Geopark of China and Chinese Academy of Sciences, China

<sup>2</sup>Zhangjiajie Geopark of China, Hunan, China

Recent movement on setting up geoparks at national and global scales has imposed considerable challenges to geopark management. The geologically and geomorphically distinct sites are of very important scientific, ecological and tourism values and provide an excellent opportunity for scientist to communicate the significance and substance of the science to the community. However, few scientist have been engaged into the movement, although there are urgent issues requiring them to solve, such as naming a distinct site among the variety of landscapes that have either similar landforms or similar lithology, climate, or the other similar aspects.

Zhangjiajie Geopark is located in Hunan Province of China, and has been one of the top-listed tourism sites in China. Its unique landscape has developed in Devonian sandstone over an area of ~400 km<sup>2</sup> and is characterized by more than 3000 sheer vertical sandstone pillars, peaks and walls of up to 350m height. Due to the spectacular features, it has been declared an UNESCO Global Geopark recently. Over the years, however, considerable debates have been under way on naming the distinct landscape. To clarify the confusion and promote the application of geomorphic knowledge in managing the geopark, a research center has been set up recently. This presentation introduces the major research activities of the center, typically on the detailed investigation of the causes behind the debates over naming the landscape and the promotion of geomorphic knowledge in geopark management and tourism development.

\* Contact person email: [huanghq@igsnrr.ac.cn](mailto:huanghq@igsnrr.ac.cn)

## SC 2: Conservation and interpretation of geoheritages

SC204

## Klang Gates Quartz Ridge Geoheritage Site in Selangor, Malaysia and its Potential as a Candidate for UNESCO World Heritage Site

Che Aziz ALI<sup>1</sup>, Mohd Shafeea LEMAN<sup>1</sup>, Ibrahim KOMOO<sup>2</sup>, Chuan Sian LIM<sup>1</sup>,  
Tanot UNJAH<sup>1</sup>, Mohd Rozi UMOR<sup>1</sup>

<sup>1</sup>Universiti Kebangsaan Malaysia, Malaysia

<sup>2</sup>Universiti Malaysia Terengganu, Malaysia

Unusual but true! The 14 kilometers wall that formed north-northeastern backdrop of Kuala Lumpur City is almost entirely made of quartz. This outstanding pseudo-karst landscape is called the Klang Gates Quartz Ridge. It is a large (50-200m wide) Cretaceous quartz dyke which intruded Triassic Granite of the Main Range. The dyke formed part of the Kuala Lumpur - Mersing Fault, a major lateral fault that cut across the Peninsular Malaysia at 105° -285°. The dyke comprises of 98% or more quartz (mostly of milky quartz) emplaced through three separate mineralization episodes. Geochemical analyses show that these quartzes are originated from calc-alkaline magma of post-orogenic phase. From geomorphological analysis several domes, messas, Malay tanjaks and monuments were observed. The ridge is dissected by the Gombak, Klang and Kemensah Rivers, with Bukit Taboh (534m) as its highest peak. The ridge is protected by the Selangor State Forestry Department where only limited geotourism activities are allowed due to its fragile nature and susceptibility to possible rock fall. Klang Gates Quartz Ridge will be gazetted as a National Heritage Site this September by virtues of its outstanding scientific (i.e. being longest quartz dykes in Southeast Asia and its significance in regional tectonic history), aesthetic (i.e. unique and rare pseudo-karst landscapes and aesthetic minerals), and recreational values. This paper seeks international expert opinions on the merit of Klang Gates Quartz Ridge to be included in the Tentative List of UNESCO World Heritage Site.

\* Contact person email: [acheaziz@yahoo.com](mailto:acheaziz@yahoo.com)

## SC 3: Conservation and interpretation of geoheritages

SC301

### **PPFc (Past, Present Future Concept). A New Concept for Geoparks. First Implementations**

Guy MARTINI<sup>1</sup>

*<sup>1</sup>Geopark International Development(GID), France*

Speaking on geology is, overall, speaking about time. Geopark are unique territory able to provide new questions about time. About the necessary relativity that it has to be given to the actual interrelation that the human society is developing with the planet, using the human time scale like unique temporal referent.

Coming back to the Geopark concept, the constitutive aim of a Geopark is not simply to « teach geology », but to educate, share and to inspire thoughts on another vision of time, the vision of the 4.5 billion s years of the earths, its millions of paleo-environment. It's providing a fourth dimension to the daily vision of the planet.

Geoparks have to offer a time fourth dimension, in an attempt of a better comprehension and thoughts of a « today », needs to be completed necessarily by a vision of a future. A vision, as for a past vision, which should only be given by Geosciences.

With this time conceptual necessity, the -Past-Present-Future concept should afford the complete specificity and unquestionable difference between the Geoparks and the other UNESCO territories.

PPFc, on development from 2000<sup>1</sup>, is based on the systematic use, in Geoparks, of interpretative supports which could present three superimposed images of the locality corresponding to its present situation, its origin and genesis and its future evolutions.

Example will be given of the actual PPFc implementation in some Geoparks.

\* Contact person email: [guy.martini@hotmail.com](mailto:guy.martini@hotmail.com)

## SC 3: Conservation and interpretation of geohéritages

SC302

## Reorganizing Geosites for better Management and Conservation of Geohéritage Resources within Langkawi Globalgeopark

Tanot UNJAH<sup>1</sup>, Mohd Shafeea LEMAN<sup>1</sup>, Che Aziz ALI<sup>1</sup>, Kamal Roslan MOHAMED<sup>1</sup>  
*<sup>1</sup>Universiti Kebangsaan Malaysia, Malaysia*

A total of 94 geosites have been identified throughout Langkawi Islands prior to the establishment of the Langkawi Global Geopark in 1997. Five of these geosites are protected by the Kedah State Forestry Department under the Forestry Act No 1984 as they are located within the State's special conservation areas known as Geoforest Park. Three such parks established in Langkawi Islands are the Machinchang Cambrian, Kilim Karst and Dayang Bunting Marble Geoforest Parks. Forty one other geosites are also protected by similar Act as they are located within the various Permanent Forest Reserves and Recreational Forests. The other 48 geosites are not governed by proper protection Act as they belonged to private properties. The Langkawi Research Centre and Langkawi Global Geopark conservation committee are currently working towards the recognition of some of these geosites as National Heritage Sites to be protected under Heritage Act No 645. In doing so, geosites within the Langkawi Global Geopark are being redefined and reclassified into 13 larger geosites including both previously protected and unprotected geosites for the purpose of management efficiency. This reclassification was done on the basis of geological association as a system that is unique only to a particular geographic boundary. Some of these newly defined geosites are coincide or fall within previously described geotrails. This new classification will lead towards better understanding of the geosites, hence better management and sustainability of geosites within Langkawi Global Geopark for the benefit of the local community.

\* Contact person email: tanotunjah@yahoo.com

## SC 3: Conservation and interpretation of geoheritages

SC303

### Concept and Content of Geoheritage Diversity and its Significance

Zhizhong ZHAO<sup>1</sup>, Changxing LONG<sup>1</sup>  
*<sup>1</sup>Institute of Geomechanics, CAGS, China*

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

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

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

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

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

\* Contact person email: zhaozz2006@gmail.com



## SC 3: Conservation and interpretation of geoheritages

SC304

## Supposition on Use of Mobile Phone Application Software in Geopark Informatization Construction

Li QIAN<sup>1</sup>*<sup>1</sup>China university of Geosciences Beijing, China*

The technical requirement for China national geopark planing has declared clearly that all geoparks must plan to construct informatization system in time. The informatization system consisted of data base, monitor system, website and internet system construction. The former two were basically served managers, and the third one was for both managers and visitors. Data base collects information about geological heritage spots, including the name, properties, position, features, description and photo. They were preserved in the data bank for managers to log in to inspect and make strategic decisions. The monitor system was mainly built up for administrators to keep watch on the geopark, which also can remind visitors to protect geoheritages. The website and internet system principally payed attention to independent website design of geoparks, which worked as a internet show platform. The traditional three may not cover every aspect in geopark informatization, but with the information construction increasingly deepening, communication between geoparks and tourists are more and more important. What the plan had ignored was the popular smart-phone and the mobile application software using in the internet age, and what it could play a part in the geopark informatization. The paper focused on one kind of supposition that developing an geopark tourism application for visitors to download on mobile phone and get information about geological heritages and the whole geopark conveniently, and for managers to administrate parks and communicate with tourists directly. That means both of them could get feedback quickly and work effectively, no matter tour or protection.

\* Contact person email: [raiponce@sina.com](mailto:raiponce@sina.com)

## SC 4: Conservation and interpretation of geoheritages

SC401

### What Heritage?: Basic Concepts for Geopark Management

Enrique DÍAZ MARTÍNEZ<sup>1</sup>

<sup>1</sup>*Geological Survey of Spain (IGME) and ProGEO, Spain*

Geoparks are examples of integrated management of different types of heritage. The characterization of what is and what is not heritage, and what type of heritage it is, is crucial for a proper identification of potential use and for the design of action plans. Geoparks are faced with the integrated management of different kinds of heritage. It is thus frequent that conflicts of interest arise when the type of heritage is not clearly set.

Heritage is the legacy of tangible objects and intangible attributes of a group or society. We do not consider heritage something with little or no value, or from which we expect no future benefit or interest. This implies that: (1) not everything may be considered heritage, (2) the value given to an element may change with time, and (3) not all heritage elements have the same value. Simply defined, heritage refers to elements with value. The type of element is fixed and its value may change, so the classification of heritage necessarily needs to be based on the type of element, not on the type of value. Thus, depending on the elements under consideration, heritage may include tangible elements, either immovable or movable, as well as intangible elements. The value of an element is always biased and subjective depending on cultural aspects such as human experience, demand, knowledge, etc. Geological elements originate by natural processes, so if such an element is given sufficient value, it may be considered geoheritage, which is a kind of natural heritage.

\* Contact person email: [e.diaz@igme.es](mailto:e.diaz@igme.es)

SC 4: Conservation and interpretation of geoheritages

SC402

## On the Appropriateness of Plan and Design of Recreation Facilities in Geoparks

Xin CAO<sup>1</sup>

<sup>1</sup>*School of Landscape Architecture, Beijing Forestry University, China*

Geopark is a kind of heritage which is highly attractive to the public, and is a kind of property which is easily to be interfered and damaged as well. The geotourism of the public must need some necessary recreation facilities, such as small service structures, paths, interpretation system, seats, rubbish bins, and so on. Those recreation facilities actually affect the experience of the tourists, and at the same time, are the interference to the nature, including the topography, the vegetation, and the ecological system. So, how to merge with the nature, minimize the influence to the nature, it is the criteria of the plan and design of the recreation facilities in geoparks. On the scale, style, material, color, methods, and etc., those facilities should adapt with the local specific environment, be harmonious and unified with the natural landscape, not to cover or damage the aesthetics of nature. This paper will discuss the appropriateness of the main kinds of recreation facilities such as structure, path, interpretation system, seat, platform, and etc. And some instances of different regions will be given. Appropriate recreation facilities will contribute to the conservation of the geoparks, and will be representation of modest creativity of mankind, which express the respect to the nature and the indigenous culture.

\* Contact person email: shuiyunju@hotmail.com

## SC 4: Conservation and interpretation of geoheritages

SC403

### Communicating Geoheritage: Linking Culture and Geology in Delta Sarawak Geopark

Dana Anak BADANG<sup>1</sup>, Tanot UNJAH<sup>1</sup>  
*<sup>1</sup>Universiti Kebangsaan Malaysia, Malaysia*

Geology knowledge mainly observe as geosite within geopark are often communicate to the public in scientific mode. Most of the interpretations are in scientific jargon with minimal simplified geological term. This kind of interpretation only friendly to a place or public that already reach or receive some level of education with basic scientific knowledge. Therefore, some of the geosite are under appreciate or under utilize for tourism despite the existing panel of description. The most crucial part of communicating is to get the public or even the local get connected to geosite through their perspective of knowledge. This perspective knowledge are often general issues and with connection of physical or cultural value. This paper will discuss the possible perspective knowledge that linking culture and geology in Delta Sarawak geopark. Among the selected site are Gunung Santubong, Gunung Sejinjang, Gua Angin, Gua Pari, Sea stack Teluk Pandan, Tanjung Sapi and Mushroom rock. These geosite mainly representing landscape and geomorphological features diversity connected to culture through local folklore, myth, and local livelihood. The connection between geology and local folklore, myth, and local livelihood is more viable in communicating geoheritage for better appreciation and connection toward the geosite. This is also possible way of embedding appreciation for local heritage and people heritage.

\* Contact person email: danabadang@gmail.com

SC 4: Conservation and interpretation of geoheritages

SC404

## The Late Pleistocene Shoushan Megaslide, Kaohsiung City, Taiwan

Shyh-Jeng CHYI<sup>1</sup>

*<sup>1</sup>Department of Geography, Kaohsiung Normal University, Taiwan*

The active landslides on western Shoushan are suggested as the parts of a late Pleistocene megaslide that took place during the last glacial period. The evidences for this megaslide include the amphitheater-shaped or the horseshoe-shaped head scarp, the concave-convex slope profile, the hummocky topography, the big limestone block of colluvial hillslope deposits origin and having many speleothem fragments within them. An approximate age of less than 50 ka for this magaslide is derived based on the date of a speleothem fragment. Whether the magaslide will move again or not, and the relationship between isolated active landslides and the entire slide mass are worth further studying.

\* Contact person email: chyisj@nknku.edu.tw

## SD 1: Community involvement and economic development in geoparks

SD101

### Enhancing Geopark Spirit through Community Participation: Selected Cases from Asia Pacific Geoparks

Sharina Abdul HALIM<sup>1</sup>, Ibrahim KOMOO<sup>2</sup>

<sup>1</sup>*Institute for Environment and Development (LESTARI), UKM, Malaysia*

<sup>2</sup>*Universiti Malaysia Terengganu (UMT), Malaysia*

One of the aims of a geopark is to develop local community who are knowledgeable about heritage resources, and appreciate the close relationship between these heritage resources and the life of the people. In order to achieve this, it is importance to strengthen sense of ownership and respect among community members towards heritage through targeted educational and environmental programmes. Previous studies have shown that sense of ownership towards resources is related to the degree of dependency particularly in terms of livelihoods enhancement. Thus it is important to identify situations where people share a common social identity, for instance shared values, towards better utilization of resource for heritage conservation and management. In this paper, geopark spirit is defined as a feeling that members have of belonging, a feeling that members matter to one another and the group, and a shared faith that member's needs' will be met through their commitment to be together. The enhancement of geopark spirit can be achieved through local community livelihood diversification in association with natural heritage, local community utilizing tradition and culture for collaborative resource management, and local community coping mechanism to survive in 'living with disaster' environment. Several examples from the Asia Pacific Geoparks, namely Malaysia, Korea, and Japan, are used to illustrate how geopark spirit is importance in ensuring livelihoods sustainability and heritage conservation. In this paper, we argue there are four main elements to be considered in order to enhance geopark spirit among local community, in which are institutions, information, identity and incentives.

\* Contact person email: sharinahalim@gmail.com

SD 1: Community involvement and economic development in geoparks

SD102

## Changes in Local Communities after Designation as a Global Geopark

Kwanghun KO<sup>1</sup>, Kilrim KO<sup>2</sup>, Yongmun JEON<sup>2</sup>

<sup>1</sup>Suweolbong Tuff Ring, one of Jeju Global Geopark, Republic of Korea

<sup>2</sup>Jeju Island Geopark Team, Republic of Korea

Jeju Geopark became one of the Global Geoparks Network in 2010. The entire island of Jeju is a geopark including especially these nine 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. Among those nine sites, Suweolbong, located at the western edge of the island, was originally formed with pyroclastic deposits during phreatic eruption, and only part of the tuff ring has remained after wave erosion. Despite its geologically high value, the area around Suweolbong had long been ignored as a tourist spot due to inconvenient accessibility and a lack of local awareness.

After the Global Geopark designation, the area has seen an increasing number of visitors and especially gained much popularity as a learning place for students. Trail courses have been developed along with geological, ecological, historical and cultural resources, local people have been working as guides, and the increasing number of visitors has helped the local economy. Residents themselves have come to understand the value of Suweolbong, taking pride in their hometown with raised awareness about conservation of the environment and making concerted efforts to protect nature and the cultural heritage in and around Suweolbong, through creating a local council for the purpose.

\* Contact person email: ymjjeom74@korea.kr

## SD 1: Community involvement and economic development in geoparks

SD103

### **Community Service-learning, Participatory Politics and Stakeholders: A Study of Oceanic Geopark Promotion**

Shew-Jiuan SU<sup>1</sup>

*<sup>1</sup>Department of Geography, National Taiwan Normal University, Taiwan*

The promotion and consequence for geoparks have been variegated due to diverse characteristics of the parks. Much research has been done for the significance of management for geoparks, but not much has been done on how the differentiated nature of geoparks and communities will require differed strategies of management and promotion.

This present paper tries to delineate how oceanic geoparks where people's livelihood are different from the communities where people live on agriculture or other means of living. Using the cases of Taiwan's Penghu Geopark and Yehliu Geopark, I examine how the livelihood and means of living have intertwined with the promotion of oceanic geoparks. Local community focus group interviews and individual qualitative interviews are utilized for collecting information to be used as the base of analysis. Service-learning is finally suggested as a way to consolidate local politics for community consensus, while participatory process is considered indispensable for the process.

The paper is divided into three parts. First is to identify the common problematic for the promotion of the two oceanic geoparks in relation to local livelihood. The paper then buttresses how these problematic could be faced in relation to community politics. Finally the paper tries to model a framework for community politics in oceanic geoparks where people's livelihood is based on fishing.

\* Contact person email: shewsu@ntnu.edu.tw



SD 1: Community involvement and economic development in geoparks

SD104

## Development of Geoparks in the Arab Region (Opportunities and Challenges)

Mohamed AL-AAWAH<sup>1</sup>

<sup>1</sup>UNESCO Cairo Office, Yemen

The establishment of a Geopark aims to bring sustainability and real economic benefit to the local populations, usually through the development of sustainable tourism and other economic and cultural activities.

The Arab region has several opportunities for the development of Geoparks. But its effective practice and implementation is not promising due to lack of commitment of governmental policy and planning strategy with combination of integrated conservation and development. This presentation tries to discuss what issues should be addressed before Geoparks development in the region. It focuses on community based management for better practice of Geopark.

\* Contact person email: [m.alaawah@unesco.org](mailto:m.alaawah@unesco.org)

## SD 1: Community involvement and economic development in geoparks

SD105

### New Start for Lushan Global Geopark

Hui CHEN<sup>1</sup>

*<sup>1</sup>Lushan Global Geopark, China*

Lushan Global Geopark got a yellow card of progress evaluation last year. Though it is unhappy thing, it is also a good thing. Because we can really analyse the aspects that we didn't do well, especially what we missed when we were managing our global geopark. The secretary of International Geoscience Programme, Mr. Patrick J. Mc Keever informed us our problems in the letter that he wrote to us, then we began to do our improvement program.

The oral presentation will have 3 parts.

1. The brief introduction of Lushan Global Geopark
2. The progress of the improvement program (geopark visibility, geopark promotion, geosite information board, geological scientific popularization, a geological museum, GGN cooperation)
3. The past, present and future of Lushan Global Geopark (a group of photos)  
(may have a little modification)

\* Contact person email: [chenhui7171@163.com](mailto:chenhui7171@163.com), [13507927171@163.com](mailto:13507927171@163.com)

SD 2: Community involvement and economic development in geoparks

SD201

## Effects of the San'in Kaigan Geopark on Local Economy

Katsunori ISHIDA<sup>1</sup>

*<sup>1</sup>San'in Kaigan Geopark Promotion Council, Japan*

The San'in Kaigan Geopark is located in western Japan, covering three cities and three towns of three prefectures.

About 14 million tourists visit in a year and enjoy hot springs, sea bathing and skiing in the area.

I'd like to announce how the San'in Kaigan Geopark Promotion Council has promoted local economy and its effects.

We've worked on promoting economic activities utilizing the logo for adding value to the products and the popularity of geopark.

The San'in Kaigan Geopark logo can be used on products authorized by the council. The authorized products are introduced on websites concerning main stores where they're sold and we positively promote the products and the geopark.

Furthermore, we've supported economic activities using natural resources in the geopark since 2011. In the area, there are many rocky shores where wakame seaweed is well grown and consumed from the past. We sent an adviser to an aging fishing village in 2011 to promote sales of wakame seaweed. We started selling it with the logo in 2012 and its sales have increased steadily as a result. This made people in this village join hands tightly and new-squid-products with the logo in fall of 2012 were sold out. This village is challenging to develop new products.

In this way, economic activities using natural resources in the geopark are connected with the enhancement of communication, people's lives and spirits in the area. The San'in Kaigan Geopark Promotion Council will support geopark activities to have more active villages.

\* Contact person email: [katsunori\\_ishida@pref.hyogo.lg.jp](mailto:katsunori_ishida@pref.hyogo.lg.jp)

## SD 2: Community involvement and economic development in geoparks

SD202

### **Geopark Development Opportunities in Indonesia As a Creative Tourism Asset**

Heryadi RACHMAT<sup>1</sup>, Igan Supriatman SUTAWIDJAJA<sup>1</sup>  
*<sup>1</sup>Geological Agency-Indonesia, Indonesia*

Indonesia lies on the triple junction of three major active plates collide with each other and within a period of millions of years there has been a complex and dynamic geological processes which formed geodiversity. It spreads forming a geological phenomenon which is potentially developed into a geoheritage or an alternative tourism. Thus associated with the principle of geological tourism called geotourism, further more it is called 'geopark' which is supported by three elements, geodiversity, biodiversity, and cultural diversity.

Currently there are 90 Geoparks in the world spread over 26 countries included in GGN (Geopark Global Network), there are only three Geoparks in South East Asia, i.e. Langkawi Geopark in Malaysia, Dong Van Geopark in Vietnam, and Batur Geopark in Indonesia. Indonesia have proposed three geoparks, Rinjani Geopark, Batur Geopark, and Pacitan Geopark. From the three proposals, only Batur Geopark was successfully has been included in GGN-UNESCO. For the second phase in 2011, there are five candidates which are being processed, it is the new candidates there are Toba Geopark, Merangin Geopark, Raja Ampat Geopark, and the old candidates there are Rinjani Geopark and Pacitan Geopark.

Indonesia has a very large opportunity to develop geopark, because it has an abundant geodiversity widespread throughout the island. So through the elements of Biodiversity and Cultural Diversity offered an opportunity for communities to develop tourism professionally in a creative tourism economy (transportation, lodging, restourants, souvenir, arts, guide, porters, etc.) that can directly support a sustainable geopark development.

\* Contact person email: [heryadirachmat220@gmail.com](mailto:heryadirachmat220@gmail.com)

SD 2: Community involvement and economic development in geoparks

SD203

## The Use of "Geo-harvests" in Toya-Usu Global Geopark's Economic Development Efforts

Masato TAKEKAWA<sup>1</sup>, Kazuya ENDO<sup>1</sup>, Nire KAGAYA<sup>1</sup>, Asami NAKAYA<sup>1</sup>, Yoshiaki HATA<sup>1</sup>  
*<sup>1</sup>Toya Caldera and Usu Volcano Global Geopark Council, Japan*

The Toya Caldera and Usu Volcano Global Geopark is famous for its beautiful views of the lake, the active volcano, and hot springs. Tourists have been visiting Toya-Usu Global geopark to refresh their bodies and relax their minds for a hundred years.

Recently, the number of tourists has been decreased 31% from 2001 to 2011. Some reasons of this decline have been the worldwide economic downturn, the appreciation of yen, and the earthquake disaster in Japan. However, we must continue in our efforts to attract more visitors by creating new perspectives regarding what our geopark provides. By highlighting our charms we may also boost the local economy.

We will present out latest efforts of using "the blessings from the earth" or "Geo-harvests" as a tool in developing Toya-Usu geopark's image and resources.

\* Contact person email: nire.kagaya@town.toyako.hokkaido.jp

## SD 2: Community involvement and economic development in geoparks

SD204

### Community Involvement for Geopark Initiatives and Their Implementation

Enrique DÍAZ MARTÍNEZ<sup>1</sup>, Juana VEGAS SALAMANCA<sup>2</sup>, Andrés DÍEZ HERRERO<sup>2</sup>,  
Ignacio GUTIÉRREZ PÉREZ<sup>3</sup>

<sup>1</sup>Geological Survey of Spain (IGME) and ProGEO, Spain

<sup>2</sup>Geological Survey of Spain (IGME), Spain

<sup>3</sup>Association of Amateur Mineralogists of Segovia (ASAM), Spain

Community involvement is crucial both for the development of geopark initiatives and for the implementation of geopark strategies. In order to facilitate a proper sustainable use of resources, for their own interest and for the interest of future generations, local communities must always be informed and aware of their resources, both natural (evidently including geoheritage) and cultural, moveable and immovable, tangible and intangible. Heritage must be properly cataloged, valued and assessed, including the analysis of potential use and vulnerability of all elements and sites involved. At the same time, the local community must participate in the decisions process and in the overall governance of the geopark, both democratically-elected representatives in the administration and stakeholders (NGOs, businesses, etc.).

This presentation looks at several examples of geopark initiatives in Spain, some fruitful, some failed, in order to draw some basic principles that may be of use for other similar initiatives around the world. Collisions of interest, misunderstandings, lack of interest, and insufficient funding are some of the classic problems. Proper communication, information flow, transparency, democratic decision-making, and efficient leadership are some of the classic solutions. Innovative ideas must be promoted and facilitated, as they are a local source of new resources that distinguishes the geopark from others. Much can be done with little resources when imagination and ICTs are put into practice, together with local singularities that serve as an attraction for tourism. After all, apart from the conservation of geoheritage, the other main objective of geoparks is local sustainable socioeconomic development.

\* Contact person email: e.diaz@igme.es

SD 3: Community involvement and economic development in geoparks

SD301

## The Case for Latin America: Geoparks as a Tool for Economic Development and Community Involvement

Denise GORFINKIEL<sup>1</sup>

<sup>1</sup>UNESCO Latin America, Uruguay

The work of Earth Sciences Programme of the Regional Bureau for Science of UNESCO in Latin America and the Caribbean has focused on the creation of a Geoparks Network in Latin America and the Caribbean. Efforts have been made towards depicting the potential Geopark universe. The contribution of Geoparks towards sustainable development needs to be better appreciated. Geoparks are part of an integrated concept of protection, education and sustainable economic development, mainly through geotourism where citizens, public managers, private sector, and scientific organizations work together.

The Latin American and Caribbean landscape has its particularities. These referred to the fact that they are mainly development countries which base their development strategies in different economic activities.

The World Tourism Organization (UNWTO) showed that Latin America is the region of the planet that showed the highest growth rate in 2011, reaching 10%, well above Europe that followed only with 6%.

Geotourism can help these economies to develop. In this sense, it is important to analyze the role geoparks play as an engine of economic and social development in the countries of Latin America, the enhancement of new assets: natural, cultural and geological, with which LAC countries position their tourism internationally.

\* Contact person email: [dgorfinkiel@unesco.org.uy](mailto:dgorfinkiel@unesco.org.uy)

## SD 3: Community involvement and economic development in geoparks

SD302

### Articulating Local and Global Geoparks Network

Wen-Cheng WANG<sup>1</sup>

*<sup>1</sup>National Taiwan Normal University, Taiwan*

This paper aims to empirically illustrate how the trajectory system of local and global geoparks network is articulated in Taiwanese experience. In order to explain the traction and trajectory, which the Geoparks crusade currently enjoys within environment resistance movements and beyond, this paper contextualizes its emergence in the shifting framework of local empowerment regimes and then traces and compares the different versions of this crusade, which has become a defining feature of landscape conservation exertions though with different meanings. It distinguishes a radical Fordist politics version to more locally empowered and centrally depoliticized versions as widely used in the local empowerment context. By articulating the latter for encouraging to the participatory demand to inclusion within the existing system. To this end, the text also traces the shifting social movements from Fordism through the various neoliberal regimes and reminds us of the respective collective identity of the actors, their target and their concerns. On this basis, it becomes possible to appreciate. Local empowerment, community buildings and mobilization of endogenous growth stabilize the regional potential through extensive focus on upgrading and regional abundant supply base, trying to mobile and transform the regional cultural, political and social economy. Its principles and policies contrast to orthodox economic doctrine, but is designed to support 'bottom-up' approach, region-specific, long-term, and multi-activity-based policy and action. The conclusion opens up the question of the implications of the current Geoparks network for the landscape preservation movement.

\* Contact person email: [wwang@ntnu.edu.tw](mailto:wwang@ntnu.edu.tw)



SD 3: Community involvement and economic development in geoparks

SD303

## Local Community Empowerment for Sustainable Geotourism Development in the Batur Global Geopark, Bali - Indonesia

I Wayan KASTAWAN<sup>1</sup>, Akhyaruddin<sup>2</sup>, I Made GIANYAR<sup>3</sup>, Hanang SAMODRA<sup>4</sup>

<sup>1</sup>General Assembly of Batur Global Geopark, Indonesia

<sup>2</sup>Ministry of Tourism and Creative Economy, Indonesia

<sup>3</sup>Regent of Bangli Regency, Indonesia

<sup>4</sup>Geological Survey Center, Indonesia

The purpose of this paper is to discuss a variety of local community empowerment for the development programs in the Batur Global Geopark area. The programs mostly give a space for public participation but until now no model is appropriate for the Batur Global Geopark which has a unique heritage. So this paper will try to evaluate the Batur Global Geopark existing area within their nature, culture, biodiversity and indigenous people. Furthermore, the Batur recognition by the Global Geoparks Network UNESCO can contribute some significant improvements to how the development, especially the Geotourism Development can enhance local community empowerment and sustainability of nature, culture and biodiversity as well. By the comparative study means all of the concepts and primary data of previous study will be critically reviewed and the weakness of each concept will be discussed. So in the final result of this study, the best model for the Geotourism Development in the Batur Global Geopark can be achieved in order to formulate the local community empowerment roles in managing their own heritage.

\* Contact person email: [iwayankastawan@gmail.com](mailto:iwayankastawan@gmail.com)

## SD 3: Community involvement and economic development in geoparks

SD304

### For the Sustainability of “Geo-life”: A Proposal of an Important Role of Geoparks

Daichi KOHMOTO<sup>1</sup>

*<sup>1</sup>School of Tourism, Kobe Shukugawa Gakuin University, Japan*

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, the author argues 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 farmers 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 economical 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.

\* Contact person email: daichizu@gmail.com

SE 1: New and aspiring geoparks

SE101

## GGN Application Guidelines for Aspiring Geoparks and Revalidation Process for Established Geoparks

Wesley HILL<sup>1</sup>, Margarete PATZAK<sup>2</sup>, Nickolas ZOUROS<sup>3</sup>

<sup>1</sup>*The Geological Society of America, GGN Bureau, USA*

<sup>2</sup>*UNESCO Assistant Programme Specialist, GGN Secretariat, Germany*

<sup>3</sup>*Lesvos Petrified Forest Geopark, European Geoparks Network (EGN) & Global Geoparks Network (GGN) Bureau, Greece*

This presentation will cover the Global Geoparks Network (GGN) application criteria for an organizational management board of a concise area of geological heritage with cultural and scientific interest that is aspiring to be a member of the GGN. A summary of the application guidelines will be presented along with information on the desk-top evaluation process involving reviews by external experts (scientific and cultural). The GGN Secretariat at UNESCO Headquarters in Paris coordinates the application and revalidation process. An overview of the Geopark Revalidation Process will be presented providing information to already established Global Geoparks that must revalidate the GGN brand and membership every 4 years, and what to expect during the revalidation process. The application timeline and various deadlines will be presented in addition to an outline of the overall process.

\* Contact person email: [whill@geosociety.org](mailto:whill@geosociety.org)

## SE 1: New and aspiring geoparks

SE102

### Aso Geopark - Where 70,000 People Live in and around the Huge Caldera

Miki TOKUNAGA<sup>1</sup>, Yoshioki SATO<sup>1</sup>, Akinobu ISHIMATSU<sup>1</sup>, Akira KATAYAMA<sup>1</sup>  
*<sup>1</sup>Aso Geopark Promotion Council, Japan*

Aso Geopark, a member of Japanese Geoparks Network, is a region with characteristics such as caldera topography formed by huge eruption approximately 90,000 years ago and the volcano which remains active.

Aso Geopark is now in the process of applying for a referral from national committee to join GGN. Aso caldera is clearly preserved, and could visually show its scale and devastation of super eruption at the time. Additionally, people who lived closely with volcano have developed their own culture and lifestyle. We assure these characteristics bring added value to GGN.

After the caldera formation, post caldera cones have been formed. Around the same time, there has been a caldera lake which has gradually drained away. Finally, caldera became living places for people. A crater lake called 'Yudamari' is formed inside of the Nakadake crater which emits large quantities of volcanic gases even during dormant periods. It is a very interesting geosite where one can feel the activities of the earth closely with the volcanic gas monitoring system.

People have lived around caldera for approximately 30,000 years with blessings of the volcano such as abundant springs, hot springs, and fertile land spreading around caldera. However, in July 2012, shallow landslide happened along caldera walls due to torrential rain, and more than 20 people lost their lives.

While enjoying many blessings of the volcano, people also have high risks of disaster in Aso region. Aso Geopark is going to promote education activities to raise people's awareness of disaster prevention.

\* Contact person email: info@aso-geopark.jp, miki@aso-geopark.jp

SE 1: New and aspiring geoparks

SE103

## Characteristics of Geoheritage Resources and Their Scientific Significance of Yanqing Geopark, Beijing, China

Qing HE<sup>1</sup>, Jianping ZHANG<sup>1</sup>, Baojun YOU<sup>2</sup>, Suzhi ZHANG<sup>2</sup>

*<sup>1</sup>Research Center for Geopark (Geoheritage) Investigation and Evaluation,  
China University of Geosciences, China*

*<sup>2</sup>Administration for Yanqing National Geopark, China*

As one of two 2013 global geopark candidates from China, Yanqing Geopark is located in the north-west part of Beijing, China. This geopark is rich in geoheritage resources, dominated by the Mesozoic Movement-related geoheritage, Late Jurassic silicified woods, dinosaur footprints and typical North-China- type karst landforms. It is an ideal place for carrying out the related scientific research and science popularization.

\* Contact person email: 1127588310@qq.com

## SE 1: New and aspiring geoparks

SE104

### A Global Plan for the Mt. Mudeung Area, South Korea

Min HUH<sup>1</sup>

<sup>1</sup>*Faculty of Earth Systems and Environmental Sciences & Korea Dinosaur Research Center,  
Chonnam National University, Republic of Korea*

Located near the center of Gwangju Metropolitan City, South Korea, Mt. Mudeung has a wide range (> 11 km<sup>2</sup>) of columnar joints in high altitude (> 750 m), which is a quite rare sight since most columnar joints are located along the coastline. The columns are made up of Welded Tuff (or Dacite), which is thought to be a result of a large-scale volcanic activity, which accrued about 87 to 85 Ma. The columns kept expanding until the Late Pleistocene (about 110 Ka), and recent study suggests that the columns of Ipseokdae and Seoseokdae were exposed due to the weathering process during 110 to 10 Ka. The columns are pentagonal or hexagonal in shape, and the length of one column surface measures 1 m to maximum 9 m. This is much larger in scale than any other columnar joints reported around the world, including the famous columns of Giant's Causeway (United Kingdom) and High Island (Hong Kong). Also there is a variety of geo-heritage sites located near the Mt. Mudeung area, including the Hwasun Dinosaur Track Site, Hwasun Dolmen Park, Mt. Anyang Talus Slopes etc. During the last 40 years, non-governmental organizations, including the 'Mt. Mudeung Conservation Organization', and media sources, such as Gwangju MBC, had been conducting conservation campaigns for the protection of the Mt. Mudeung area, and as a result, it become a national park in 2013. The scientific investigation team, supported by the Gwangju Metropolitan City, has proposed proceedings and roadmap plans for the globalization of the area.

\* Contact person email: [minhuh@chonnam.ac.kr](mailto:minhuh@chonnam.ac.kr)

## SE 2: New and aspiring geoparks

SE201

## The Four Attractive Components of Kirishima Geopark

Toru ISHIKAWA<sup>1</sup>, Ryusuke IMURA<sup>2</sup>

<sup>1</sup>The Council for the Promotion of the Kirishima Geopark, Japan

<sup>2</sup>Department of Earth and Environmental Sciences Faculty of Science, Kagoshima University, Japan

Kirishima Geopark, located on Southern Kyusyu, Japan, is centered around the Kirishima Volcanic Range developed on the Southern rim of the Kakuto Caldera that erupted approximately 340,000 years ago. The activities of these volcanoes have nurtured the diversity of nature in the area, which is the theme of Kirishima Geopark. Kirishima Geopark comprises four different aspects as follows.

The first is the scenery. Landscapes of the Kirishima Volcanic Range are distinct and scenic, and show different shapes if looked at from different angles. In addition, the volcanic front of the Southern Kyushu Volcanic Range including the Aira Caldera, Sakurajima and Mt. Kaimondake can be viewed from the mountain area of Kirishima Geopark.

The second is the volcanoes. Clustered craters and layers of volcanic products covering 20x30 square kilometers point a historical picture of the formation of the area. Also, the 2011 eruption of Mt. Shinmoedake clearly exhibits the dynamism of local volcanic activities. Therefore, Kirishima Geopark is worthy of being called "the museum of volcanoes".

The third is the diverse vegetation. About 1300 species of plants are found in the area, including the Kyushu Azaleas and the Nokaidou which are signature flowers of Kirishima mountains. A plethora of plant life has developed alongside the volcanic activity in the area, leading to a wide field of ecological observation.

The fourth is the mythology and history that permeates the landscape. In the Kojiki, an ancient Japanese document, the area is described as the location where the gods first descended to the earth.

\* Contact person email: [kiri-geopark@po.mct.ne.jp](mailto:kiri-geopark@po.mct.ne.jp)

## SE 2: New and aspiring geoparks

SE202

### Geopark Development Strategy in Thailand

Yudh SARADATTA<sup>1</sup>, Ronnati SIKEO<sup>1</sup>

*<sup>1</sup>Department of Mineral Resources, Thailand*

The commence of substantial geoconservation activity of the Department of Mineral Resources(DMR) was the compilation of previous geological data accumulated over a century in 2001 and 2004 and produced 2 publications regarding geoheritages and geotourism sites respectively in order to disseminate to public. The actual geoconservation project has been initiated since 2010 in Satun followed by the subsequent projects in Loei, Ubonratchathani and Khonkaen. All projects have the objectives to conserve the rapidly deteriorating valuable geosites, both academic and referencing standard, which distribute through all regions of Thailand and some of them are world class tourist places; conservely develop them as sustainable and proper highest exploitation especially in academic, tourism and socio-economic purposes, and are still running with the hope to achieve the Global Geoparks Network membership from UNESCO. This fiscal year DMR plans to do the work in the areas of Chiangmai and Chiangrai. In order to be success, DMR applies a new dimension of conservation through sustainable development and coordination among all stakeholders that is GEOPARK which has been initiated by UNESCO since 2006 and brings the real and tangible benefits to communities.

Up until now DMR has developed geoconservation site evaluation criteria, guidelines to establish geopark and more than 80 geoconservation sites in south and northeast Thailand has been defined including 4 potential areas for geopark development in Satun, Loei, Ubon Ratchathani and Khonkaen Province with their own undergoing management and development policy, plan and measures.

\* Contact person email: ekawat@dmr.go.th, ronnati\_sk@hotmail.com



## SE 2: New and aspiring geoparks

SE203

## Importance and Strategy for a New Model of Metropolitan Geopark

Young-Seog KIM<sup>1</sup>, Hyun Joo KIM<sup>1</sup>, In Sung PAIK<sup>1</sup>, Jin-Seop KIM<sup>2</sup>,  
Moon SON<sup>2</sup>, Hyeongseong CHO<sup>2</sup>, Sunwoon KIM<sup>2</sup>, Karyung KANG<sup>2</sup>

<sup>1</sup>*Pukyong National University, Republic of Korea*

<sup>2</sup>*Pusan National University, Republic of Korea*

Although Busan is a developed thriving metropolis, as the second largest city in Korea, many geologically important and attractive sites remain undamaged. These sites can be preserved and used for the public and for educational purposes. We, here, propose the sites as a new leading model for a National Metropolitan Geoparks. We will show the importance and advantages of this Metropolitan Geosite.

The Busan metropolitan area is mainly composed of Cretaceous sedimentary rocks (Gyeongsang Basin), which developed in an alluvial basin including lacustrine environment. The tectonic setting of this basin has been interpreted as a volcanic back-arc basin. Therefore, packages of volcanic and intrusive materials are commonly observed in the sedimentary rocks. Volcanic and magmatic activity, sedimentation, and dinosaur activities in this basin generated several unusual geologic features which can be found in the mountainous areas as well as along the coasts which remain well preserved within the rapidly developing city.

The main importance of this area is the combination and co-existence of well-preserved Geological Records (Past) and Geological Process (Present). Some of them (Dusong Peninsula, Taejongdae, Geumjeong Mountain etc.) are unique and geologically important, and others are more important as ideal examples of modern geological process (Haeundae Beach, Nakdong-gang Estuary, Oryukdo etc.).

Busan has a unique landscape composed of a combination of an anthropogenic city, beaches, towering cliffs and flat platforms, shaped by coastal erosion of igneous and sedimentary rocks. Busan also contains many cultural heritage sites resulting from the long history of this city. Furthermore, the well-developed infrastructure of the city is well organized around these natural and cultural heritage sites. Therefore, Busan could easily become a new international model of Metropolitan Geoparks, especially with its unique combination of city, sea, rivers and geology.

\* Contact person email: ysk7909@pknu.ac.kr

## SE 2: New and aspiring geoparks

SE204

### Ulleungdo · Dokdo Korea National Geopark

Sugyeong BAE<sup>1</sup>

<sup>1</sup>Ulleung-gun, Republic of Korea

Ulleungdo and Dokdo, volcanic islands far off the east coast of Korean Peninsula, were produced by volcanic activity which occurred about two million years ago. Ulleungdo and Dokdo located in the south-western part of the central East Sea are the Cenozonic alkali ocean volcanos, showing the seamount evolution of diverse rocks derived from distinct magmatic composition, systematic eruptive mechanism and characteristics of eruption. For example, there are various rocks such as trachyte, phonolite, trachytic andesite and pumice that cannot be easily observed in Korea. Also, landforms formed after volcanic activity in Ulleungdo and Dokdo show beautiful scenes such as tafoni, sea cliff and coast terrace, resulted from weathering and erosion due to wave and wind. Geological heritages around Ulleungdo and Dokdo support evidence about the formation of volcanic landform and the process of magmatic evolution. Therefore, it is necessary to preserve geological heritages for the present and future generations because Ulleungdo and Dokdo have many nice places worth visiting and educating geoscientific knowledge, with geoenvironmental concepts to the public.

Besides geodiversity (rocks, minerals, geological structures, etc.), Ulleungdo and Dokdo are very valuable for studying ecology related to the habitat of rare, special, and endangered plants that are in possible extinction, along with the phase of plant's unique evolution such as anagenesis and the presence of natural monument (e.g. Daepunggam Juniper Habitat, Wood Pigeon Habitat, Taeha-ri Habitat of Pine Tree, Korean Nut Pine and Beech, etc.).

Also, there are valuable assets in culture and archaeology (e.g. Seongha Shrine, Nari-dong Tumak House, Hyeonpo Old Tomb, Taeha-ri Gwangseomyeong Gakseokmun, etc.). Various kinds of leisure sports and culture activities such as Ulleungdo squid festival, scuba in underwater, nationwide fishing contest, and Ulleung Usan cultural festival are famous, together with special foods including Yakso beef, myeonggi(*Allium victorialis* L.), wild edible greens, squid, pumpkin taffy and Jukdo deodeok, etc.

As of December 2012, Ulleungdo and Dokdo were accepted as a National Geopark with Jeju. Ulleungdo · Dokdo geopark is approximately 127km<sup>2</sup> including sea, having 23 geosites; Bongrae Waterfall, Jeodong Seaside Walkway, Dodong Seaside Walkway, Turtle Rock & the Natural Habitat of Juniper Growing Wild, Noodle Rock, Mushroom Rock, Hakpo Beach, Red Soil Cave, Taeha Seaside

### SE 2: New and aspiring geoparks

Walkway & Daepunggam, Old Man Peak, Needle Peak, Elephant Rock, Yongchulso Spring, Albong, Seonginbong Primeval Forest, Jukam Shingle Beach, Samseonam, Gwaneumdo, Jukdo, Whetstone Rock, Three Brothers Cave Rock, Independence Gate Rock and Ceiling Cave. It is acknowledged that Ulleungdo · Dokdo geopark already became one of the most attractive sites in Korea. It is evident that the Geopark can help maximization of the development and economic vitalization of Ulleungdo and Dokdo.

\* Contact person email: [sgbae@korea.kr](mailto:sgbae@korea.kr)

## SE 3: New and aspiring geoparks

SE301

### Developing a Geopark Next to the Ha Long Bay World Heritage - A Good Way for Conserving and Promoting Heritage Values

Tan Van TRAN<sup>1</sup>

*<sup>1</sup>Vietnam Institute of Geosciences and Mineral Resources, Vietnam*

A World Heritage Site is strictly protected and usually only sustainable, “non-destructive” economic activities e.g. tourism and other related services are allowed, both within the World Heritage Site and its buffer zone. Many efforts are spent on improving the livelihood of the local community in the buffer zone for as a way to help conserve and protect the World Heritage Site. There is, however, no good, “commonly accepted” socio-economic development model for the buffer zone, especially in a developing country like Vietnam. On the other hand, the conflict between conservation and development, suffice it to talk just about tourism and other related services, always put the World Heritage Site under a permanent and ever-growing pressure, with such consequences as excessive tourism development, unwanted unnatural demographic growth and environmental degradation etc. Furthermore, a World Heritage Site, due to management constrain, usually covers only part of the whole, often equally valuable area, leaving unaccounted for and unprotected many heritage values in the buffer zone. And last but not least, some World Natural Heritage Sites, even though recognized by aesthetic beauty and geological-geomorphological values can't readily and explicitly show, and explain, these values. All these problems may be eased by developing a geopark in the buffer zone of an existing World Heritage Site, including maybe even part of the latter. Some attempts have been, and are undertaken, in this direction in Ha Long Bay World Natural Heritage, Vietnam. They will be presented and discussed in this article.

\* Contact person email: [trantv@gmail.com](mailto:trantv@gmail.com)

SE 3: New and aspiring geoparks

SE302

## Geological Values of Mt. Seoraksan Geopark

Ryeon KIM<sup>1</sup>

<sup>1</sup>Natural Heritage Institute of Korea, Republic of Korea

Mt. Seoraksang Geopark includes Mt. Seoraksan and adjacent areas. Mt. Seoraksan is a national park with an area of 398.237 which includes a number of significant animal and plant species which made the park as Man and Biosphere Reserve by UNESCO. The geopark contains the geosites with a variety of landforms from mountain to coast range such as lagoons, tafonis, spits, mineral water springs, river terraces, mines as well as various granite landforms. Especially, many geosites in Mt. Seoraksan show significant debris flow deposits along river valleys and other features with high geodiversity of granite landforms which cannot be seen in the World Heritage sites in China. Also, additional volcanic landforms add its geoheritage values.

Some of the geosites appear to have international geological values which provide promising potential for the Mt. Seoraksan Geopark to be endorsed as a national and global geopark in the future. Sustainable development and educational geotourism programs should be developed for this site to become a geopark.

\* Contact person email: cave92@daum.net

## SE 3: New and aspiring geoparks

SE303

### Geopark Initiative in Imjin and- Hantan Rivers in Northern Gyeonggi Province Korea

Yang-Ju LEE<sup>1</sup>

*<sup>1</sup>Gyeonggi Research Institute(GRI), Republic of Korea*

Imjin and Hantan Rivers flow through Pocheon City and Yeoncheon County in northern Gyeonggi Province crossing the Northern Limit Line of the Korean Demilitarized Zone (DMZ). The proposed geopark site along the rivers boast unique geological features as well as valuable historical and cultural resources, such as Jeongok-ri pre-historic relic and well-preserved ecosystems due to development restrictions such as Protection Zone for Military Installations.

Its significant geological features include a long span of geologic time from pre-cambrian era to quaternary period of the cenozoic era and the important geological values of typical tectonic settings of the Korean Peninsula through Imjin River and Kyonggi massif. Through a literature review and field surveys, 20 geosites were selected and classified into 4 groups considering their main geo-heritage elements.

A feasibility study for establishing a National Geopark Site along the Imjin and Hantan Rivers was completed in April 2013. As a follow-up, the Gyeonggi Province will establish a standing operating committee consisting of responsible officials from the relevant provincial and municipal administrations and Gyeonggi Research Institute for the efficient preparation for the geopark nomination. The Yeoncheon County has already developed or is under preparation of several geo-tour courses and geo-education programs and carried out activities for awareness raising of local people. The Pocheon City will complete a complementary survey on geo-sites in its territory by the end of this year and continue the efforts to get prepared for a geopark nomination as well.

When the site is recognized as a National Geopark Site, it is envisaged to nominate as a Global Geopark the extended site combining the adjacent geological features of the DMZ region in Gangwon Province and further to incorporate the extended site with the North Korean part the DMZ, where the source of volcanic earthquakes are situated.

\* Contact person email: dandi65@gri.re.kr

## SE 3: New and aspiring geoparks

SE304

## A Study on Paleoflora (Permian) of Jambi, Sumatera, Indonesia

Fauzie HASIBUAN<sup>1</sup>, Mohamad Sapari Dwi HADIAN<sup>2</sup>, Sofyan SUWARDI<sup>1</sup><sup>1</sup>Geological Agency, Indonesia<sup>2</sup>Padjadjaran University, Indonesia

The “Jambi Flora” are the plants and trees that grew on the slopes of a volcano that rose out of the sea in a tropical climate, nearly 300 million years ago. The climate in which the plants and trees lived was tropical and similar to that of the present day. The age of these flora is also supported by the presence of fusulinid in the marine bed intercalations.

They are the best known because the leaves and the wood are exceptionally well preserved through their fossilization in the volcanic ashes, lava flow, pyroclastic, river bank and lake sediments in which they are buried. These rocks are exposed in the banks of the Merangin, Mengkarang and Karing rivers which have exposed the lower slopes of the former volcano.

Globally, the tropical “Jambi Flora” occurs in the geographical gap between the tropical Cathaysian and cold climate Gondwana floras which lived at the same time. The unique “Jambi Flora” is a part of the National Geological Heritage and its occurrences in the Mengkarang, Merangin and Karing rivers are sites of special scientific interest, the conservation of which will promote the future scientific study and educational interest that this unique fossil flora potentially can generate a Global Geopark in Indonesia.

\* Contact person email: [sapari@unpad.ac.id](mailto:sapari@unpad.ac.id)

## SE 4: New and aspiring geoparks

SE401

### Looking for Geopark Candidates in West Java Province, Indonesia

**Budi BRAHMANTYO<sup>1</sup>**, Oman ABDURAHMAN<sup>2</sup>

*<sup>1</sup>Department of Geology, Faculty of Earth Science and Technology,  
Bandung Institute of Technology (ITB), Indonesia*

*<sup>2</sup>Secretariate of Geological Agency, Ministry of Energy and Mineral Resources, Indonesia*

Indonesia has successfully passed Batur Caldera region as member in the Global Geopark Networks (GGN) in 2012. In the next few years, there are four other candidates to be proposed to gain recognition of GGN UNESCO, namely Toba Lake in North Sumatra, Merangin in Jambi, Karst Gunungsewu in Java, and Rinjani Volcano in Lombok Island, West Nusa Tenggara. In the spirit of regional development and considering of unique geological condition, the province of West Java is also eager to have a geopark.

The preliminary evaluation on the basis of geodiversity and geoheritage values as well as general condition of recent activities and infrastructures in West Java have been carried out. As the results, there are three regions with the most potential, namely 1. North Bandung Basin, 2. Pangandaran - South Tasikmalaya, and 3. Palabuhanratu-Ciletuh-Cikaso. The first region mainly comprises of Quaternary active volcano with a crater can be reached by vehicle, karst area of Tertiary limestones, and Tertiary deep marine sediments. The second region is a combination of jasper gemstones phenomenon, karst areas and beautiful beaches in southern West Java. The third region is a very rare mélange area. The first two are belong to region of well-established tourist destination. The third is still an undeveloped area but it is very promising due to its rare geological condition. In this paper we will present the stage of geosite analysis of the three regions as geopark candidates of West Java, Indonesia.

\* Contact person email: budibr@gc.itb.ac.id



## SE 4: New and aspiring geoparks

SE402

## The Value of the Cheongsong as a Potential Geopark

Hyeondong WOO<sup>1</sup>, Jinsu PARK<sup>1</sup>, Yundeuk JANG<sup>1</sup><sup>1</sup>Department of Geology, Kyungpook National University, Republic of Korea

Cheongsong is located in the northeastern part of Gyeongsangbuk Province, South Korea. It covers an area of 846 km<sup>2</sup>, and has a population of almost 27,000. Cheongsong has an inland mountainous terrain, ravines and dense forest, leading it to have had a few visitors. With the recent developed transport systems and information exchange technologies, Cheongsong is preparing to utilize its well-conserved natural environment including mountains as an asset of eco-friendly geotourism. Cheongsong has the following characteristics as a potential geopark.

First, from the geological perspective, Cheongsong has a distribution of volcanic, metamorphic and sedimentary rocks covering times from the Precambrian to the Cenozoic era, and offers the findings of diverse geohéritages such as columnar joints, spherulitic structures, and dinosaur footprints created by characteristics of diverse rocks. From the ecological perspective, natural monuments, protected species and other diverse flora and fauna combine to create wondrous landscapes. And, Cheongsong presents some 40 designated cultural heritages, such as old houses and Confucian academies among other cultural and historical heritages.

In addition, the apple festival, wild royal azalea festival, ice climbing competition, pottery and Korean paper crafting enhance the value of Cheongsong as a geopark, together with such geosites.

The 2011 feasibility study verified the value of Cheongsong as a geopark and diverse geohéritage studies confirmed the value of geosites. Also, in a bid to establish itself as a geopark, Cheongsong is pushing forward diverse activities such as the holding of symposiums, preparation of information signboards, and development of educational programs. As such, Cheongsong is making diverse efforts to make a comprehensive, eco-friendly use of its ecological, historical and cultural heritages based on its excellent geohéritages, proving itself to become one of the outstanding aspiring geopark.

\* Contact person email: [crosssaver@naver.com](mailto:crosssaver@naver.com)

## SE 4: New and aspiring geoparks

SE403

### Endemic Alpine Plants and Creatures Borne from Peridotite Soil, Those Protect Them and Tell the Mountains Story

Satomi KATO<sup>1</sup>, Takumi HARADA<sup>1</sup>

<sup>1</sup>Mt. Apoi Geopark Promoting Council, Japan

Samani Town is located in the eastern Hidaka area of Hokkaido. It is home to mountains and gorges of remarkably fresh, colorful peridotite and endemic alpine plant communities that grow in the area's particular soil conditions. The town has also developed a history and culture as a trading center thanks to the favorable natural harbor created by its unusual coastal terrain.

Mt. Apoi Geopark is parkland where visitors can learn about and enjoy the region's precious geological heritage and its rich natural surroundings as well as the history and culture of Samani. It was certified as a Japanese Geopark in 2008, and efforts are being made to have it incorporated into the Global Geoparks Network.

The Hidaka Mountains were formed by the collision of two crustal plates 13 million years ago. In the collision, part of the mantle under the crust was pushed up and appeared on the earth's surface to form the Horoman peridotite complex, which includes Mt. Apoi.

Although Mt. Apoi is not a high-altitude mountain, alpine vegetation is found there due to its particular soil, weather and geographical conditions. A number of endemic plants grow there, and Apoi's alpine plant communities have been designated as a special natural monument by the national government. In addition to alpine plants, the area is also home to the apoimaimai (*Paraegista apoensis*), a snail endemic to Mt. Apoi, the himechamadaraseseri (*Pyrgus malvae*), a butterfly not found anywhere else in Japan.

\* Contact person email: [apoi.gvc@iris.ocn.ne.jp](mailto:apoi.gvc@iris.ocn.ne.jp)

SE 4: New and aspiring geoparks

SE404

## Sanuki Geopark Located Centrally in the Setouchi Volcanic Belt (SW Japan)

Tomomi TAKAGI<sup>1</sup>, Shuichi HASEGAWA<sup>2</sup>

<sup>1</sup>Graduate School of Management, Kagawa University, Japan

<sup>2</sup>Faculty of Engineering, Kagawa University, Japan

Sanuki will serve as a unique geopark with the following unique points:

- 1) Unique Setouchi volcanism which produced sanukitoid and sanukite
- 2) Unique monadnocs, comprised of mesas and volcanic necks resulting from Setouchi volcanic activities
- 3) Unique stone cultures using diverse properties of volcanic rocks.

Sanuki is the old name of Kagawa Prefecture, which is situated in the northeastern part of Shikoku, a large island in southwestern Japan. The Sanuki Plains stretch to the north, and the Seto Inland Sea beyond that is dotted with 116 islands of all sizes, to form an impressive archipelago.

The Sanuki Plains are dotted with beautiful hills in the form of plateaus or conical hills. Yashima is a plateau, which was formed by pyroxene andesite lava on a granite base. Mt. Inoyama is a beautiful conical mountain, sometimes referred to as the Mt. Fuji of Sanuki. Unlike Mt. Fuji, Mt. Inoyama is not an active volcano, but an eroded volcanic neck. Both andesite lava and andesite volcanic necks were formed by the Setouchivolcanic activity approximately 14 million years ago.

The volcanic activity produced sanukite; petrologically it is an aphyricandesite, but much harder and more finely grained. More than ten thousand years ago, Paleolithic people used it to make numerous stone tools. Today, sanukite has been praised as an excellent material for making highly sophisticated stone music instruments. The volcanic activity also produced soft tuffaceous rocks and medium-hard andesite, which have been used for making stone cisterns, stone Buddha images, and stone lanterns.

\* Contact person email: [takagi@gsm.kagawa-u.ac.jp](mailto:takagi@gsm.kagawa-u.ac.jp)

## SE 5: New and aspiring geoparks

SE501

### Opportunities and Challenges of Geopark Initiative in Africa

Sadrack Felix TOTEU<sup>1</sup>

<sup>1</sup>UNESCO Nairobi, Kenya

The Global Geopark Network (GGN) is expanding worldwide with more and more countries adhering to the geopark concept. Today, Africa remains the only continent with no geopark under GGN, but many initiatives spearheaded either by communities, private sector institutions or governments are in progress in various countries (Kenya, Morocco, South Africa, Tanzania...). This paper discusses the challenges and opportunities of promoting the geopark concept in Africa and present actions taken by UNESCO in this regards, focusing on three aspiring geoparks. In Kenya, the Mt Suswa initiative is a community-based project of the Maasai pastoralists seeking to preserve their culture and their environment. In Tanzania, the Ngorongoro Conservation Area Authority is working to developing a geopark that may include the actual Ngorongoro Conservation area. In South Africa, the management of the Tswaing Meteorite Crater expect the site to join GGN as a legacy of the 34<sup>th</sup> International Geological Congress.

\* Contact person email: [sf.toteu@unesco.org](mailto:sf.toteu@unesco.org)

## SE 5: New and aspiring geoparks

SE502

## Structure of Geosites in the Northern Coast Aspiring Geopark of Taiwan to Raise Geo-tourism Development

Chao-hui SHIH<sup>1,2</sup>, Mei-Hsiu CHEN<sup>1,2</sup>, Szu-Hsien LEE<sup>1,2</sup>, Chin-Chien YANG<sup>1,3</sup>

<sup>1</sup>Manage team of Yehliu Geopark Taiwan(aspiring), Taiwan

<sup>2</sup>North Coast and Guanyinshan National Scenic Area Administration, Tourism Bureau, MOTC, Taiwan

<sup>3</sup>Neo-Space International Inc., Taiwan

The Northern Coast located at the north of Taiwan is also known as the "Crown Coast". It consists of nine main geo-sites resulting from millions of years of natural erosions and weathering. The distinctive coastal landforms along the Northern Coast continue to reveal its unique geological background. From the hoodoo stones at Yehliu Cape crafted by Mother Nature to the sediment beds of Bitou Cape, the Northern Coast's abundant resources offer surprises at each and every corners.

Biologically, ocean currents from three different directions provided the Northern Coast a perfect breeding ground for marine life forms. With estimated of more than 136 species of coral reefs, 160 species of invertebrates, 30 species of seaweeds, 200 species of fish and plants and nearly 300 species of birds inhabiting along the coastline. In addition, historic temples and the geological resources make the Northern Coast a precious environmental and cultural asset.

Apart from the magnificent stones along the shoreline, the Northern Coast also offers fine sandy beaches with stunning views. Further inland, behind the rugged and precipitous landscapes are the unique hot springs and amazing farmlands. In addition to the marine resources, the management team is also utilizing the UNESCO (United Nations Educational, Scientific and Cultural Organization) guidelines to advance the Crown Coast towards international geoparks.

Natural forces throughout the years crafted the unique landscapes along the coastlines of Northern Coast. The process of which is both geological and evolutionary interests for many people. As a member of the society, management strategies of the geopark have to cooperate with local communities in order to promote local environmental consciousness. By training young volunteered tour guides, recording local histories from elders, holding summer camps and culture festivals, both natural and cultural assets can be preserved and pass on, and hence the seeds of environmental and cultural awareness can be planted and developed.

\* Contact person email: chshih@ntu.edu.tw

## SE 5: New and aspiring geoparks

SE503

### **Preliminary Study on the Candidate Sites for the New Geopark of Jeollanam-do Pvince, South Korea: Focusing on Dinosaur Fossil Sites**

Min HUH<sup>1</sup>

*<sup>1</sup>Faculty of Earth Systems and Environmental Sciences & Korea Dinosaur Research Center,  
Chonnam National University, Republic of Korea*

Jeollanam-do province of South Korea has about 200 geoheritage sites with academic and scenic values. Especially the dinosaur fossil sites in Jeollanam-do province are well known by its universal and scientific significance, and they are listed as a tentative site for the UNESCO World Heritage. This study focuses the new tentative geopark sites of Jeollanam-do province, Korea. The tentative name for the geopark is 'Jeonnam Dinosaur Coast Geopark (JDCG)'. JDCG consists of 40 geosite locations, which are under 11 main geosites group: Haenam, Boseong, Yeosu, Hwasun dinosaur fossil sites, Suncheon Bay, Sinan Hong-do island site, Sinan Byeongpung-do wood fossil site, Sinan Ui-do sand-dune, Sinan Saok-do Cretaceous fossil site, Mokpo Gatbawi region and Jindo Gwanmae-do sedimentary rocks. JDCG area consists various and differentiated Korean traditional and cultural asserts such as Buddhist and confucianism remains, traditional foods, ancient and modern arts, and also folk cultures and festivals. Many sites are protected as a National Monument and have been developed for public education and geotourism associated with its adjacent cultural and historical heritages, geographical and scenic sites.

\* Contact person email: [minhuh@chonnam.ac.kr](mailto:minhuh@chonnam.ac.kr)

## SE 5: New and aspiring geoparks

SE504

## Looking for Rinjani as the 5<sup>th</sup> Geopark in South East Asia

Rosyadi SAYUTI<sup>1</sup>, Abdul BASIT<sup>2</sup>, Iwan Mulia SEPTERIANSYAH<sup>3</sup>

<sup>1</sup>Regional Development Planning Board, West Nusa Tenggara Province, Indonesia

<sup>2</sup>Gunung Rinjani National Park, Indonesia

<sup>3</sup>Department of Energy and Mining, West Lombok Regency, Indonesia

Mount Rinjani (+3726m) is located in Lombok island, Nusa Tenggara Barat as a second highest volcano in Indonesia. The Rinjani volcano grew in the eastern part of the caldera. The Rinjani caldera has a crescent-shaped crater lake, and within the caldera formed an active volcano, called Mount Barujari. This fascinating scene can be use as a Geotourism destination. Mount Rinjani has been erupted of several large eruptions formed a morphology of the caldera that comprises rock variations and the important distribution of biodiversity in Indonesia. This volcano has also been as the center of indigeneous and unique cultures of Sasak and Hindus.

Mount Rinjani as part of the Gunung Rinjani National Park (GRNP) is now managed by local government named Rinjani Trek Management Board (RTMB) that comprises of private companies, communities and tourist agencies. Since it was managed by RTMB, Mount Rinjani has been granted several national and international awards, such as "World Legacy Award"(2004), and the finalist of "Tourism for Tomorrow Awards" in 2005 and 2008. In this case, Rinjani is suitable promoted as "Geopark" and as the second geopark in Indonesia. If it succeed, then Rinjani Geopark will adds the geopark number in the world that already had 90 geoparks, distributed in 26 countries under coordinated by UNESCO, and Rinjani Geopark will become the fifth geopark in Southeast Asia after Langkawi island in Malaysia.

To reach the aim, RTMB collecting data and informations of geological aspects, also to analyze data for developing alternatives.

\* Contact person email: sayuti861@gmail.com

### III. Poster Session



PA: Management, communication and networking in geoparks

PA001

## An Integrated Management Plan for UNESCO Related Sites in Jeju Island, Korea

Soojae LEE<sup>1</sup>

*<sup>1</sup>Korea Environment Institute, Republic of Korea*

UNESCO related World Heritage Site, Biosphere Region and Global Geopark etc, are very good examples to enhance the awareness of the environmental conservation. As Jeju Self Governing Province(JSGP) has three UNESCO sites, the effective management of them is of high concerns. So we started a research project to find a reasonable integrated management model for the Jeju Island.

The integrated management of the three sites is now possible as JSGP has already established a managerial body under provincial ordinance. But there should be some improvements when these sites are under revalidation process; for example, the periods of revalidation are different with each other; 10 years for BR, 6 years for WHS, and 4 years for GP. So this acts as a burden to the managerial body if the evaluation mission dates are continually scheduled. This can jeopardize the image or impression of the UNESCO sites. Therefore we expect that UNESCO should take a step to revise the revalidation procedure if a place has multiple UNESCO sites. We'll suggest powerful measures to promote the vision and goals of UNESCO through the integrated management model.

\* Contact person email: [sjlee@kei.re.kr](mailto:sjlee@kei.re.kr)

PA: Management, communication and networking in geoparks

PA002

## Grants-in-Aid System for Encouragement of Academic Research of the San'in Kaigan Geopark

Muneki MITAMURA<sup>1</sup>, Tohru SAKIYAMA<sup>2</sup>, Noritaka MATSUBARA<sup>2</sup>, Muneharu NAKAGAI<sup>3</sup>

<sup>1</sup>Academic Group San'in Kaigan Geopark Promotion Council, Osaka City University, Japan

<sup>2</sup>Academic Group San'in Kaigan Geopark Promotion Council, University of Hyogo, Japan

<sup>3</sup>San'in Kaigan Geopark Promotion Council, Japan

The San'in Kaigan Geopark has the main theme as "Geological features, the natural environment, peoples' lives, and the formation of the Sea of Japan". There are various geological, geomorphological, biological features related with local history and cultures in this Geopark. We have to enhance the academic value on these features for the sustainable utilization by the local people.

In order to further understanding on the natural and social resources in the Geopark, the Promotion Council gives grants for encouragement to university students, graduate students, and local groups undertaking research related to the geological conditions, land formation, social environments on the Geopark area from 2009.

The total budget for the grants in the Promotion Council is 1,500,000 JPY per year. Each adopted research theme is contributed the grant from 50,000 to 200,000 JPY for one year research. Total adopted research themes for 3 years from 2010 to 2012 are 31 themes (2010: 9 themes, 2011: 12 themes, 2012: 10 themes).

More than 10 study themes have been adopted every year. The results of these studies have been introduced with poster and oral presentation at Geopark Festival in every November. Young researchers are requested the easily understandable presentation for the local peoples at the presentation. This research presentation at the Geopark Festival is given the opportunity for exchanges between young researchers and local peoples.

\* Contact person email: mitamura@sci.osaka-cu.ac.jp

PA: Management, communication and networking in geoparks

PA003

## Resources Types and Protection Planning of Hong Kong Global Geopark

Lulin WANG<sup>1</sup>, Fadong WU<sup>1</sup>

<sup>1</sup>*School of Earth Sciences and Resources, China University of Geosciences, China*

Hong Kong global geopark imposes the volcano geology, the deposition geology and the island and coastal erosion landform class geoheritage landscape primarily, natural ecology and humanities landscape for auxiliary, it is a synthesis geopark which collects aesthetic value and scientific value in a body. In the foundation of open country synthesis geology inspection and comprehensive collection material, this paper carries on system of classification and the elaboration to geoheritage resources in Hong Kong global geopark, clears about the main body tourist resources of the geopark, and surveys the present situation of geopark protection and overall planning.

\* Contact person email: lindakitten@qq.com

PA: Management, communication and networking in geoparks

PA004

## Langkawi Global Geopark in the 2011 Langkawi Tourism Blueprint

Rasanubari Asmah Rahmah **ABDUL HAMID**<sup>1</sup>, Khalid RAMLI<sup>1</sup>,  
Mohd Shafeea LEMAN<sup>2</sup>, Khairul Nizam ABDUL GHALIM<sup>1</sup>

<sup>1</sup>Langkawi Development Authority, Malaysia

<sup>2</sup>Universiti Kebangsaan Malaysia, Malaysia

Langkawi is an archipelago of 99 islands with total area of 478km<sup>2</sup> located in the northwestern corner of Peninsular Malaysia. Geologically, Langkawi is dubbed as the birth place of Malaysia with widespread of Cambrian rocks (~550m.a). However, anthropologically, civilisation only began in the 17th century A.D. when traders first stopped by and made Langkawi their transit homes. Beginning as remote islands, Langkawi grew with various kinds of myths and legends. All of these were suddenly changed after Langkawi was transformed into a Duty Free Island in 1987. Langkawi then gradually became one of the premier island tourism destinations in Malaysia. Several event tourisms organized by LADA had seasonally attracted large crowds to Langkawi, in addition to holiday shoppers. This scene changed again when Langkawi was awarded by UNESCO with Global Geopark status in 2007. Langkawi Geopark development concept was introduced focusing on sustainable nature tourism encompassing flora, fauna, geology and landscape. Geotourism was introduced in order to promote various geosites, geo-heritage trails, geoforest parks, and geopark products in Langkawi. For capacity building, various programs pertaining to nature and environmental awareness were organized for different stakeholders to ensure that the geopark concept is understood by the public. In 2011, Langkawi Tourism Blueprint was launched by LADA to provide better tourism environment for Langkawi Global Geopark. Special considerations are given towards enhancement of tourism services. This include upgrading present infrastructures, building new Geopark Discovery Centre, encouraging multi-disciplinary research, and creating more attractive and innovative programs for capacity building.

\* Contact person email: rasanubari@lada.gov.my

PA: Management, communication and networking in geoparks

PA005

## Discussion on Key Points of Geopark Construction and Development in China

Jianping ZHANG<sup>1</sup>, Mingzhong TIAN<sup>1</sup>, Fadong WU<sup>1</sup>, Xiao MEI<sup>1</sup>

*<sup>1</sup>Research Center for Geopark (Geoheritage) Investigation and Evaluation,  
China University of Geosciences, China*

A total of 219 National Geoparks in China has been established, including 27 Global Geoparks. One of the most important characteristics of Chinese geoparks is government-dominated, which has made remarkable progress in geoheritage and natural landscape protection, science popularization and local economic promotion. Based on the analysis on the current status of Chinese geoparks, and differences in geopark construction aims, sign system, science popularization and networking activities between the domestic and foreign geoparks, this paper discusses the key differences in the geopark construction and development between Chinese geoparks and foreign geoparks, and proposes countermeasures to solve these problems.

\* Contact person email: 2501820286@qq.com

PA: Management, communication and networking in geoparks

PA006

## Top Geological Scenic Spots in Taishan Global Geopark, China

Shengping MA<sup>1</sup>, Jian NIU<sup>1</sup>

*<sup>1</sup>Taishan Global Geopark, China*

Mount Taishan is the cradle of Chinese culture and the most magnificent mountain under heaven. With a height of 1,545 meters, its majesty and splendor is incomparable. It is mainly made up of natural sights as well as man-made sights. In China, we often use Mount Taishan to glorify a person's devotion to the country. Thus Taishan is of significant importance in Chinese minds. Mount Taishan became part of the world both cultural and nature heritage list in 1987. On September 19, 2005, the Taishan Mountain was approved by the Ministry of Land and Resources of China to become a national geopark. Following that last success, the Taishan Mountain was approved for world geopark status on September 18, 2006. As a global geopark, the Taishan Mountain keeps a complete record of the long and complicated evolutionary history of more than 2.7 billion years since the Neoproterozoic. Several major geological discoveries in the Taishan Mountain have attracted close attention from the world's geological community.

\* Contact person email: [tsdzgy@163.com](mailto:tsdzgy@163.com)

PA: Management, communication and networking in geoparks

PA007

## The Geoparks with Chinese Characteristics

Mingzhong TIAN<sup>1</sup>

*<sup>1</sup>School of Earth Sciences and Resources, China University of Geosciences, China*

China is one of the most active countries, which promotes the sustainable development of geoparks. Up to now, China has established a total of 217 national geoparks, of which 29 geoparks are members of the Global Geoparks Network. The perfect combination of long history of geological evolution, various geoheritage resources, a 5,000-year history of China and typical geoheritage resources is the main feature of the geoparks of China. The geoparks of China has formed Chinese characteristics in operations, development, management, science popularization and sustainable development. This article pays attention to the geoparks of China, summarizes and analyzes the key features of these geoparks. Combining the current condition of the geoparks in our country, the author sums up the main problems of the geoparks in the process of our development and strategies for these main problems.

\* Contact person email: 1085250594@qq.com, tianmz@cugb.edu.cn

PB: Education and geotourism for sustainable development

PB001

## The Geostory Related to Historical Heritages, Food Cultures and Natural Disasters - An Example of the Unzen Volcanic Area Global Geopark

Marekazu OHNO<sup>1</sup>

<sup>1</sup>Unzen Volcanic Area Global Geopark, Japan

Highlights of a Geopark are not only outcrops and natural landscapes with earth scientific value but also include human histories, cultures, and local customs. Especially, because Japan suffers many natural disasters, such as earthquakes, volcanic eruptions, tsunami and so on, a natural phenomenon give big influences for a living of local people. Main highlights of Japanese Geoparks are, therefore, to enjoy a relation between living of local people and earth's activities. In this poster, we introduce the geostory of the "Hamanokawa Spring" where actually can be feel the relation between an active volcano of Mt. Unzen and a unique culture cultivated by inhabitants.

The Hamanokawa Spring is one of the popular spring spot in the Shimabara city. Local people have used this spring water for daily living. Originally, the place of the spring was the sea. However, because the sea was buried by the debris accompanied with the big landslide occurred in 1792, the spring which originally should gush out in the sea bottom sprang out on the land. About 100 years ago, a woman who lived next to the spring made an original sweet using this spring water. The sweet named "Kanzarashi" had unique texture and taste, and became popular immediately. Time went by and her shop had closed about 10 years ago. The Kanzarashi, however, have become representative local sweets in the Shimabara city. The Kanzarashi, therefore, is special local geo-sweets that the big landslide produced. This is the "geostory" of the Hamanokawa Spring.

\* Contact person email: [staff3@unzen-geopark.jp](mailto:staff3@unzen-geopark.jp)



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PB002

## A New Geostory in the Unzen Volcanic Area Global Geopark: Electric Power Generation Using Untapped Hot Water at the Obama Spa, Nagasaki Pref., Japan

Kodo UMAKOSHI<sup>1</sup>, Mari NOGUSHI<sup>2</sup><sup>1</sup>Graduate School of Fisheries Science and Environmental Studies, Nagasaki University, Japan<sup>2</sup>Faculty of Environmental Studies, Nagasaki University, Japan

The Obama spa, a geosite in the Unzen volcanic area global geopark, is located on the western sea-side of the Shimabara Peninsula in southwest Japan. There are approximately 30 spring sources along a 1500-m stretch of the seaside that produce about 15,000 tons of hot water per day at a temperature around 100°C. However, about 70% of the hot water is estimated to be untapped, which is thermal energy that is greatly wasted (“mottainai” in Japanese). For the purpose of the utilization of such untapped hot water, a demonstration plant of a binary cycle power generation with an output capacity of about 210 kilowatts has been working since March 2013, supported by a subsidy provided by the Ministry of the Environment. After the Great East Japan Earthquake on March 11, 2011, movement toward a renewable energy introduction has been increasing globally. Also, as is written in the “Shimabara declaration” announced at the 5th international UNESCO Conference on Geoparks in May 2012, we should strive to become known for a best practice approach by utilizing renewable energy and employing the best standards of green-tourism. From these viewpoints, the power generation plant installed in the Obama spa is expected to become a new geosite in the Unzen volcanic area geopark, especially for energy and environmental education. In this study, a new geostory is proposed focusing on the electric power generation using untapped hot water as well as focusing on the interesting history of the Obama spa.

\* Contact person email: [umakoshi@nagasaki-u.ac.jp](mailto:umakoshi@nagasaki-u.ac.jp)

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PB003

## **Disaster Ruins and Disaster Related Landscapes as the Learning Materials of Education for Disaster Mitigation - A Case Study in the Hakusan Tedorigawa Geopark, Central Japan -**

Tatsuto AOKI<sup>1</sup>, Kiyomi HAYASHI<sup>1</sup>

*<sup>1</sup>School of Regional Development Studies, Kanazawa University, Japan*

The authors introduce the disaster ruins and disaster related landscapes within the Hakusan Tedorigawa Geopark and other regions in Japan for discussing the classifying in patterns of these materials and problematic issues on the processes to register as the geoheritage. Disaster ruins and disaster related landscapes must be important geoheritage as the learning materials of education for disaster mitigation, because these materials shows directly the scales and intensity of the former disasters for the local people lives in the area of geopark. On the other hand, we need to discuss the validity of monuments and / or structures for disaster prevention such as levees, floodgates, Sand control dams, etc. as the geoheritage, because these objects also good materials for learning and making future disasters visible. In addition, the disaster ruins are meaning to "negative geoheritage" for the local people sometime. It is necessary to make agreements carefully with the local people for handling the disaster ruins as geoheritage especially recent disaster-damaged region.

\* Contact person email: kentaoki@staff.kanazawa-u.ac.jp

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PB004

## Study Regarding the Potential Relationship between the Toyooka Basin and Natural Disasters

Eiji HASHIMOTO<sup>1</sup>, Akira MIKI<sup>1</sup>, Wataru INOUE<sup>1</sup>, Takahumi NISHIMURA<sup>1</sup>, Tsunetaka NUMATA<sup>1</sup>, Saki ISHIDA<sup>1</sup>, You ISHIDA<sup>1</sup>, Ayumi SAWAMURA<sup>1</sup>, Yusuke AZUMA<sup>1</sup>, Mizuki IKEDA<sup>1</sup>, Takumi ENDO<sup>1</sup>, Daiki MATSUE<sup>1</sup>, Risa TAKENAKA<sup>1</sup>, Rinko HIRANO<sup>1</sup>, Noritaka MATSUBARA<sup>2</sup>

<sup>1</sup>Toyooka High school, Japan

<sup>2</sup>University of Hyogo, Japan

Using fieldwork and documents, we analyzed a geological map of the Toyooka Basin and considered the likelihood of natural disasters. In addition to the map, we collected records of a major earthquake Hokutandaishinsai, and analyze the relationship between earthquakes and specific geological areas within the Toyooka Basin. Based on these activities, we made a map that showed the risk of natural disasters.

\* Contact person email: matsubara-n@stork.u-hyogo.ac.jp

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PB005

## The Activities of Mt.Hakusan Tedori-river Geo-park Fan Club

Yasuhiro SHIRASAKI<sup>1</sup>

*<sup>1</sup>Mt.Hakusan Tedori-river Geo-park Fan Club, Japan*

Mt.Hakusan Tedori-river Geo-park Fan Club was found in August 2011 as a private organization. At present, there are 58 individual members and 17 group members.

Associate Prof. Aoki Tatsuto is the organization's president from Kanazawa University College of Human and Social Sciences. This fanclub is also the member of Council for Promotion of Mt.Hakusan Tedori-river Geo-park Fan Club.

The central activity of the fanclub is to plan and conduct geo-tours mainly for club members. In 2012, several tours were held, such as the exploration tour of limestone cavern formed by Hida metamorphic rock approximately 250 million years ago, and the tour of visiting erosion-control dams which was designated as a registered tangible cultural property of Japan. These kinds of tours received a favorable reception from participants, because the tours can take visitors to places which cannot be viewed in the normal sightseeing tour.

In the future, we are going to improve the geo-tour by strengthen our efforts towards the finding of geo points which are not known very much, and develop the Geopark-related products, and promote the tour service for foreign tourists, by cooperation with Hakusan City government.

\* Contact person email: [y-sirasaki@nihonkai.co.jp](mailto:y-sirasaki@nihonkai.co.jp)

PB: Education and geotourism for sustainable development

PB006

## Activities of the Kirishima Geopark and Volcanic Disaster Prevention

Ryusuke IMURA<sup>1</sup>, Toru ISHIKAWA<sup>2</sup>*<sup>1</sup>Department of Earth and Environmental Sciences, Faculty of Science, Kagoshima University, Japan**<sup>2</sup>The Council for the Promotion of the Kirishima Geopark, Japan*

Kirishima Volcano is a Quaternary composite volcano situated in the Kyushu, Japan. Activities in the area around Kirishima Volcano under the theme of "Diversity of the nature and volcanic activity nurturing it" were recognized by the Japanese Geoparks Network (JGN); admission to this network was approved on September 14, 2010. The violent pumice eruption of Shinmoedake, an active volcano in the Kirishima Volcano, occurred only about four months later.

In the Kirishima area, in March 2009, the "Kirishima Volcano Disaster Prevention Map" was prepared and distributed to local residents in promoting Geopark activities. An explanatory meeting was held with every local government. This activity caused people living in Takaharu-cho, Miyazaki prefecture close to the volcano to be evacuated promptly at the occurrence of the present eruption. In the field of school education, a textbook "Kirishima Volcano, our mother the mountain" were prepared in March 2010. This activity was helpful for the diffusion of correct knowledge about volcanic eruptions to children and their guardians. Kirishima Geopark held lectures and field training courses in 2009 and 2010, and trained about 70 Geo-guides. When the present eruption occurred, these guides served meritoriously in the presentation of correct information, disaster prevention awareness activities (giving advice to general citizens), and volunteer activities.

It might be said that the eruption of Shinmoedake in 2011 added new findings to Kirishima Geopark and simultaneously showed for the first time in the world that geoparks have extremely important roles in their disaster-prevention aspects.

\* Contact person email: imura@sci.kagoshima-u.ac.jp

PB: Education and geotourism for sustainable development

PB007

## Practical Use of “Geopark” for University Education -Example at The San'in Kaigan Geopark, Japan-

Hiroo INOKUCHI<sup>1</sup>

*<sup>1</sup>Institute of Natural and Environmental Sciences, University of Hyogo, Japan*

Geopark is very useful field for a university education as a participatory learning. Because, the concept of the geoparks not only relate geological and/or geographical study, but also include so many scientific field e.g. ecological, social, historical science field and so on. I have a lecture named “Geopark and Community” for the first degree student of all school of the University of Hyogo, six schools of economics, business, engineering, science, “human science and environment”, and nursing. Student gain a knowledge of nature and human activities through geopark study, and master abilities of action, thinking and team-work through group-work. Understanding of geopark activities for university students will connect to the reactivation of the local communities, after their graduation. In the another lecture called “field work” for the second degree students of the faculty of “human science and environment”, students learned nature itself and also relationship between characteristic nature and human activities. I present some examples of presentation by student. They did prior leaning for some keywords for example, hot-spring, falls, coastal topography, sand-dune marine-algae. In the field trip, they observe their own theme and also another students themas by themselves and learn new knowledge form geo-guide and living people. After field-trip, they re-examine their own theme. Student make new presentation and they get new knowledge about importance of understanding of nature.

\* Contact person email: [inokuchi@shse.u-hyogo.ac.jp](mailto:inokuchi@shse.u-hyogo.ac.jp)

## The Integrated Study on Ping Chau Formation, Hong Kong

Lulin WANG<sup>1</sup>, Fadong WU<sup>1</sup>

*<sup>1</sup>School of Earth Sciences and Resources, China University of Geosciences, China*

The geographical limitations of Tung Ping Chau of Hong Kong cause difficulties for geological researches, only a few numbers of studies have been carried out which are insufficient for a systematic and comprehensive understanding of the Ping Chau Formation. A detailed study on the sedimentary features and the origin of the rock formation is therefore important and significant on reconstructing the geological history of Hong Kong. This paper studies Ping Chau Formation in a broad scope, includes the rock types, sedimentary features, and its sedimentary environment through field investigations and regional geological surveys. The major findings of this paper are as follows:

- (1) Ping Chau Formation features of rhythmic bedding includes siltstone, argillaceous siltstones, silty mudstone, inter-bedded mudstone and a single layer of rhyolitic tuff; Typical sedimentary structures have horizontal bedding, wavy bedding, rhythmic bedding, ripple marks, mud cracks, rain prints and convolute bedding etc.; the sedimentary facies being recognized are lake sedimentary facies and shore-lake subfacies.
- (2) Comprehensive analysis concludes Ping Chau Formation was formed in a brackish water body or under reducing environment in a freshwater shallow lake. A small amount of volcanic pyroclastic rocks indicated the crustal instability, littoral and shallow lacustrine deposition might frequently influenced by volcanic activities in proximity. Based on the pollen combination and unusual lithologic features of the 'Dragon Diving into the Sea', the geological age of the Ping Chau Formation should be Late Cretaceous.

\* Contact person email: lindakitten@qq.com

PB: Education and geotourism for sustainable development

PB009

## Experiences on Scientific Research and Popularization in Alxa Desert Global Geopark, China

Tuya NAREN<sup>1</sup>, Jie YANG<sup>1</sup>

*<sup>1</sup>Alxa Desert Global Geopark of China, China*

The scientific research and popularization are among the important targets in the progress of geopark establishment and development, which play an important role in sustainable geopark development. Alxa Desert Global Geopark is the only geopark dominated by desert, wind-eroded landforms formed by eolian process in the world. Since the geopark establishment, our geopark administration has been organized and carried out a lot of science research projects, and obtained a large amount of scientific achievements. Based on these scientific results, the geopark has taken effective methods to do geo-science knowledge transfer, and organized a series of science popularization activities to geopark visitors and juvenile. The good scientific research and science popularization have paved a sustainable way to our geopark. This paper summarizes the achievements and current status of scientific research and science popularization activities in our geopark, points out the future challenge in this aspect, and discusses the ways to promote the development of Alxa Desert Global Geopark Alxa Desert Global Geopark in a sustainable development way.

\* Contact person email: smgy2005@163.com



PB: Education and geotourism for sustainable development

PB010

## Challenging Educational and Scientific Activities for the Sustainable Toya-Usu Global Geopark, Hokkaido - Japan

Hiromu OKADA<sup>1</sup>, Tadahide UI<sup>1</sup>, Saburo MIMATSU<sup>2</sup>

<sup>1</sup>Academic Committee Member of Toya Caldera and Usu Volcano Global Geopark Council, Japan

<sup>2</sup>Mimatsu Masao Memorial Hall, Japan

Scientists had challengingly participated in field researches at recent 4 eruptions of Mt. Usu, Japan, even before the eruptions. Those scientific activities fortunately linked well to the regional educational activities and contributed to general success of mitigating disasters.

Even in 1910 eruption, 15,000 people had safely evacuated before the start of eruption based on the adequate decision by the visiting police chief Mr. Iida who had a timely knowledge. Local mayors asked visiting volcanologists a lecture to their villagers even in 1910. People's prompt action was the key for the all success. Resources of key persons and supporting mechanism in the area are the most essential.

Mr. Masao Mimatsu (1888-1977) was the one, who had contributed to creating a regional safe culture as well as preserving natural volcanic heritage. He purchased the land of Showa-Shinzan Lava Dome that became the main attraction of Toya-Usu Global Geopark now.

This year, we celebrate the 25th years anniversary of the establishment of Mimatsu Masao Memorial Hall (or Showa-Shinzan Museum), which functioned a key center linking smoothly scientific community and regional community in the past. Various activities, mostly educational ones contributed to the success during the 2000 eruption management.

Under the Global Geopark activities since 2009, new approach arises gradually; vital works by 23 Usu Volcano Meisters, private sectors such as Volcano Village of Ropeway Company and regional professionals. We strongly hope such further activities coupled with the formal museum/info-center and guide activities continue to creating a regional safety culture and sustainable geotourism.

\* Contact person email: gensaiv@yahoo.co.jp

PB: Education and geotourism for sustainable development

PB011

## Geopark Study in the Regular School Curriculum at the Itoigawa Global Geopark, Japan

Hiroko TORIGOE<sup>1</sup>, Hideshi FUJITA<sup>2</sup>, Hisaki CHIKAATO<sup>3</sup>, Takayuki MATSUNAWA<sup>3</sup>

<sup>1</sup>*Geopark Promotion Office, Itoigawa Global Geopark, Japan*

<sup>2</sup>*Itoigawa Science Education Center Itoigawa Global Geopark, Japan*

<sup>3</sup>*Itoigawa Board of Education, Itoigawa Global Geopark, Japan*

Since the Itoigawa Global Geopark's certification, the Itoigawa City Board of Education has included Geopark Studies as part of the city's school curriculum. As a result, formal school education has become another of the environments wherein children can learn about Itoigawa and other Global Geoparks. The specific ways in which this has been implemented include the following: special workshops and conferences for educators (including outdoor education and classroom material preparation) offered by the Science Education Center; publication of Science Supplementary Textbooks (3rd and 4th grade, 5th and 6th grade, and comprehensive studies) and notebooks for outdoor studies; Geo School Lunch Program (in which locally grown produce is used to teach about local traditional cuisine); Geopark Studies Presentations; and others.

Through these programs, children develop a sense of pride in their hometown, critical-thinking skills, self-motivation, and general comprehension skills while at the same time coming to understand that connection between mankind and the Earth and the importance of a sustainable society. Within Itoigawa's school system, one elementary school combined Geopark Study with Disaster Readiness Education and as a result earned the grand prize at an education contest hosted by the Cabinet Office, Government of Japan.

\* Contact person email: [geopark@city.itoigawa.niigata.jp](mailto:geopark@city.itoigawa.niigata.jp), [hiroko.torigoe@city.itoigawa.niigata.jp](mailto:hiroko.torigoe@city.itoigawa.niigata.jp)

PB: Education and geotourism for sustainable development

PB012

## Geotouristic Attitude and Behavior of the Tourists Visiting Langkawi Global Geopark

Mohd Shafeea LEMAN<sup>1</sup>, Sofia EHSAN<sup>1</sup>, Rawshan Ara BEGUM<sup>1</sup>, Ibrahim KOMOO<sup>2</sup><sup>1</sup>Universiti Kebangsaan Malaysia, Malaysia<sup>2</sup>Universiti Malaysia Terengganu, Malaysia

Ideal geotourists contribute to economic, social, and environmental sectors in various ways. Evaluating geotouristic attitude and behavior of Langkawi Global Geopark visitors is essential for measuring effects of geopark towards geoheritage sustainability, and geotourism in luring tourists. At Kilim Karst, Dayang Bunting Marble and Machinchang Cambrian Geoforest Parks 656 tourists were interviewed. Geotouristic characters were evaluated from respondent's attitude towards aesthetic, cultural, recreational and scientific values. Results show that 47.30% of respondents are genuine geotourists, 43.86% are amateur geotourists and 8.97% are non-geotourists. 71.02% geotourists and 27.50% amateur geotourists perceived aesthetic value; 57% geotourists and 39.02% amateur geotourists perceived recreational value; 56.75% geotourists and 39.62% amateur geotourists perceived cultural value; and 56.54% geotourists and 30.99% amateur geotourists perceived scientific value. As for geotouristic behavior 37.28% geotourists and 51.94% amateur geotourists showed geotouristic behavior in environmental protection; 30.10% geotourists and 46.64% amateur geotourists showed geotouristic behavior in local economic development; and 22.40% geotourists and 71.30% amateur geotourists showed geotouristic behavior in community and society well-being. The results also indicated that 60.33% geotourists and 34.28% amateur geotourists have high geotouristic attitude but rather moderate in geotouristic behavior. On the other end, 5.53% tourists did not perceive any value with regards of geotouristic attitude and 13.55% tourists did not show any action with regards of geotouristic behavior. A paired sample t test showed that at 5% significance level there is significant difference between their geotouristic attitude and behavior. The study shows that Langkawi needs go for more aggressive marketing for its geotourism products.

\* Contact person email: 1mshafeea@gmail.com

PB: Education and geotourism for sustainable development

PB013

## Hold High the Great Banner of Science to Develop Geopark: As the Case of Danxiashan Global Geopark

Yu LI<sup>1</sup>, Rongfeng HOU<sup>1</sup>

*<sup>1</sup>Administrative Committee of Danxiashan Global Geopark, China*

How to deepen the work of geoparks into scientific research of geological foundation and geoscience popularization is two essences of geopark development. As the naming place of Danxia landform and one of the first global geoparks, Mt.Danxiashan has been devoting to basic science research on red layer and Danxia landform, and interaction of study on geomorphology and geology, while Mt.Danxiashan also has been attaching great importance to geoscience popularization, so as to make the interpretation system more comprehensive, completely and simply. Hence, Mt.Danxiashan has become practice base on scientific research for global Danxia Landform and scientific education.

\* Contact person email: 370030876@qq.com

## Lifelong Education Programs by the Museum in the San-in Kaigan Geopark

Tohru SAKIYAMA<sup>1,2</sup>

<sup>1</sup>San-in Kaigan Geopark, Japan

<sup>2</sup>Museum of Nature and Human Activities, Hyogo, Japan

Three types of lifelong educational programs are given by the museum in the San-in Kaigan Geopark.

- (1) Cosponsored seminars by the museum and municipalities are held on the geology, biology, landscape and history in the San-in Kaigan Geopark. These seminars are provided as the lifelong education program targeting indefinite people in and around the geopark by the museum. On the other hand, some municipalities in the geopark arrange the seminars as one of the tour-guide training programs.
- (2) Requests for guided bus tour increase in the museum, since the San-in Kaigan Geopark became to the member of GGN in 2010. Staffs of the museum ride together with participants of the tour and explain the geopark, and each geo-site is guided by the guide groups in the site. Most of the bus tours are requested by the groups promoting natural and environmental educational activities. These bus tours have potential to increase the tours from outside area into the geopark.
- (3) Outreach programs of the museum named "Geo-caravan" composed of exhibitions, seminars and some events related to nature and culture is held at some facilities in the San-in Kaigan Geopark. These programs are not held unilaterally by the museum, but are organized and performed with the cooperation among the staffs of facilities, active groups, administrative organ and the museum.

Lifelong educations by museum are not only to give some knowledge on the nature of geopark but advancement of cooperation among the facilities and people in the geopark.

\* Contact person email: saki@hitohaku.jp

PC: Conservation and interpretation of geoheritages

PC001

## Hakusan Tedorigawa Geopark, - the Geopark of “Exogenic Processes” in Japan

Tsuyoshi HIBINO<sup>1</sup>, Tatsuto AOKI<sup>2</sup>

*<sup>1</sup>Hakusan Tedorigawa Geopark Promotion Council, Japan*

*<sup>2</sup>School of Regional Development Studies, Kanazawa University, Japan*

As well known, Japanese archipelago is quite active region with many active faults and volcanos. All of global geoparks in Japan exhibit such “endogenic processes” as a decisive element. On the other hand, the “exogenic processes” such as erosion, transportation and deposition are also quite active owing to the heavy rain and large gradient of river bed. So, it is necessary to approach both of endogenic and exogenic processes for understanding the characteristics of geological activities in Japanese islands.

Hakusan Tedorigawa Geopark, the GGN candidate geopark, exists in Japan have good geosites to understand the water circulation, river landform and regional human activities including disaster sub-cultures related to the exogenic processes of the Tedorigawa river. In the presentation, the authors introduce the geo-stories and geoheritages in our geopark related to the behaviors of river and water.

\* Contact person email: [t-hibino@city.hakusan.lg.jp](mailto:t-hibino@city.hakusan.lg.jp), [geopark@city.hakusan.lg.jp](mailto:geopark@city.hakusan.lg.jp)

PC: Conservation and interpretation of geohéritages

PC002

## Reexamination of "Ancient Ripple Mark" Designated as a Natural Monument and its Contribution to Education

Noritaka MATSUBARA<sup>1</sup>, Tohru SAKIYAMA<sup>1</sup>*<sup>1</sup>Institute of Natural and Environmental Sciences, University of Hyogo, Japan*

It is important to offer information scientifically to geopark activities which are utilizing geological information for sightseeing or product developments. However, there are also many wrong interpretations of geosites information.

In the San'in Kaigan Geopark covering three prefectures, we can observe Miocene sedimentary rocks related to the formation of the Sea of Japan. Sedimentary-originated lineament considered to be an "ancient ripple mark", which is designated as a Hyogo Prefectural Natural Monument, has been preserved in the base of the Miocene gravel bed of the Hokudan group in Shimonohama, Kamicho, Hyogo Prefecture.

The result of the sedimentary facies analysis shows that most of the Miocene deposits in the Shimonohama area are mainly due to fluvial, flood plane, debris flow, and pyroclastic flow. As a result of the shaped analysis, the lineament can be considered as a gutter cast, a kind of flute cast formed on the bottom of channel of gravelly river. It is also clarified that it is not a ripple mark formed by wave movements as assumed previously. This finding also contributes to educational activities in that it provides correct information scientifically.

\* Contact person email: matsubara-n@stork.u-hyogo.ac.jp

PC: Conservation and interpretation of geoheritages

PC003

## The Imprint of Cretaceous Subduction in the Karangsambung Village, Central Java, Indonesia

MUNASRI<sup>1</sup>, Haryadi PERMANA<sup>1</sup>

<sup>1</sup>Research Center of Geotechnology, Indonesian Institute of Sciences Jalan Sangkuriang, Indonesia

The Cretaceous melange complex, a chaotic mixtures of various kinds of sedimentary, igneous and metamorphic rocks, are exposed in limited area (about 250 km<sup>2</sup>) in the Karangsambung village, Central Java, Indonesia. These rocks are now juxtaposed with younger Tertiary and Quaternary volcanic and clastic rocks.

Geological processes which were recorded in these rocks may be a guideline to interpret the formation history of the earth's surface. It is believed that the rock assemblage in the Karangsambung area is a collision product of Indo-Australian Plate which subducted to Eurasia Plate in the Cretaceous time. For that reason the Karangsambung village then is used as a place for study of field geology.

In 1964, Indonesian Government through Indonesian Institute of Sciences (LIPI) built a geologic field station in the Karangsambung village. The station is equipped by classroom, library, dormitory, rocks museum, office building and others. More than 25.000 Indonesian geologist and other earth scientist during their college student have ever stayed here for 10 - 30 days to study geological mapping and other field geology.

The geological uniqueness in the Karangsambung village as a natural laboratory for geological research activities at the college level is also frequently visited by junior to senior school students and general public for geotourism and earth science education. In this regard, Indonesian Institute of Sciences (LIPI) have a role in conserving this rare geological sites through outreach to the public as well as introducing the earth science in popular way.

\* Contact person email: [irsanum@yahoo.co.id](mailto:irsanum@yahoo.co.id)



PC: Conservation and interpretation of geohéritages

PC004

## Discovering Japan's Neolithic Cultural Perceptions through the Study of Jade at the Itoigawa Global Geopark

Tsutomu KIJIMA<sup>1</sup>, Yoichi YAMAGISHI<sup>1</sup>, Ko TAKENOUCHI<sup>2</sup>

<sup>1</sup>Chijagahara Archeological Museum, Itoigawa Global Geopark, Japan

<sup>2</sup>Fossa Magna Museum, Itoigawa Global Geopark, Japan

The Itoigawa Global Geopark is the site of Japan's largest jade-producing region and was also the site of the world's oldest jade-working culture. Large jade beads and comma-shaped 'magatama' beads were produced here and spread across not only Japan, but also to the Korean Peninsula. Using green-colored jade, the earliest-dated samples of large jade beads have only been excavated from the graves of those believed to have held high ranks within society. Therefore it is thought that these ancient people treated jade as not just any stone, rather, they sought it as a stone that held some kind of meaning to them. In this way Jade can provide insight into the cultural perceptions of these Neolithic groups, making it a valuable element of the Geopark.

The Chojagahara Historic Site, a National Historic Site, was a production and trading center for large beads made from Itoigawa jade. Known as the site of world's oldest jade culture, this approximately 5000-year-old historic site is invaluable. Furthermore, an additional feature of the "Itoigawa Geopark" is its location at the site where the Japanese Archipelago was formed, making it a historical heritage site depicting how people lived both on and alongside the land. For this reason, Itoigawa City has included this historic site among the Itoigawa Geopark's 24 geosites. Accordingly, we will present our attempted methods of preservation and practical application of this jade culture and the Chojagahara Historic Site upon which it was centered.

\* Contact person email: [geopark@city.itoigawa.niigata.jp](mailto:geopark@city.itoigawa.niigata.jp)

## PC: Conservation and interpretation of geoheritages

PC005

### The Role of Research Center in Ensuring the Sustainability of a Geopark: Experience from Langkawi Geopark, Malaysia

Che Aziz ALI<sup>1</sup>

*<sup>1</sup>Universiti Kebangsaan Malaysia, Malaysia*

Being and oldest landmass with the most complete Paleozoic rock sequence Langkawi archipelago host the richest geological diversity and heritage resources in Malaysia. This geological diversity has in turn created a wide range of biological and socio-culture diversities that attract tourists to Langkawi. Independent scientific research in Langkawi geopark has been going on since the middle of the past century covering all aspects including geology and biology. During that period there was no effort has been made to connect all the research aspects that can produce a meaningful use of the research outcomes let alone to envisage the natural in Langkawi resources as heritage. More intensified research programmes that were trying to bring out the heritage value and heritage conservation was only started in 1996 after the Geological Heritage Group of Malaysia was established. Since then more effort has been focused on identifying, characterizing and ranking all the geological features in Langkawi. In 2002 the Langkawi Research Center (LRC) was established after realizing that integration all research programmes covering all disciplines of study can enhance the significance and value of the heritage resources in Langkawi. Under LRC all short terms and long terms research are being plan to ensure that the Langkawi Geopark will sustain over a long period of time. At the same time LRC also provides logistics to facilitate all research in Langkawi. To date there are more than 90 interesting geological features located at more than 10 geosites have been identified, characterized and proposed for conservation. At the same time more than 10 potential biosites that are associated with geosites have also been identified and in the process of further characterization. The importance of these two interdependent natural resources have been combined and conserved within 3 geoareas known as geoforest parks. The geosites and biosites that are located outside the integrated conservation areas are always under stress due to the needs of space for the development. In this case Langkawi Geopark has come up with a Langkawi Geopark Management Plan that suggests all the important sites be included in future land use planning.

\* Contact person email: [acheaziz@yahoo.com](mailto:acheaziz@yahoo.com)

## Longevity Survey Report in Fengshan, Leye-Fengshan Global Geopark

Yelie WEI<sup>1</sup>, Jean BOTTAZZI<sup>1</sup>

<sup>1</sup>Leye-Fengshan Global Geopark, China

### Introduction :

Leye-Fengshan Geopark is located in Leye County and Fengshan County in northwest Guangxi, China. It has 132 geosites distributed in eight scenic areas, including cone karst, poljes, tiankengs (great dolines), caves, karst windows and large subterranean river systems. The Geopark has developed geotourism routes, which include general sightseeing, eco-experience tours, adventure experience tours and professional adventure tours.

### 1. Longevity survey :

- At the end of 2012, the county census registered 70 centenarians for a population of 208 889, that means 3.3/10000 of the total population, the highest percentage of centenarians in the world.
- The life expectancy is 78.2 years, higher than the national level of 74.8 years.
- In 2012, Fengshan had a population of 26872 people who aged over 60.
- Among them, 4039 people who aged over 80 (15.03%).

### 2. Main reason for the longevity :

- The quality of the environment : High forest coverage, ambient air and water quality.
- The organic and ecological food inherited from local traditions.
- The practice of physical activities : lifelong diligent work and exercise
- The style of life : eat well, keep calm and happy.
- The harmonious society.

### Conclusion :

The longevity is an important part of our geo-heritage and a powerful factor of attractivity : our local products and the time spent to visit our geopark can claim the virtue of increasing our visitor's life! For this reason, to record and protect this particular feature is one of our goals.

\* Contact person email: weiyelie@163.com

PC: Conservation and interpretation of geoheritages

PC007

## Dark Circles and Recent Discoveries in Fengshan, Leye-Fengshan Global Geopark

Yelie WEI<sup>1</sup>, Jean BOTTAZZI<sup>1</sup>

<sup>1</sup>Leye-Fengshan Global Geopark, China

This is the story of a surprising discovery of a very newly described feature in Fengshan county.

From the beginning of our geopark's adventure, karst cave exploration never stopped.

The geopark created a local exploration team who know have the capacity of extending of the length and number of described and mapped caves.

In connection with external teams, we access to new technologies such as 3D laser to record complex and big volumes, such as the Nantianmen chamber and its famous inside natural bridge.

But the most surprising discovery was not what we were looking for: It was the presence of dark circles with some strange features, a kind of speleothem we never mentioned before.

The explanation came to us by a fortuitous chat during a work meeting at the French Federation of Speleology. A caving team discovered in Laos the same kind of dark circles and studied their formation. It was a very new speleothem formation process created by the air moved by drops fall.

We then measured these circles and put the results in a table to check their fitting to the theory: The correlation between the height of the drop fall and the diameter of the circle perfectly respect the mathematical model.

Doing this, we improved our acuity and recently discovered the first of these dark circle reaching an over 5 m diameter.

Now this new geo-heritage feature is known, we work at protecting it and showing it to our geopark's visitors as well

\* Contact person email: [weiyelie@163.com](mailto:weiyelie@163.com)

## PC: Conservation and interpretation of geoheritages

PC008

## The Geological Relic Type of Jiuhuashan National Geopark in Anhui Province, China

Weiping WU<sup>1</sup>, Zhengping XIA<sup>2</sup>, Qigang LIN<sup>2</sup>, Yinhu ZHANG<sup>2</sup>, Xiaoping DONG<sup>1</sup><sup>1</sup>Anhui Institute of Geology, China<sup>2</sup>Jiuhuashan national geopark administration committee, China

Jiuhuashan national geopark, located in Chizhou city, Anhui province, P.R. China, is characterized by granite mountainous landform and limestone cave landscape, totally covering about 120 km<sup>2</sup>.

Jiuhuashan park has typical granite landform: granite peak cluster, bizarre stones, caves, valleys, basins, etc. There are 71 grand peaks, 44 odd stones and 16 caves, from which Tianzhu peak, Double peak, Lion peak, King peak, Celestial Platform peak, Candle peak, Roc Listening to Confucian classics, Avalokitesvara Watching the Buddha Temple, the Jade Hare Worshipping the Buddha, the God Rat Getting into the Mountain, Iron Rod, Flowering Peach and Waterfalls, and Minyuan Valley are grandest. These geological relic landscapes date back to 120 Ma ago, in the early Cretaceous era, and granites form joints in different directions and faults structures, through the functions of weathering and erosion.

Fish Dragon Cave park is a typical limestone cave landform, and the limestone of the karst cave formed about 490 Ma ago, in the early Ordovician era. The cave is over 5000m long with four layers, and the secondary biochemical sediments within the cave are various and beautiful, including oddly-shaped stalactites, elegant pinnacles and terraced flow stones, grand stone curtains, stone flags and stone waterfalls, thus Fish Dragon Cave assembles the essence of Karst cave sediments. The existence of multi-layer structural Karst cave indicates that this area occurred at least 3 times of intermittent rise in the Cenozoic.

\* Contact person email: 962745352@qq.com

PC: Conservation and interpretation of geoheritages

PC009

## Main Geoheritage of the Zigong Global Geopark of China and their Geological Significance

Yuning YOU<sup>1</sup>, Mingzhong TIAN<sup>1</sup>

*<sup>1</sup>School of Earth Sciences and Resources, China University of Geosciences, China*

The Zigong Global Geopark of China in Sichuan Province is characterized by ancient fossils. In the Geopark, the Jurassic terrestrial strata are quite developed, with a complete sequence, yielding rich ancient fossils. It is one of the most important vertebrate fossil situ burial sites in China, especially the Jurassic dinosaur fossils. Meanwhile, in the long history of well salt production, remarkable ten great science and technology inventions were created, and numerous well salt production relics were perfectly preserved, thus having high scientific value and significance at home and abroad.

\* Contact person email: you200601772@126.com

PC: Conservation and interpretation of geheritages

PC010

## Ruyang Gooup Geological Heritage Characteristics and Geopark Construction in the South Rim of North China Platform

Zhonghui ZHANG<sup>1,2</sup>, Fengjun DU<sup>2</sup><sup>1</sup>Henan Shanshui Geotourism Resources Development Co, Ltd, China<sup>2</sup>Henan Institute of Geological Survey, China

Ruyang Group is the first set of terrigenous elastic after the formation of North China Plate crystalline basement, which is the key area in the comparative study between Mesoproterozoic and Neoproterozoic of North China Plate and Sinian Period of Yangtze Plate. Complex paleogeographic environment during the period made rich and typical geological heritages occur in the set so strata. Moreover, specific combination with red quartzose sandstone and mudstone bring us the landform scenery in the area where Ruyang Group distributes as the perfect place to build a geopark. As we know, Ruyang Group is one of the most important geological heritages and geological sceneries in Yuntaishan Global Geopark, Songshan Global Geopark and Wangwushan-Daimeishan Global Geopark and the research on the distribution rule and sedimentary evolution characteristics of Ruyang Group is conducive for the tourists to improve the cognition of Ruyang Group geological heritages and is conducive to protect the typical and systematic geological heritages of Ruyang Group and achieve the geological tourism sustainable development of the type of geoparks. This article presents the thought of development of the type of geoparks and the orientation of geopark further construction on based on the discussion of distribution characteristics, evolutionary history, geological heritages and the geopark construction situations of in Ruyang Group distribution area.

\* Contact person email: zzhui62@163.com

PC: Conservation and interpretation of geoheritages

PC011

## **Cherishing Geological Relics, Strengthening Publicity of Science Popularization Making Efforts to Build the Science Popularization Brand of Hexigten Global Geopark**

Sun MENG<sup>1</sup>, Aru HAN<sup>2</sup>

*<sup>1</sup>School of Earth Sciences and Resources, China University of Geosciences, China*

*<sup>2</sup>Hexigten Global Geopark Bureau of China, China*

Science communication is one of the three aims of global geopark, also an important mission of science popularization education base for land and resources. Hexigten Global Geopark has carried out active exploration and practice on how to combine science popularization education base with geological relic protection and tourism development to realize mutual promotion and effectively communicate geological scientific knowledge, so as to make efforts to build the science popularization brand of Hexigten Global Geopark.

\* Contact person email: sunmencugb@163.com



PC: Conservation and interpretation of geoheritages

PC012

## Exploration and Practice on Conservation and Interpretation of Geoheritages in Stone Forest Geopark

*<sup>1</sup>Stone Forest Geopark Administration, China*

Geoheritages are products of earth evolution over long period of times and they are precious and non-renewable resources to human beings. The main purpose that we establish geopark is that we should enhance geoheritage conservation and make them more popular with tourists and community. Stone Forest Geopark, in Yunnan Province of P.R.C is taking some measures and management methods to strengthen its conservation and interpretation of geoheritages, and achieved remarkable effects.

\* Contact person email: [bjh723@163.com](mailto:bjh723@163.com)

PD: Community involvement and economic development in geoparks

PD001

## Wudalianchi Geopark is in Harmony with Local Community

Guo LIMEI<sup>1</sup>, Yao YU<sup>1</sup>

<sup>1</sup>Wudalianchi Global Geopark, China

Wudalianchi Geopark has focused great importance on local community involvement in the development of the geopark since it became the member of GGN in 2004. The Geopark and local community have been developing in harmony in the following ways: Local residents enjoy the priority to employment; Experts from the geopark museum are employed to teach the geological knowledge for students; local residents voluntarily set up patrol team to protect the geoheritages and environment; local people run hotels and restaurants to serve for tourists; folk handicraftsmen make souvenirs with the feature of volcanoes and mineral springs; The geopark, together with local government, celebrate Holy Spring Festival each year to promote the Geopark.

\* Contact person email: gtjfhb@163.com

PD: Community involvement and economic development in geoparks

PD002

## Examples of Synergy between Increased Geotourism and Community Involvement in the Itoigawa Global Geopark

Ko TAKENOUCHI<sup>1</sup>, Hiroshi MIYAJIMA<sup>1</sup>, Yosuke IBARAKI<sup>1</sup>, Akizo MARUYAMA<sup>2</sup>

<sup>1</sup>Fossa Magna Museum, Itoigawa Global Geopark, Japan

<sup>2</sup>Kotaki Area Geosite Council, Japan

Geoparks are a form of educational park that help realize sustainable society while at the same time are a valuable tool for regional promotion and development. In order to expand the geopark's support from the people of the world, we are looking to show ways in which Geopark-related regional development can have a real contribution to regional sustainability.

We present an example that illustrates how after Itoigawa's geopark received Global Geopark Certification efforts by local community members contributed positively to regional development at the Kotakigawa Jade Gorge Geosite. This geosite, in the mountainous Kotaki District, has about 200 inhabitants (mostly elderly) many of whom have taken a progressive role in its management. As a result, the geosite has seen an increased number of tourists and the uplifted local inhabitants have continued to improve the geosite to make it even more enjoyable. In response, the Itoigawa Geopark Council now provides financial assistance. The activities undertaken include: Local inhabitants operate a restaurant, gift shop, and fishing park within the geosite; plan geotourism activities; promote local foods made from wild mountain vegetables; constructed a tourist information center; assist in the protection of jade and other natural resources and held discussions with students from Niigata University regarding regional development. We hope that progressive activities like these will have a positive effect on the activities of the inhabitants of other geosites.

\* Contact person email: [geopark@city.itoigawa.niigata.jp](mailto:geopark@city.itoigawa.niigata.jp)

## PD: Community involvement and economic development in geoparks

PD003

### The Geoparkian of Langkawi

Rasanubari Asmah Rahmah **ABDUL HAMID**<sup>1</sup>, Puay Liu **ONG**<sup>2</sup>, Rahimah **ABDUL AZIZ**<sup>2</sup>,  
Sharina **ABDUL HALIM**<sup>2</sup>, Mohd Shafeea **LEMAN**<sup>2</sup>, Cheng Chye **TEH**

<sup>1</sup>Langkawi Development Authority, Malaysia

<sup>2</sup>Universiti Kebangsaan Malaysia, Malaysia

Geopark is not a geopark for its rocks alone!!! An area becomes a geopark because of the peoples within are the main pillar of the Geopark concept. People that live in the geopark has huge role to ensure their geopark is moving on the right track. Good Geopark should be able to produce a community that are knowledgeable on nature heritage and its relation to local socio-culture heritage, understand the need to protect and conserve their own heritage and to practice sustainable livelihood. In Langkawi, geoparkian is a concept that can nurture sense of place, sense of ownership and sense of belonging to community of Langkawi Global Geopark. This concept was introduced by former Principal of the Tunku Putra Secondary School, the first school adopted as geopark schools in Langkawi. Mr. Teh Cheng Chye who is popularly known as Cikgu Teh has formulated and adopted this concept in his school with strategic plans to cultivate better geopark culture among its teachers and student. Six characteristics to become the absolute geoparkian have been laid out and inculcate to all teachers and students of the school. A geoparkian can help to improve and enhance tourism in Langkawi as one able to introduce and promote heritage of Langkawi to the tourist. Local students and teachers usually made best geoparkian as they are more knowledgeable on local culture, history of the place and more familiar with the environment of Langkawi. Accordingly, excellent geoparkian will make best guardian of Langkawi Global Geopark.

\* Contact person email: rasanubari@lada.gov.my

PE: New and aspiring geoparks

PE001

## Volcano Gifts from the South: Conception and Preparation for the Izu Peninsula Geopark

Kaoru YOSHIKAWA<sup>1</sup>, Masato KOYAMA<sup>2</sup>, Chiharu ISHII<sup>1</sup>, Yusuke SUZUKI<sup>1</sup>

*<sup>1</sup>Izu Peninsula Geopark Promotion Council, Japan*

*<sup>2</sup>Center for Integrated Research and Education of Natural Hazard, Shizuoka University, Japan*

The Izu Peninsula is located in the Pacific Ocean side in the central part of Honshu, Japan. This peninsula, located on the northernmost tip of the Philippine Sea plate, is a terrestrial part of a volcanic massif (Izu block) formed by the subduction of the Pacific plate. The Izu block drifted by the northward motion of the Philippine Sea plate, and collided with Honshu island at about 1Ma ago. After the collision, terrestrial volcanoes continue to erupt and active crustal movements deform the topography of the Peninsula.

The main theme of the Izu Peninsula Geopark "Volcano gifts from the south" consists of the following subthemes: (1) A volcanic massif drifted from the south and collided with the Japanese mainland, (2) Geological basement originated from submarine volcanoes, (3) Large terrestrial volcanoes after the collision, (4) An active monogenetic volcano field and crustal movements associated with ongoing accretion, and (5) Unique local culture developed by the geological benefits, and people's wisdom over a geological disaster.

On March 28, 2011, 7 cities and 6 towns offices, Shizuoka Prefecture, tourist associations, branches of national administrations, and local NPOs organized the Izu Peninsula Geopark Promotion Council and started to prepare for the establishment of the Izu Peninsula Geopark. The Council is preparing various items such as geosites, seminars for geoguides and general resident, textbooks and leaflets, and geotours. On September 24, 2012, We were approved to join the Japan Geopark Network, and now we aim at the affiliation to the Global Geoparks Network.

\* Contact person email: [k.yoshikawa@izugeopark.org](mailto:k.yoshikawa@izugeopark.org)

PE: New and aspiring geoparks

PE002

## The Diverse Vegetation of Kirishima Geopark Derived from Climate Change and Volcanic Activities

Toru ISHIKAWA<sup>1</sup>, Ryusuke IMURA<sup>2</sup>

*<sup>1</sup>The Council for the Promotion of the Kirishima Geopark, Japan*

*<sup>2</sup>Department of Earth and Environmental Sciences Faculty of Science, Kagoshima University, Japan*

The theme of Kirishima Geopark, located at Southern Kyusyu, Japan, is "The Diversity of Nature and the Volcanic Activities that Nurture it". This report, in particular, introduces Kirishima Geopark's distinctive diversity of vegetation caused by changes in the global climate and the volcanic activity of the Kirishima Volcanic Range.

The cycle between the glacial period and the interglacial period causes a spatial variation of vegetation. The Japanese Beech and Mongolian Oak trees, that can now only be seen at a high elevation (→1,000 m), grew near the base of the mountains during the glacial period. These plants, on the volcanoes formed before the glacial period, are said to be remaining survivors of the last glacial period. Volcanoes that are relatively younger than the glacial period do not have such plant life, but instead host Japanese Red Pines, Pampas Grass, and Kyushu Azaleas, called pioneer plants.

Volcanic activities additionally contribute to the temporal transition of plant communities. Volcanoes that have recently erupted have no vegetation. As time advances, the transition takes place, resulting in trees such as the Japanese Beeches and Mongolian Oak trees on the highland, and the Evergreen Oaks on the lowland in a few hundred to a thousand years. However, if there is another eruption the process will be reset to the beginning. The 2011 eruptions of Mt. Shinmoedake brought a section of the mountain back to the barren stage.

\* Contact person email: [kiri-geopark@po.mct.ne.jp](mailto:kiri-geopark@po.mct.ne.jp)

PE: New and aspiring geoparks

PE003

## Geopark and Sadogaku in Sado Island, Japan

Ichihashi YAYOI<sup>1</sup>

*<sup>1</sup>Geopark Promotion Office Sado City Board of Education, Japan*

In 2012, farming practices on Sado Island were the first in a developed country to be officially acknowledged as a Globally Important Agricultural Heritage System by the FAO (Food and Agriculture Organization of the United Nations). Furthermore, the Sado Gold and Silver Mines have been placed on the list of potential World Heritage sites since 2010.

SADOGAKU is Sado City's initiative to raise and educate children in a way that they love and feel a sense of pride in these and other qualities of their home. The program's aim is to foster an understanding of the nature, history and culture of Sado Island in its children. We hope that they will be able to convey what they've learned from SADOGAKU to the rest of the world.

We believe that the efforts of the Geopark are connected to the advancement of the SADOGAKU program. The reason for this being that the primary role of the Geopark is to connect nature, history and culture. SADOGAKU is largely focused on teaching the following three things: "The TOKI, also called crested ibis, and the environment"; "The history and industry of Sado Island gold and silver mines"; and "The traditions and culture of Sado Island". It is our expectation that these 3 themes being connected through "Sado Island's Land (=Geopark)" will enrich SADOGAKU.

\* Contact person email: sado-geopark@city.sado.niigata.jp

PE: New and aspiring geoparks

PE004

## Environmental Geological Aspects One of Decisive Element of Merangin Aspiring Geopark Jambi, Indonesia

Mohamad Sapari Dwi HADIAN<sup>1</sup>, Sofyan SUWARDI<sup>2</sup>

<sup>1</sup>*Padjadjaran University, Indonesia*

<sup>2</sup>*Geology Agency Indonesia, Indonesia*

Over the last few years, geologists and the academic world have felt the need to publicize geological research and to make this science more accessible to the general public. These movements have grown stronger as they became associated to the need to conserve the geological heritage by means of educational information about the heritage value of rocks, fossils, minerals, landforms and the landscape in general. One of the goals of this program is to make available to the general public, near geological sites and written in accessible language, the geo-ecological history of the Earth Merangin River lies in the southeast of Kerinci Mountain, forming the unique pattern of "a mountain between two rivers". The hydrological resources are rich and colorful, with waterfalls, well ponds, streams, springs, rivers, lakes and other attractions.

A new period is beginning: an action plan is proposed for the next five years in order to mitigate the extent of the landscape change. Five strategies must be followed in order to benefit the geoarea: ranging from restoring riverside flora to minimizing building impact in landscape; cleaning of infrastructure; implementation of geoconservation procedures and research; improvement of the management policies; innovating interpretation with social and environmental-friendly approaches.

\* Contact person email: [sapari@unpad.ac.id](mailto:sapari@unpad.ac.id)



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PE005

## The Classification and Assessment of Geoheritage Resources in the Ongniud Geopark

Yuning YOU<sup>1</sup>, Mingzhong TIAN<sup>1</sup>

<sup>1</sup>*School of Earth Sciences and Resources, China University of Geosciences, China*

The Ongniud Geopark of Inner Mongolia Autonomous Region has rich geoheritage resources, such as granite landform, river landform, sand-accumulated landform, structural feature (Xar Moron Deep Fracture), water landscape, etc. On the basis of field survey and indoor comparative analysis, the geoheritage resources are divided into four categories, i.e., fossil heritage, structural geoheritage, geomorphological heritage, and water landscape. The monomers or types of geoheritage resources are taken as the objects of evaluation. The Analytic Hierarchy Process (AHP) method is used to evaluate the value of geoheritage resources. The results showed that the Ongniud Geopark includes a world-class geoheritage site, 3 national geoheritage sites and 7 provincial geoheritage sites. The results deduced by the authors can help understand the geoheritage resources in the Ongniud Geopark, and can also provide basis for the protection, development and utilization of geoheritage as well as the planning and management of the geopark.

\* Contact person email: you200601772@126.com

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PE006

## Ha Long Bay World Heritage's Geological Value and the Potential of Designing Geo-Park

Nguyen CONG THAI<sup>1</sup>

<sup>1</sup>Quang Ninh Provincial People's Committee, Vietnam

### 1. THE INTRODUCTION OF HA LONG BAY, A WORLD HERITAGE SITE

Ha Long Bay world heritage site is located in the North East of Vietnam, belonging to Quang Ninh province. The site is 165km from Ha Noi, the capital of Vietnam. The world heritage site covers the areas of 434km<sup>2</sup> with 775 islands. Its buffer zone is 1119km<sup>2</sup>.

#### 1.1. Geological and morphological value of Ha Long Bay

Ha Long Bay is the most typical and largest marine erose karst area. It is also one of the most important karst landscape which include peak cluster - depression and individual towers. Besides, cave system is one of the remarkably typical geological aspects of the site. There are three main types of cave in the site including old underground caves, old karst caves, and marine notch caves. The site is the ample evidence of the process of the karst development with the large scale and the long period of geological evolution process.

#### 1.2. Aesthetic value

Ha Long Bay is large marine area including thousands of limestone islands jutting up from the water surface and the mass of beautiful, unique, and amazing caves. The scenery changes with angle and time.

#### 1.3. Bio-diversity value

Ha Long Bay has high biodiversity containing the typical ecosystems of tropical coastal areas. Biodiversity of the site includes a variety of species, diversity of endemic and rare genes, and ecosystem diversity.

#### 1.4. Historical - cultural value

Ha Long is one of the homes to ancient Viet people with three continuous prehistoric cultures about 18 to 3500 years ago which are Soi Nhu, Cai Beo, and Ha Long cultures. At the present time, residents of fishing villages in the bay still preserve their traditional unique culture.

### 2. POTENTIALS FOR DEVELOPMENT

Containing outstanding values, Ha Long Bay has great potential for socio-economic development,

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such as tourism services, marine transportation and port, fishing, and aquaculture development.

### 3. THE MANAGEMENT, CONSERVATION AND SUSTAINABLE DEVELOPMENT OF HA LONG BAY WORLD HERITAGE SITE

The long term orientation of the management, conservation, and sustainable development of Ha Long Bay world heritage site focuses on (1) maintaining the integrity of the site' values and its environment; (2) improving legal policies for management; (3) monitoring the social economic activities; (4) applying technology in heritage management; (5) strengthening researches to clarify the heritage' values; (6) Building capacity of world heritage management; and (7) raising community awareness and involving them into the management of the world heritage site.

### Development of the Ha Long Bay's dossier for applying for the membership in the Global Geoparks Network

Applying for Global Geopark Network membership is highly important for Ha Long Bay heritage' values conservation enabling local government to successfully implement management plans and to develop local economy. The boundary of Ha Long Bay has been formally established and local authority has designed the management plan with the involvement of local government and community. These are the best conditions to apply for the Global Geoparks Network membership. Therefore, we have been taking the beginning steps to make it possible for Ha Long Bay to become a member of the Network.

### 4. CONCLUSION

Through this Conference, we really hope to meet and exchange ideals on the development of Geopark proposals, the responsibilities and benefits when becoming a Geopark. We are always eager to get the support, investment and research cooperation from the international community, the professional organizations, experts, and scientists in management and conservation of the site to make it possible to benefit community and future generations.

\* Contact person email: [doingoi.hl@gmail.com](mailto:doingoi.hl@gmail.com)

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