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ABSTRACTS BOOK

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"Local/indigenous people and sustainable development in Geoparks"

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Global Geopark

GLOBAL GEOPARKS NETWORK | APGN ASIA PACIFIC GEOPARKS NETWORK

NON NUOC CAO BANG
UNESCO GLOBAL GEOPARK

Contents

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AEKN, THE FIRST ECOTOURISM COMMUNITY ASSOCIATION IN LAOS: AN EXAMPLE OF SUSTAINABLE WORK WITH LOCAL COMMUNITIES IN AN AUGGP

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Hin Boun aUGGp[1] – The UNESCO Chauvet-Pont d'Arc cave[2] – AEKN[3] – Monts d'Ardèche UNESCO Global Geopark[4] – Tétraktys[5]

Born in 2014, with the assistance of the French Cooperation Agency (AFD) and Tétraktys (French NGO specialized in territorial development, in Laos since 2009), the AEKN is the first ecotourism community association that manages a major tourism site in central Laos: the cave of Konglor-Natane which can be crossed by boat along the Hin Boun River to connect the valleys of Konglor & Natane, in the heart of a breathtaking karstic area: the Phou Hin Phoun.

The management model of the AEKN allows a better distribution of the income generated by the visits of the cave and its vicinity with the villagers gathered in groups of activities. To develop this community model and reduce the impact and encroachment on the natural environment, villagers provide various services such as handicrafts, guided tours, electric boat transport, mountain bike tours, food, homestay. Local commitment and knowledge are valorized.

In addition, the AEKN, together with the villagers and the authorities, has promoted and protected different tourism sites within the two valleys to offer an experience and a complete destination to visitors and has also encouraged the establishment of community micro-projects, by supporting the creation of a signature menu based on local agricultural production.

Natural and cultural heritages are at the heart of this program as a vector of sustainable development, improvement of living conditions, social ties, and territorial governance for communities. The tourism activity must allow direct benefits for villagers (guiding, accommodation, catering, market gardening, crafts, etc.) and indirect (waste management, access to water and sanitation, etc.) while preserving the environment and their cultural assets.

The more the territory manages to control the impact of its tourism development, the more the destination will be attractive and sustainable. Finally, following the latest directives from the Government of Laos, the project is in line with the stated desire of the country to promote ecotourism in its rural and natural areas as tools of income improvement for local communities. All combined these actions are definitively the basis to initiate an international recognition of this work by setting up the first geopark in Laos: The Hin Boun aUGGp.

Keywords: aUGGp; local development; local empowerment; ecotourism; indigenous knowledge valorization; territorial governance.

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BEGAWAI PHILOSOPHY IN BELITONG ISLAND: THE EXISTENCE OF GENDER EQUALITY AND LOCAL KNOWLEDGE EDUCATION

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Begawai is a symbolic communal preparation ritual aimed at fostering harmony between humans and their environment. From a hermeneutic perspective, Begawai involves exploring the symbolic meanings embedded in the various stages of the ritual, including its preparation, execution, and the ongoing sustainability of its outcomes. This ritual serves as a framework for understanding how cultural practices mediate relationships with nature and uphold ecological balance. The philosophy of begawai is examined through symbolic analysis of its components, including ritual elements and associated practices. This study employs participatory observation and in-depth interviews to delve into the intricate layers of meaning within begawai, providing insights into how these rituals reflect and reinforce the community's environmental ethos and commitment to sustainability. This research highlights how traditional practices like begawai contribute to the maintenance of environmental harmony and cultural continuity.

Keywords: Begawai, Belitong Geopark. Cultural Diversity, Education, Gender Equality, Indigenous People, Intangible, Local Knowledge, Philosophy.
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COLLABORATIVE MANAGEMENT OF GEOPARK SITES IN LANGKAWI UNESCO GLOBAL GEOPARK: INTEGRATING STAKEHOLDER EFFORTS

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Langkawi UNESCO Global Geopark (LUGGp) stands as Malaysia's foremost UNESCO Global Geopark, showcasing a successful model of co-management for its distinctive Sites of Geological Interest. This collaborative effort involves government agencies, private enterprises, and local communities, all coordinated by the Langkawi Development Authority (LADA). The strategy promotes sustainable development, conservation, and the well-being of the community across its key geoforest parks, including Machinchang Cambrian, Kilim Karst, Dayang Bunting Marble, and the Kubang Badak Biogeotrail. The Machinchang Cambrian Geoforest Park, renowned for its ancient Cambrian rock formations, is overseen by Panorama Langkawi, which manages the cable car operations and implements eco-friendly infrastructure while fostering geotourism with a focus on minimizing environmental impact. The Kilim Cooperative Community manages Kilim Karst Geoforest Park (KKGP), featuring intricate mangrove ecosystems, limestone formations, and diverse wildlife. The management focuses on conservation and education, with local communities conducting boat tours under stringent regulations to protect the mangrove environment. Ecotourism programs led by local guides educate visitors on the KKGP's ecological and geological significance, while community-led mangrove replanting projects underscore their commitment to ecological restoration. Langsura Geopark Sdn. Bhd. Manages Dayang Bunting Marble Geoforest Park (DBMGP), renowned for its marble formations and the iconic Dayang Bunting Lake. This management balances tourism with conservation, offering sustainable kayaking and boating services. Local communities maintain the DBMGP's natural and cultural integrity by running visitor centers that provide educational materials and cultural exhibits, fostering a deeper understanding of the area's heritage. Kubang Badak Biogeotrail, managed by the Kubang Badak Cooperative Community, offers a unique blend of biodiversity and geological features. This biogeotrail highlights the importance of preserving both biological diversity and geological formations, with the community facilitating educational tours that promote conservation awareness and introduce visitors to the fishermen's way of life. LUGGp's collaborative management model, driven by LADA and integrating efforts from the private sector and local communities, ensures sustainable tourism, conservation of geological and ecological features, and economic benefits for the local population. This synergy of resources and expertise highlights LUGGp as a model for balancing development and conservation in globally significant natural areas.

Keywords: Co-management, Sites of Geological Interest, local community, Langkawi UNESCO Global Geopark

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COMMUNITY ENGAGEMENT ENHANCES GEOPARK SUSTAINABLE DEVELOPMENT AND RESIDENTS WELL-BEING: TAKE WUKESHU VILLAGE AS AN EXAMPLE

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Shilin UGGp, located in Shilin Yi Autonomous County, Yunnan Province, China, mainly features pinnacle Karst (stone forest) landform. It was approved as a Global Geopark in 2004. The terminology “Stone Forest” originates in the Goepark. The major developments in the stone forests of Shilin occurred over 270 million years during four major geological periods from the Permian to the present, illustrating the episodic nature of the evolution of these karst features. The stone forests of Shilin are considered the world reference site of the same type.

After Shilin became a Global Geopark, more communities have been engaged in geotourism and lots of regular and occasional jobs have been created for local residents, such as tour guides, homestay owners, electric sightseeing car drivers, geosite patrolmen, geopark cleaners, security guards, local product providers and sellers, etc.

Wukeshu Village, one kilometer away from the Shilin UGGp, is home to 428 households and 1209 residents. 97% of the villagers are Sani people, a branch of the Yi ethnic minority. Over 800 villagers are engaged in the tourism industry. There are 72 homestays, 18 restaurants, 1 e-commerce service point and other facilities in the village. Some land was transformed as orchard growing pepino melon, peach, pear, persimmon, plum, grape and many more fruits. Over 40 elderly villagers are involved in picking and selling fruits. The annual revenue of fruits selling is over 60,000 yuan. In addition, over 200 villagers are taking pictures and renting traditional Yi people’s costumes for visitors in the Geopark.

Geopark building and tourism development has resulted in the increasing income of local residents, and this in return helps to gain their self-confidence and self-pride for the place where they live. As always, Shilin Global Geopark will continue to enable communities to enjoy more benefits of tourism development.

Keywords: sustainable development, residents well-being, community engagement, Shilin Geopark

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COMMUNITY PARTICIPATIONS AND ENGAGEMENT IN SARAWAK DELTA MALAYSIAN NATIONAL GEOPARK - A CASE STUDY AT PADAWAN DISTRICT, KUCHING, SARAWAK, MALAYSIA

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Sarawak Delta Malaysian National Geopark (SDMNGp) located in East Malaysia, Borneo Island, is currently the sixth National Geopark of Malaysia and aims to become a UNESCO Global Geopark by 2026. It consists of four districts, comprising the districts of Kuching, Bau, Padawan and Siburan with 904,995. The area has diverse communities, which come from ethnicity of Malay, Chinese, Bidayuh, Iban and others. The rural area and sub-urban are mostly in Bau, Siburan and Padawan Districts with highly authentic cultural diversity, vast areas of Sites of Biological Interest (flora and fauna) found, and area for Sites of Geological Interest. One of the core functions of having a geopark is to promote community involvement in preserving and creating economic activities through this strategy of territorial development. SDMNGp have few areas that involved community such as Jagoi Area Development Committee, Sapit Village, Padawan (known as the "Village above the Clouds") and those at Upper Bengoh Dam. Santubong Village and Bako Village, located in the Kuching District, play a significant role in managing the well-known Bako National Park, particularly in facilitating river transportation for visitors and conducting tour-guiding activities. Community involvement in the Padawan District of SDMNGp primarily includes managing homestays and villagestays, providing boat transportation services, offering tour guide services, and promoting the appreciation of cultural events. Additionally, it encompasses local food tastings and the management of Sites of Biological and Geological Interest, such as those found in the Jagoi Area Development Committee, Annah Rais Longhouse, Paku Rock Maze Garden, and the preservation of cave systems in Wind Cave, Fairy Cave, and Posih Cave in Bau. Apart from that, SDMNGp also have collaborated with numerous of schools such as Borneo International School, Kuching, Sekolah Kebangsaan Taba Sait, in Padawan, and SMK Santubong, Kuching and SMK Paku, in Bau, with the objective of creating better awareness among the students. This presentation will concentrate on the various programs, the involvement of community participants, and strategies for advancing opportunities within the SDMNGp communities.

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DISASTER MITIGATION BASED ON GEOLOGICAL HERITAGE CONSERVATION FOR SUSTAINABLE DEVELOPMENT IN MERANGIN JAMBI UNESCO GLOBAL GEOPARK

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Environmental issues and population distribution are controlling evidences in the sustainability of the development of the natural and cultural heritage in the Merangin Jambi UNESCO Global Geopark (MJUGGp). This territory is located in the tropical rainforest of Sumatra in the Barisan Mountains, Indonesia, covering an area of 4,832.31 km² or 62.9% of the total area of Merangin Regency. This research prioritizes geological heritage conservation based on disaster mitigation for sustainable development.

The large potential for geotourism in the MJUGGp apparently has a threat of disaster that can come at any time. In this context, it really requires disaster mitigation as early as possible, which is conservative regarding the geological heritage. Thus, creating a landscape plan based on disaster mitigation and conservation education by using a cultural approach is believed to be an alternative to increase public understanding regarding geological heritage conservation.

The ecological zone approach and landscape characteristics, as well as disaster risk analysis are steps used for sustainable development in the MJUGGp. Traditional ecological knowledge hereditary generation allows communities in the MJUGGp to implement sustainable resource management practices, including the use of Micro Hydro Power Plant Technology.

The community's role in geological heritage conservation efforts includes various activities such as education, environmental outreach, and sustainable geotourism. Participation in preserving geological heritage is a form of community support that constitutes an effective contribution to the SDGs, aligned with the management strategy of the MJUGGp.

The MJUGGp is a geographical area, where geological sites are preserved. Of the three zones, the western supporting zone is the zone that is closely connected to the disaster area, because it is located in the Barisan Mountains with the Mount Sumbing complex, Mount Hulunilo, Masurai Caldera, and also active faults from the Dikit Segment.

The conclusion is that collaboration between communities in the MJUGGp in geological heritage conservation can be carried out using a landscape approach in disaster mitigation and also a cultural approach in an effort to support sustainable development. The success of conservation in disaster resilience is the active role of the community in maintaining the preservation and continuity of geological heritage.

Keywords: Disaster mitigation, geological heritage conservation, Merangin Jambi UGGp, SDGs

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ESTABLISHING COLLABORATION AMONG INDIGENOUS COMMUNITIES, GEOLOGICAL HERITAGE, AND SUSTAINABLE PRACTICES IN MERANGIN JAMBI UNESCO GLOBAL GEOPARK

Agus

Merangin Jambi UNESCO Global Geopark

The Merangin Jambi Geopark (MJUGGp), an area of 4,832 square kilometers, covering most of Merangin Regency. Part of the Merangin Jambi Geopark located in the highlands, is also part of the UNESCO Tropical Rain Forest Heritage of Sumatra, within the working area of the Kerinci Seblat National Park. This study focuses on the contribution of the Serampas indigenous community in Rantau Kermas village to the conservation of the Depati Karo Tuo Jayo Customary Forest through the application of traditional spatial planning systems and sustainable innovations. The village, located in the buffer area of Kerinci Seblat National Park, and the recognition of community land rights is through Customary Law which is strengthened by Regional Regulations and the Decree of the Minister of Forestry.

The Serampas community enforces customary law that divides the area into ‘tanah ulu aek’ for water source protection, ‘tanah arai’ for steep land, and ‘tanah ajum arah’ for agriculture and settlement. This spatial arrangement, administered by the Depati (customary leader), maintains ecological and social balance.

The Serampas community’s success in conservation is also demonstrated by their development of a Micro-Hydro Power Plant (PLTMH), which uses river flow to generate renewable energy. The PLTMH plays a critical role in reducing dependence on fossil fuels, minimizing environmental impact, and improving community welfare by providing sustainable energy.

The ”Pohon Asuh” (Adopt a Tree) program contributes to forest conservation and supports the local economy. Ecologically, the program improves soil quality, regulates the water cycle, and supports forest conservation. Economically, the program directly supports the impoverished and improves their quality of life. In addition, the development of coffee production using modern technology implemented through the Social Forestry Business Groups (KUPS), increases the market value of coffee, and provides additional economic opportunities to participate in coffee production and related financial activities, supporting gender empowerment and enhancing the role of women in the local economy.

The synergy between the implementation of customary law, environmentally friendly technology, and social programs contributes to the sustainability of the Depati Karo Jayo Customary Forest. The active participation of the Serampas indigenous community is critical to ensure environmental conservation and local well-being, confirming the importance of integrating indigenous communities, geological heritage, and sustainable practice within the Merangin Jambi Geopark.

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EXAMPLE OF COMMUNITIES ENGAGEMENT WITHIN TIANZHUSHAN UNESCO GLOBAL GEOPARK

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Over the years, Tianzhushan UNESCO Global Geopark has attached great importance to the engagement of local communities in the management and development of the geopark, and local communities have actively supported activities and carried out win-win cooperation with Tianzhushan geopark.

Nowadays, as a new type of geoscience popularization and tourism model in China, the geo-cultural village aims to promote the sustainable development of the local tourism industry through the integration of geological and cultural resources. With its unique geological landscape and profound cultural connotation, Tianzhushan Global Geopark has propelled to build two geo-cultural villages within the geopark.

Relying on the unique geological resources of ultrahigh pressure metamorphic belt and Paleocene paleontological fossils, together with Tianzhushan Geopark, the two geo-cultural villages invite professional scientific research institutes to carry out investigation on the geoheritage, improve infrastructure facilities to protect the geoheritage and many local people have become volunteers to patrol fossil sites and protect the geoheritage. The two geo-cultural villages actively create an "immersive science classroom" to make knowledge alive, through science popularization corridors, exhibition wall, interpretation system, exhibition room of rocks and fossils, etc. Tianzhushan Geopark and the villages jointly carries out colorful thematic science popularization activities for students and the public, such as lectures and field trips. In addition, the two villages actively develop ecological agriculture to promote the development of characteristic industries. Based on high-quality land resources, they develop selenium-rich and zinc-rich green organic agricultural and sideline products, turning beautiful resources into industries that enrich the people and attract tourists. Through the model of “geology + ecology + tourism”, the local communities have found a path to the sustainable development.

The geotourism development of Tianzhushan greatly benefits local communities, vice versa, local communities promote Tianzhushan Geopark through their service, products and their participation in the geopark.

Keywords: Geo-cultural Village, science popularization, sustainable development
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GEOPARK AS A TOOLS TO INTERPRETE THE ROLE OF INDIGENOUS HANDICRAFT ON FOREST CONSERVATION IN MAYALIBIT BAY IN WAIGEO ISLAND – RAJA AMPAT

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Geoparks are a Sustainable Development tool used by the regional government of Raja Ampat Regency, Southwest Papua Province, that managed with a holistic concept of conservation, education, community empowerment and regional economic development. As one of Indonesia's leading tourist destination, Raja Ampat traditional handicrafts are an opportunity to improve the local economy as a souvenir. The handicraft production process has issues, considering that most of the Raja Ampat indigenous people, especially in Mayalibit Bay, Waigeo Island, live in villages located in conservation buffer areas. The Maniambyan Raja Ampat local product management was initiated in 2018 by BBKSDA West Papua and Fauna C Flora, has succeeded in changing the behavior of craftsmen who previously used plastic rope and textile dyes, to completely using natural dyes and raw materials. Reusing forest materials raises questions about forest sustainability, because they will take materials from nature. This study wants to use a holistic Geopark management perspective in looking at the role of traditional handicraft making towards forest conservation in the nature reserve around the area. Using the qualitative method by observation, interviews, and documentation, with source triangulation, the results shown the conservation actions carried out by women craftsmen by protecting forest areas which are abundant in plant materials for handicrafts. They also made a special garden to grow types of natural dye plants, so they do not necessarily have to go far into the forest to have it. The craftsmen teach children about these types of plants, while also training them in weaving to preserve this tradition. Human capacity development is no longer carried out by mentors but is carried out independently by the craftsmen themselves. Selling handicrafts as souvenirs becomes an alternative to family income, especially for children's school fees. The Geopark management concept can provide answers regarding the role of preserving community handicrafts and local wisdom using indigenous knowledge, which is not only able to conserve forest areas, but also educates their successors, and has economically beneficial.

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GEO-TOURISM IN KHORAT UNESCO GLOBAL GEOPARK: AN ANALYSIS OF THE PROCESS OF TOURISM NETWORK AND TOURISM PROMOTING IN SIKHIO DISTRICT, NAKHON RATCHASIMA

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Khorat Geopark territory encompasses five administrative districts: Sikhio, Sung Noen, Kham Thale So, Mueang, and Chaloem Phra Kiat, all of which offer geotourism opportunities. Local communities, in collaboration with Khorat Geopark as official partners, have collectively developed a comprehensive tourism system. Sikhio District, known as the gateway to Khorat Geopark, features fantastic cuesta landscapes and attractions that draw visitors. This area holds significant potential for the development of diverse visitor activities. This research aims to (1) study the context of geotourism management in Sikhio district, Khorat Global Geopark, (2) examine the collaboration process among the public sector, private sector, citizen sector, and tourists, and (3) promote geotourism in Sikhio district through a tourism network by using the Area Based Collaborative Research (ABC) approach and participatory research. The research population includes community representatives, government, private sector organizations, tourism operators, and tourists. Data were collected through secondary data collection, field work using focus group discussions, and in-depth questionnaires from key informants.

The results revealed that the geotourism products and community groups have drawn upon the unique identity, way of life, and distinctive features of being a geopark to create services and activities that meet the needs of tourists. Local community leaders were identified as the primary factors influencing these efforts. Additionally, the management and participation of community groups were found to be voluntary and well-participated. The coordination network within these groups follows complex distribution patterns, effectively enabling cooperation with local government, private sector tour agencies and Geopark committee.

In term of the tourism promoting, the tourism networking in Sikhio District create the new tourism route by using the public transportation to motivate the tourist traveling by train, bus and local transportation and promote by event and tourism activities in which locals need to take parts.

Keywords: Geotourism development, Multilevel partnership engagement
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INVOLVEMENT OF THE GEOPARK PARTNER NETWORK IN THE ACTIVITIES OF NON NUOC CAO BANG UNESCO GLOBAL GEOPARK (VIET NAM)

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Non nuoc Cao Bang Geopark is the 2nd designated UNESCO Global Geopark (UGGp) in Viet Nam. Following the bottom-up approach, engaging the local communities in the Geopark's activities has always been a priority during the development of the Geopark. Since the establishment of the Geopark, the Management Board has been paying attention to the development of the Geopark's partner network. Since 2018, the number of the Geopark partners has increases from 24 to 45 (2024). Capacity building workshops and experience study exchanges aiming at raising awareness about the Geopark and heritage preservation for sustainable tourism development are held annually. To be a member of the Geopark partner network, a partner has to commit to comply with the Geopark's partner network criteria. Supporting activities among the network have been carried out for the development of the Geopark partners as well as the Geopark and communities. For example, the partners providing tourist services (hotels, restaurants, homestays, etc.) support selling products of traditional craft villages at the establishments. The Geopark partners also actively respond to activities on environmental protection activities launched by the Geopark.

Keywords: Cao Bang UGGp, Geopark partners, heritage protection, sustainable tourism development
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JENANG RAJE - A HEALTH KNOWLEDGE SYSTEM THAT HELPS THE BELITONG LOCAL COMMUNITY ADDRESS ENDEMIC DISEASES

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This research delves into the local health knowledge of the Belitong community, employing in-depth interviews and a comprehensive literature review, including the historical text "De Eerste Jaren der Billiton-Onderneming" by J.F. Loudon from 1883. The investigation reveals the existence of a traditional regulatory system called Jenang Raje, which functions as a form of soft law. This system outlines the procedures and protocols for managing disease outbreaks on Belitong Island. Supported by historical records detailing local wisdom, historical disease patterns, and island-specific health practices, Jenang Raje serves as a culturally rooted mechanism for addressing health crises. The study highlights that the Belitong community is not only aware of the psychosomatic effects of diseases but also effectively employs preventative measures and response strategies. This traditional knowledge reflects a well-developed understanding of health management, demonstrating the integration of historical practices with contemporary health challenges in the context of endemics.

Keywords: Belitong, Cultural Anthropology, Medical Anthropology, Jenang Raje, Local Knowledge.
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LOCAL AND INDIGENOUS KNOWLEDGE: A BRIDGE BETWEEN PAST AND FUTURE

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If we take a glance of the development of China's global Geopark in 20 years, Geoparks, as an important carrier of natural and cultural heritage, cannot function effectively without the active participation of local and indigenous peoples. These local and indigenous peoples have lived in these areas for generations and possess a wealth of knowledge about the natural and cultural heritage. This knowledge is crucial for the protection and management of geoparks. Therefore, we need to value and respect the knowledge and rights of these local and indigenous peoples and actively invite them to participate in all activities related to geoparks. In the management and development of geoparks, local and indigenous knowledge is not only a valuable resource, but also a bridge connecting the past and the future. This knowledge system covers ecosystem management, sustainable use of resources, cultural customs, and wisdom for living in harmony with nature. By integrating this knowledge into the planning, protection, and education programs of geoparks, we can ensure that geoparks protect natural heritage while also respecting and maintaining the cultural heritage of local communities.

To effectively promote the participation of local and indigenous peoples, it is necessary to establish a relationship of mutual trust and respect first. This means that the management agency of the geopark should actively listen and understand the needs and concerns of local and indigenous peoples, ensuring that their voices are fully represented in decision-making processes. At the same time, by providing training and support, the agency can enhance the capacity of local and indigenous peoples in geopark protection, interpretation, and tourism development, making them an indispensable part of geopark management.

In the activities of geoparks, a series of projects can be designed that are closely related to local communities, such as traditional handicraft displays, local cultural festivals, and ecological guided tours. These activities not only attract visitors and enhance the geopark's visibility, but more importantly, they can disseminate local and indigenous knowledge and enhance the public's awareness of the value of natural and cultural heritage. Moreover, by using modern technological means such as digital platforms and social media, the influence of local and indigenous knowledge can be further expanded. By documenting and sharing the unique value of this knowledge, we can inspire more people to take an interest and show concern for the protection of natural and cultural heritage, thereby fostering a good atmosphere of community participation in geopark protection.

Keywords: Local and indigenous knowledge, geopark, community engagement
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"KLUEA HUA" AND THE "GSB YOUTH DEVELOPMENT PROJECT ON LOCALITY CONSERVATION" IN THE KHORAT UNESCO GLOBAL GEOPARK, THAILAND

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Kham Thale So District is within the Khorat UNESCO Global Geopark. This area is notable for its geological features, which include a series of rock layers from the Maha Sarakham Formation. These layers were created approximately 90-100 million years ago through the deposition of stream sediments and saltwater in a basin situated on the Khorat Plateau. The community area has long served as a repository of local expertise in salt production, passed down through generations.

The Phan Dung inscription, which dates back to 1372 B.E., shows that this community has an ancient civilization that has been around for thousands of years. There is the production of fine-grained salt for medicine in the ancient way called "Kluea Hua". From the stories and evidence found around some salt-making areas, there were pieces of pottery, which confirms that the production of "Kluea Hua" has existed in this community for a long time and is a wisdom heritage that is about to be forgotten and lost.

"Kluea Hua" is salt in a line pattern wide mouth pottery, size 8 cm in height, 5 cm in width, and thickness of 0.40 cm. This knowledge was closely transferred to a few families. Originally, about 50-60 people from less than 20 families were within the community. It was made by order and sold for 1-3 baht per head. Over the past 30-40 years, with advances in public health, the demand for salt has decreased.

"Kluea Hua" has disappeared from the community. Community sages have disappeared.

However, in 2019, Khorat UGGp cooperated with Nakhon Ratchasima Rajabhat University and Government Savings Bank (GSB) and created the "GSB Youth Development Project on Locality Conservation", which led to its restoration, study, and conservation. At present, five community members possess local knowledge that has been passed down from the community elders who have since passed away. The "Kluea Hua" knowledge has been shared with over 1,700 students and visitors through various activities organized by two local community enterprises. To date, 23 members of these enterprises, along with several locals participating in the activities, have acquired valuable knowledge, established networks, and generated additional income through local products and services. It was approximately 100,000 baht to share for each year. We aim to support the end of poverty (SDG1), promote lifelong learning (SDG4), and women and men, and girls and boys, enjoy the same rights, resources, and opportunities (SDG5).

Keywords: Kluea Hua, Salt-making, Khorat UNESCO Global Geopark, community engagement, local knowledge, SDGs.

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PARTICIPATORY INVENTORY FOR THE CHARACTERIZATION OF LOCAL GEOHERITAGE. MIXTECA ALTA UGGP (MEXICO) AS A CASE STUDY

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Geosite inventories are important tools for determining the most significant elements of the geodiversity of a territory and also play a representative role in the dissemination of an area of interest and its geological, geomorphological, mining, and paleontological heritage. The specialized literature has standardized the need for geosites to have a preponderant scientific value for their consideration; however, in the context of geoparks, it is appropriate that geosites, in addition to their intrinsic interests, have a symbolic relationship with local communities, considering that geoparks seek to promote the correlation and relationship between the population and their environment.

Mixteca Alta UGGp (Mexico), there is a valuable relationship between the indigenous communities and their territory; this strong link unites the local cosmovision with geodiversity, evidenced in their language, legends, orality and toponymy. This sense of belonging must be fostered and strengthened. This particular panorama made it possible to generate a geosites inventory model that takes advantage of the strong social and geological link, for which a participatory inventory was elaborated, with the active involvement of local communities, being a viable option, adequate and adapted to the territorial reality.

Although the inventories were generated by the local communities, represented by their municipal authorities and certified local guides, the geosites listed and described effectively fulfilled the role of generating a panoramic view of the main geological and geomorphological interests present in the geopark territories. In general, this inventory fulfilled a participatory need and complemented geological-geomorphological information.

Keywords: Participatory inventory, Mixteca Alta UNESCO Global Geopark, Geoheritage, Geosites.

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STRATEGIES FOR ENHANCING COMPETITIVENESS BASED ON LOCAL WISDOM: A STUDY OF COMMUNITY ENTERPRISES IN THE KHORAT UNESCO GLOBAL GEOPARK

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Korat Geopark established formal partnerships in 2019 with 21 local communities for Geotourism. Since then, more community enterprises have been created within the Geopark's territory. This rapid growth in partnerships has prompted Geopark to explore collaborative management and operational strategies. This research aimed to study the operational potential of community enterprises in the Khorat UNESCO Global Geopark area, develop strategies to enhance competitiveness based on local wisdom, and examine satisfaction with the strategies among community enterprises in the Khorat UNESCO Global Geopark area. A mixed-methods approach was employed, utilizing questionnaires, interviews, focus group discussions, participatory observation, brainstorming sessions, SWOT analysis, and TOWS Matrix. Key informants comprised 15 community leaders, local leaders, group members, and committee members for qualitative data collection. A sample of 30 participants was selected through simple random sampling to assess strategy satisfaction. Data were analyzed using basic statistical methods.

The findings revealed that community enterprise operations received support from various network partners, promoting tourism activities in the Khorat Geopark area. Effective marketing channels and public relations were observed, along with distinct community identities, notable local wisdom, and technology transfer processes for agricultural product production and lifestyle. Continuous community personnel development was also evident. Strategy development included offensive strategies such as creative community tourism management and value addition through differentiation; defensive strategies such as sustainable tourism network creation and creative tourism marketing communication; corrective strategies such as proactive alliance building and participatory group management; and reactive strategies such as community.

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THE CONCEPT OF BIOREGIONALISM IN *DUKUN KAMPONG* BELITONG TO BALANCE ANTHROPOCENTRIC NEEDS AND ENVIRONMENTAL ETHICS

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The role of the *dukun kampong* (shaman) is crucial for maintaining certain areas within each village on Belitong Island. In Belitong, Dukun Kampong are akin to leaders chosen based on meritocracy; they can be removed by village residents through a collective decision called *berapit ketong* if they lack understanding of environmental aspects. Key indicators of their effectiveness include the safety of the community, the management of anthropogenic disasters, and adherence to universal moral principles. This study employs a combination of literature review, ethnographic research in the villages of Gunung Riting, Aik Seruk, and Keciput, and in-depth interviews with several traditional figures from Belitong Island. The research aims to explore how the *dukun kampong*'s environmental stewardship aligns with and supports deep ecological values, offering insights into the integration of traditional practices with contemporary ecological concerns.

Keywords: Anthropocentric, Belitong Island, *Berapit Ketong*, Bioregionalism, Cultural Diversity, *Dukun Kampong*, Environmental Ethics, Political Anthropology.

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THE CONSERVATION AND UTILISATION OF GEOLOGICAL SITES AT MINÉ-AKIYOSHIDAI KARST PLATEAU GEOPARK, JAPAN

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Miné-Akiyoshidai Karst Plateau Geopark is located in western Japan, and is a region rich in mineral resources such as copper, coal and limestone which have been closely linked with people's lives since ancient times. It was certified as a Japanese Geopark in 2015, and is working with local residents to become a UNESCO Global Geopark.

Upper Triassic formations of the Mine Group, which have produced many fossils of plants and insects and contain coal seams, are distributed in the Omine Coalfield area of the geopark. The Omine Coalfield area contains multiple geological sites and cultural sites that are conserved and utilised for geotours and events by local residents.

One of these geological sites is 'Momonoki Strip Mine Ruins'. This site is a former coal mining site that the city received for free by conducting negotiations with the owning company, according to the strong requests of local residents. Since receiving this land, local residents have taken the lead to maintain the site and to utilise it for geotours and events.

A cultural site of the Omine Coalfield area is the 'Arakawa Horizontal Mine Ruins', the remains of an opening to a mine and tunnel which was developed by the Imperial Japanese Navy approximately 120 years ago, shortly after the start of Japan's modernisation. The Geopark Promotion Council negotiated with the landowner to allow anyone to freely visit the site and view its exterior. Visitors can enter the entrance of the mine by participating in geotours.

Another cultural site, 'Mine Inclined Mineshaft Ruins', is one of the most important mine shaft sites of Omine Coalfield, where anthracite coal was mined. A railway station was established nearby to transport coal efficiently. Although the station and train tracks no longer exist due to the discontinuation of the railway line, local residents have used a subsidy from the geopark to install signage of maps around the site.Miné-Akiyoshidai Karst Plateau Geopark Promotion Council will continue to work together with local residents to protect, preserve and utilise not only geological heritage but also cultural and intangible cultural heritage.

Keywords: Miné-Akiyoshidai Karst Plateau Geopark, Japan, Omine Coalfield, Momonoki Strip Mine Ruins, Arakawa Horizontal Mine Ruins, Mine Inclined Mineshaft Ruins
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THE LOCAL GASTRONOMY PROMOTES GEOTOURISM ACTIVITIES IN THA CHANG COMMUNITIES, KHORAT UGGP, THAILAND

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Khorat UNESCO Global Geopark has partnered with Nakhon Ratchasima Rajabhat University to promote local gastronomy for geotourism in Tha Chang communities. This initiative aligns with Sustainable Development Goals (SDGs) 8 (Decent work and economic growth) and 12 (Responsible consumption and production), aiming to foster creative and sustainable tourism while enhancing the creative economy in higher education institutions. Tha Chang communities, located in Chaloem Phra Kiat District, possess rich local resources, including ancient elephant fossils. The community's resourcefulness has inspired the development of a culinary experience that connects with these resources, attracting tourists and generating income.

The signature dish is "Pha Khao Kham Chang," meaning "Elephant's Bite-Sized Rice." This compound word is derived from the terms Pha Khao, Kham, and Chang. "Pha Khao" refers to the rice-eating traditions of the Thai people, particularly in the northeastern and northern areas, which involve setting up a table or tray and sitting around to eat. "Kham" indicates one bite of rice, while "Chang" denotes an elephant and refers to the area’s ten genera of fossil elephants. Like an elephant, the vast food platter satisfies a person's hunger with just one serving. It features a full-course meal, including an appetizer, main dish, dessert, and beverage, all prepared using local and seasonal ingredients. The dishes are visually appealing and uniquely connected to the area's fossil heritage.

The community's involvement in shaping the culinary experience ensures sustainable tourism practices and aligns with SDG 12. Through workshops and activities, community members learned to present dishes beautifully, set appropriate prices, and incorporate storytelling that resonates with the local resource base. This collaboration has empowered the community to develop new menus and provide an exceptional welcome to tourists, contributing to the overall success and sustainability of geotourism in Tha Chang communities.

Keywords: Gastronomy, Geotourism, Ancient Elephants, Tha Chang Communities, Khorat UNESCO Global Geopark
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THE PAST AND FUTURE OF THE GUIDE ORGANIZATION “GEO SEN.S”

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As the representative of Geo.sen.s, a certified guide organization of the San'in Kaigan Geopark, I am dedicated to the preservation of the natural and cultural heritage in this area while providing immersive experiences for our community. The geo of "geo sen.s" is the geo of the geopark. The sen.s in "geo sen.s" represents Japanese dots and lines. It represents Connecting the Dots.

The San'in Kaigan Geopark spans a vast area of 120 kilometers east to west and is often referred to as a "museum of geology." In my hometown of Shin-onsen town, you can observe andesite rock formations, while neighboring Iwami town showcases beautiful granite. My first experience with stand-up paddleboarding (SUP) in Iwami town reignited my appreciation for nature's wonders and inspired me to offer SUP experiences in my own community.

Shin-onsen town is rich in history and culture, being home to the Japanese Heritage site of the port of the Kitamae-bune ship, which is a cargo ship sailed the Sea of Japan from Osaka to Hokkaido during the Edo period and the Japan Agricultural Heritage site of Tajima beef. At Geo.sen.s, we primarily provide SUP experiences that help participants deepen their connection with nature. Additionally, we organize a variety of activities, including waterfall tours, beach yoga sessions, and long trail events for local children.

In 2017, I founded Geo.sen.s with the resolution, "I'll live with a smile on my face." Our mission is to create a sense of belonging for everyone, encapsulated in our philosophy, "Imagining a home for all." Our vision is to realize a world where people connect through smiles. My goal is to foster a society where people understand and respect each other.

In my presentation at the Asia Geopark Conference, I will share the journey of Geo.sen.s from its inception to the present with you all, highlighting our achievements and their impact. Our projects contribute to strengthening the local community and building a sustainable future. I hope my passion and efforts will inspire you and serve as a guide toward a better future where we all can create a world connected through smiles.

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THE PRESERVATION OF THE TRADITIONAL CRAFTS IN NON NUOC CAO BANG GEOPARK

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Located in the Northeast of Vietnam, Non nuoc Cao Bang has an area of 3,683 km^2. The Geopark is home to different ethnic groups, including Tay, Nung, Mong, Dao, Lo Lo, San Chi, etc. Non nuoc Cao Bang UNESCO Global Geopark is also a land of many tangible and intangible cultural heritage. Each ethnic group has different cultural features that create imbued cultural identity in the Geopark. Cao Bang is a land of traditional crafts passed down from generation to generation. However, some crafts have been in the risk of disappearing. Among the traditional crafts in Non nuoc Cao Bang UGGp are the traditional paper making in Dia Tren village and incense making in Phja Thap village, Phuc Sen Commune, Quang Hoa District. However, the low income from traditional crafts makes many people, especially young villagers no longer interested in practicing the crafts. The traditional products are not be able to compete with the industrial products. During the past few years, the Management Board of Non nuoc Cao Bang Geopark has been focusing on the preservation and promotion of the traditional crafts.

This presentation will share some of the Geopark's efforts in preserving the traditional incense and paper making crafts in connection with the livelihood improvement for local people and the orientation of transforming the villages into interesting destinations for experience tourism in the Geopark territory.

Keywords: intangible, traditional crafts, preservation, livelihood improvement
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THE ROLE OF KEDAONG FOLKLORE AND DEEP ECOLOGY PARADIGMS IN BELITONG ISLAND

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Kedaong, a mythological creature in Belitong folklore, exemplifies the deep cultural connection between the local community and their environment. In Belitong, sacred areas designated by local shamans (dukun kampong) are believed to have equal rights as humans, encompassing both the plants and animals within them. This belief system aligns with deep ecology principles, which assert the intrinsic value of all living beings and advocate for the preservation of nature beyond its utility to humans. This study uses in-depth interviews and observations with 10 dukun kampong across Belitong Island, employing a hermeneutic epistemology approach in environmental anthropology to explore how these traditional beliefs reflect and support deep ecology values. The research aims to reveal how indigenous practices contribute to and resonate with contemporary ecological philosophies.

Keywords: Belitong Island, Cultural Anthropology, Deep Ecology, Environmental Anthropology, Folklore, Hermeneutic, Kedaong
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WHITE STORK CONSERVATION ACTIVITIES BY LOCAL RESIDENTS AND SUPPORTS FROM THE GOVERNMENT IN THE SAN'IN KAIGAN UNESCO GLOBAL GEOPARK (JAPAN)

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The San'in Kaigan UNESCO Global Geopark (SKUGGp) hosts the Oriental white storks (*Ciconia boyciana*), recognized as a globally rare and endangered species. Research and conservation efforts are primarily focused in Toyooka City, Hyogo Prefecture.

Since approximately 2016, storks have been frequently seen soaring through the Nikko area of Ketaka-cho in Tottori City, Tottori Prefecture,. Mr. Tsubaki, a local resident, has initiating the sharing of information related to conservation efforts. This includes sending photographs of the storks that visit to Hyogo Park of the Oriental White Stork, where he is involved in research activities in Toyooka City, Hyogo Prefecture.

In 2019, a stork was seen nesting and laying eggs on the radio tower of a private telecommunications company located near Mr. Tsubaki's residence. That year, in collaboration with the telecommunications company, Stork Park, and various government agencies, we initiated a monitoring program for the storks on the radio tower, successfully witnessing the birth and departure of four chicks. However, due to the inability to continue conservation efforts, such as monitoring nests on radio towers in the following years, Mr. Tsubaki took the initiative to construct a nesting tower at his own expense in 2020. In that year, three chicks fledge from the nesting tower, followed by two chicks each in 2021 and 2022.

Noticing a year-on-year decline in the number of chicks hatching, Tsubaki hypothesized that the parent storks are modulating their offspring based on the availability of food. Therefore, we leveraged the SKUGGp activity subsidy from the local city hall to enhance the pond's drainage, ensuring a stable food supply for the storks and safeguarding the biodiversity of the Nikko area.

Furthermore, to enhance local awareness regarding the ecology of white storks, we are implementing initiatives that include the installation of bulletin boards and educational presentations about white stork ecology in elementary schools.

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UNITING FOR CLEAN COASTS: LANGKAWI GEOPARK'S COMMUNITY-DRIVEN SUSTAINABILITY INITIATIVES

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Langkawi is made up of 99 islands, with only three inhabited by the community. However, the main island falls under the administrative jurisdiction of the local municipal council. The other islands are managed differently. Langkawi Geopark comprises of 38 geopark sites, with 21 accessible to visitors and the remaining 17 outside the operative area of the local council. As an island Geopark, Langkawi faces a persistent threat from marine debris, necessitating ongoing cleanup efforts along its beaches., the Idaman Geosite Clean Up (IGSC) initiated in 2019 is a weekly cleaning program organized by Langkawi UNESCO Global Geopark, locally known as 'gotong-royong.' The program works closely with E-idaman Sdn. Bhd., a local waste management company and Geopark Partner since its inception. E-idaman facilitates the transport of collected plastic waste and marine debris to recycling centres or landfills for responsible disposal. This partnership is honoured through the program's name, 'Idaman,' meaning hopes or dreams. This initiative aims to maintain the cleanliness and physical upkeep of 38 geosites and beaches, playing a crucial role in promoting multi-stakeholder partnerships. By involving a diverse group of volunteers—including local community members, students, corporate employees, NGOs, tourists, and government agencies—the program fosters networking, cooperation, experiential learning, knowledge sharing, and skill development. Geopark personnel provide onsite guidance and educational sessions, highlighting the importance of natural and geological preservation, sustainable practices, and the significance of UNESCO Global Geoparks. This enhances environmental literacy, fosters a sense of responsibility, and empowers individuals to become active stewards of their natural heritage. Regular maintenance and restoration are essential due to the harsh tropical climate and littering by visitors. So far, 2,326 participants have collected approximately 7,973 kilograms of plastic waste.

Keywords: conservation, community, partnership
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BELITUNG ISLAND'S ENDEMIC DRAGONFLY SPECIES CONSERVATION EFFORTS AND HABITAT PRESERVATION IN TANJUNG KELAYANG RESERVES

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Dragonflies (Odonata) are crucial indicators of freshwater ecosystem health, with 6,405 extant species globally. Indonesia, home to approximately 900 Odonata species, represents 14% of this biodiversity. Belitung Island stands out for its unique odonate species, which are now primarily threatened by tin mining. It is home to 103 Odonata species, with significant contributions from researcher Lieftinck since 1934. Notably, species e.g. Amphicnemis billitonis, Amphicnemis kuiperi, and Mortonagrion appendiculatum are endemic and highly sensitive to habitat changes. This study explores Belitung's odonate species, their habitats, and the effects of environmental degradation, with a focus on the Tanjung Kelayang Reserve (TKR), part of the Belitong UNESCO Global Geopark Natural Site.

Belitung Island, located between Sumatra and Borneo at the northern edge of the Java Sea, features diverse topography, with "Gunung Tajam" as its highest point at 460m asl. Tin mining has been ongoing since 1823, significantly disrupting the island's aquatic and terrestrial ecosystems. This disruption impacts rivers, lakes, peatlands, and primary forests, which are essential for odonate habitats. The Tanjung Kelayang Reserve, located in Belitung's northwest and covering 200 hectares, with half designated as a wildlife sanctuary and nature reserve, is crucial for conserving threatened species and maintaining ecological balance. The peat swamp forests within TKR are particularly important for odonates and groundwater stability. The degradation caused by mining and land conversion threatens these species, underscoring the need for conservation. Conservation efforts within TKR are essential for protecting Belitung's unique odonates. The reserve offers critical habitats, particularly in peat swamp forests where species e.g. M. appendiculatum and A. kuiperi are found. M. appendiculatum, now classified as Endangered by the IUCN, is highly stenotopic, with strict habitat requirements, making it particularly vulnerable to habitat loss. Meanwhile, A. kuiperi, though more habitat-tolerant, is classified as Vulnerable. These damselflies rely on the specific microclimatic conditions of their habitats, which are susceptible to disruption from mining and deforestation. Preserving these habitats and implementing sustainable water management practices at Tanjung Kelayang Reserve are crucial for mitigating environmental impacts and preserving Belitung Island's Odonata diversity.

Keywords: Odonata**,** Belitung Island**,** Tanjung Kelayang Reserves**,** Habitat Conservation**,** Peat Swamp Forests.
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CHARACTERISTICS AND EFFECTIVE OPERATION OF THE TOYA-USU VOLCANO MEISTER SYSTEM, WHICH HAS BEEN IN OPERATION FOR 15 YEARS

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Toya-Usu UNESCO Global Geopark council, Japan

Toya-Usu UNESCO Global Geopark is located in Hokkaido, the northernmost island of Japan. Its main feature is volcanoes. There is the Mt. Usu, an active volcano that erupts once every few decades in our Geopark. The biggest problem for our region is how to coexist with this active volcano, and it is also a major theme for the UGGp.
Since 2008, the UGGp has been certifying local residents who have learned about the history of Mt. Usu's eruptions and the disasters it has caused, and who can convey methods for regional disaster risk reduction, as Toya-Usu Volcano Meisters. To date, 71 volcano meisters have been certified. Many of the meisters are not only lectures disaster risk reduction education activities for local schools and other residents, but also serve as geopark guides, leading educational guided tours and guiding tours to experience impressive volcanic trails. More than 15,000 people a year take the guided tour by the meisters.
The certification examination, which is held every year in conjunction with World Disaster Reduction Day on October 13th, continues to receive applications from motivated candidates. Meisters of a wide range of ages are certified, and most of them are of working age. The gender ratio is also ideal. The activities of the Meisters are highly regarded both domestic and abroad, and have received several awards as excellent examples of regional disaster risk reduction. In Japan, in the area around Ontake volcano, which erupted in 2014, the certification of "Mt. Ontake Volcano Meisters" began in 2018, based on the system from Toya-Usu. In addition, in volcanic regions overseas, consideration is underway to establish a disaster risk reduction leader certification system based on our system.
So why is the Volcano Meister such an active and sustainable certification system? Why are working-age candidates gathering, and why is the activity spreading in a positive movement? This presentation will compare the Volcano Meister System with general Geopark guide certification systems and analyze the attributes of certified Meisters over the past 15 years. It will also introduce the characteristics and effectiveness of the Volcano Meister System from the perspectives of 1) system design, 2) operation, and 3) the ripple effects of the activities of certified Meisters.

Keywords: volcano, disaster risk reduction, education and geopark guide
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EFFORTS TO ENHANCE LOCAL DISASTER RESILIENCE THROUGH WALKING AROUND TOWN: AN EXAMPLE OF KIRISHIMA NATIONAL GEOPARK, JAPAN

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Promoting town walking to local residents is expected to have the following effects. For example, (1) health improvement through aerobic exercise, (2) reduction of CO_2 emissions by not using cars, (3) promotion of human interaction in the city, and (4) discovery of previously overlooked attractions and features of the city. Among these, we would like to emphasize in this presentation that (4) has a significant effect in enhancing the disaster resilience of a region. For example, in a city developed on an alluvial plain, walking and understanding the various micro topographies formed by fluvial process is an effective way to prepare for future flood damage.

The central Kokubu district of Kirishima City, Kagoshima Prefecture, Japan, is formed on a low-lying area that includes an old river channel and is therefore at high risk of flooding during heavy rains. However, many of the generation born after the August 1993 floods and those who have moved into the area since then are unaware of such risks. Therefore, we conducted a guided walking tour of the town in October 2023 to share information with local residents about the vulnerability of flooding while showing them the attractions of the town.

Although this was the first attempt at such a tour, it was generally well received by the participants. Perhaps one of the reasons for the success of the tour was that the tour guide, who experienced the flood 31 years ago, gave a very realistic account of the disaster. We intend to continue to hold such events in the future to pass on the memory of disasters and to prepare for the coming times.

Keywords: Kirishima Geopark, disaster risk reduction, walking around town, guided tour, flood
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EVALUATION OF COMMUNICATION STRATEGIES IN THE HAZARDS RISK FOR CHILDREN IN RINJANI-LOMBOK UNESCO GLOBAL GEOPARK

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Rinjani-Lombok UGGp is situated in Lombok Island, a small island prone to 13 disaster hazards. The most destructive type of disaster is an earthquake, such as the one that struck in 2018. The earthquake had a significant impact on the Rinjani-Lombok Geopark's disaster risk reduction program. Following the 2018 earthquake, the Rinjani-Lombok Geopark required Disaster Mitigation as a mandatory session/ lesson in all training and actively utilized the moment of International Day for Disaster Risk Reduction every October. Women and children lost the most lives in the 2018 earthquake. Furthermore, based on the evaluation results, there were very few disaster awareness activities had planned for children. Therefore, after the earthquake, Rinjani-Lombok UGGp committed to continue working on disaster risk reduction programs and activities for children. Since 2020, Rinjani-Lombok Geopark has held various disaster-related competitions for children, including poetry reading competitions, storytelling competitions, quiz competitions and coloring competitions. These competitions attract a lot of interest from children and have high exposure on social media. Participants are expected to learn a lot about disasters, and social media users are also socialized. After three years of operation, the DRR program was reviewed using a SWOT analysis. These competitions attracted a large number of children, yet exposure remained rather constant. Therefore, in 2023, the disaster communication strategy for children was revised to be more localized and inclusive. The types of communication used included the creation of more local/ smaller scale comic books, Rinjani Literacy, coloring competition for kindergartens, storytelling for kindergarten and primary school students, and the Training of Trainers (TOT) initiative to recruit and engage youth groups. These youth are then asked to conduct awareness and evacuation drills in schools in their respective areas. These programs proved to be simpler, had a broader reach, and were more effective in disaster risk reduction efforts.

Keywords: Rinjani-Lombok UGGp, DRR for children, communication strategy, earthquake
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THE COASTAL NATURE-BASED SCHOOL OF KECIPUT VILLAGE IN BELITONG GEOPARK: UNDERSTANDING CLIMATE CRISIS IN COASTAL AREAS (INDONESIA)

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This study examines the role of the Coastal Nature-Based School in Keciput Village within the Belitong UNESCO Global Geopark in addressing the climate crisis that affects coastal areas. Utilizing Participatory Action Research (PAR) and focus groups, the research engages community members, staff, and local stakeholders in exploring the school's climate adaptation strategies and their impact on environmental sustainability. PAR facilitates collaborative problem-solving, allowing participants to actively contribute to identifying climate-related challenges and developing solutions. Focus groups provide a platform for in-depth discussions, capturing diverse perspectives on the effectiveness of the school's nature-based approaches and educational programs. The study aims to assess how the school integrates climate education and nature-based solutions, enhancing community resilience and understanding of climate change. Findings will contribute to broaden insights into effective school-based climate strategies and their role in mitigating environmental impacts in coastal regions.

Keywords: Belitong Geopark, Climate Crisis, Coastal Nature-Based School, Community Resilience, Keciput Village, Indigenous People Pedagogy, Ocean Literacy.
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THE POWER OF INTERNATIONAL COLLABORATION FOR DISASTER RISK REDUCTION AND COMMUNITY RESILIENCE IN TOYA-USU UNESCO GLOBAL GEOPARK, JAPAN

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The Toya-Usu Global Geopark, home to Lake Toya which was formed by the huge pyroclastic eruptions about 110,000 years ago as well as Mt. Usu volcano, which was formed about 20,000 years ago after repeated volcanic activity. This geopark hosts about 47,000 residents and attracts numerous visitors annually. Despite the geological risks, the community has been around since a long time ago and it has collaborated with government, experts, and the media to manage potential future disasters and embrace the benefits of living in this unique environment.

Coexistence with volcanic activity has been crucial for maintaining the region's resilience and thriving tourism industry. For example, notable achievements include the world's first successful volcanic evacuation in 1910 and the first record of volcanic growth which was carefully recorded from the first activity in 1943 till the completion of the volcano in 1945. This contributes to current hazard mapping and risk reduction. These experiences and knowledge continue to be preserved and shared across generations.

The 'Toya-Usu Volcano Meister' initiative, created in this geopark by the local residents, aims to preserve and share valuable knowledge, experiences, and memories related to the Lake Toya and Usu Volcano.

This local wisdom and related activities contribute to minimizing disaster risks for future generations within and beyond the region.

As a Volcano Meister, I will share insights on the themes of loss, rebirth, and coexistence experienced by those living near Lake Toya and the Usu Volcano, as well as living life in the geopark. By promoting international disaster risk reduction efforts our mission is to foster global collaboration and resilience in the face of geological hazards.

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THE "SENGI GAME" - A DISASTER PREVENTION-THEMED GAME CREATED BY SAKURAJIMA-KINKOWAN JAPANESE NATIONAL GEOPARK

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The Sakurajima-Kinkowan Japanese National Geopark (JNG) is located in the southern region of Kyushu Island in Japan. This territory emcompasses three cities, the active Sakurajima volcano, and Kinkowan Bay, which was formed by volcanic processes. A remarkable aspect of this territory is that over 600,000 residents live in proximity to the active volcano, which experiences daily eruptions.

Approximately 3,500 people live in Sakurajima, despite the fact that the volcano has experienced significant eruptions on four occasions throughout recorded history. The residents have managed to overcome volcanic disaster and continue to live in harmony with the volcano.

Reportedly, almost 90% of the magma quantity that flowed out during the Taisho eruption (1914) has been restored in Aira Caldera's magma chamber in recent years. It is said that a huge eruption comparable to theTaisho eruption would happen in the future.

Considering the volume of magma, it is essential to enhance preparations for significant eruptions. In response, the Sakurajima-Kinkowan JNG has developed a card game. This game serves as an educational tool for residents, enabling them to understand volcanic disasters and the necessary preventive measures. Additionally, it prompts them to contemplate the appropriate actions to take in the event of a disaster. The card game draws inspiration from a traditional educational approach known as "Sengi", which has been utilized in the region for 400 years.

The core idea of the method is to encourage people to think and discuss possible solutions for situations that are likely to happen and yet hard to give the right judgment to them.

The Sakurajima-Kinkowan JNG promotion council communicated with the Disaster Prevention Department and local communities in the process of making the card game. Basic information about Sakurajima, lessons from the past eruptions and evacuation plans were included. The Geopark staff members introduce the game at public lectures and disaster drills. The game aims to raise awareness among the participants of Geohazards and necessary preparations. The program involves many people regardless of age and encourages every single person to evacuate in the face of a possible huge eruption.

Keywords: Education, Volcano, Card Game.
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A GEOPARK ADVENTURE TOUR INITIATIVE IN TOYA-USU UNESCO GLOBAL GEOPARK, JAPAN

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Last year the Adventure Travel World Summit was held in Sapporo, Hokkaido. The summit focused on a new travel style that utilizes nature and culture emphasizing not only traveller satisfaction but also consideration for the local economy and environment. As a consequence the Geopark Promotion Council is planning to establish a 'Geopark Adventure Tour' as a day trip.

Mt.Usu is an active volcano and access has been restricted since an eruption from 1977 to 1978. Recently, as part of disaster reduction education, there has been a movement to re-open it as a tourism resource and a trial for guided tours has been proposed. Since 2022, three meetings have been held to consider the use of guided tours advancing the need for safety measures and tour training courses.

In October 2023 three monitored tours were conducted each with 15 participants. They targeted the old National Route 230, Mt.Ousu climb, and the Usu Volcano Crater Plain.

Twenty-three warning signs have been installed for climbers and measures are being taken against unauthorized entries. From 2025 year a system will be established where guides meeting certain requirements will be listed.

The utilization of Mt.Usu as a tourism resource is expected to contribute to the revitalization of the local economy and the promotion of disaster reduction education. The proposed 'Geopark Adventure Tour' is planned for 16 times in summer and 6 in winter and will include not only the restricted area of the Mt.Usu but also Jomon ruins and Lake Toya.

Keywords: Japan, Mt Usu, volcano tourism, adventure travel
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AN INTEGRATED INTERPRETATION AND PROMOTION OF AN INTERNATIONAL-VALUE GEOSITE AT PSILORITIS UGGP IN CRETE, GREECE: THE NIDA PLATEAU

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One of the most important from the scientific, natural and cultural points of view geosite and one of the most popular in Psiloritis UGGp is the Nida plateau, located at Psiloritis mts at a mean altitude of 1360m. It is a large karstic depression formed along a large detachment fault that separates high pressure metamorphosed marbles from un-metamorphosed carbonate rocks. The fault itself and the occurrence of meta-flysch between the two nappes create the hydrological conditions for many water appearances. In addition, a large and active normal fault delineates the western boarders of the plateau with the mountain peaks and exposes at the surface the Idaion Antro cave, which appears to be one of the most important worship places of the island of Crete since the neolithic era. Today, the main human activity in the plateau is livestock-farming, with several *mitata* (dry-stone shelters) of the shepherds "hidden" in the countless nooks and crannies of the plateau. All these physical and cultural traits along with local myths and stories inspire local and international artists to create poems, songs or even open-air sculptures referring to it. Psiloritis UGGp has created many tools for the promotion and interpretation of this geosite. In terms of visibility and promotion, information and interpretation signage is present in many parts of the plateau, as well as along the geotrail that follows its margin, and a new view and interpretation point has been established. Through the respective informative material and during presentations and field visits for diverse audiences, multiple traits of Nida's geo- and bio- diversity are equally presented. For the enhancement of Nida's cultural heritage (tangible and intangible), story boxes for local myths, *mantinades* (Cretan rhymes) and traditional songs have been incorporated on material used during educational activities, nature walks and outreach events. Digital tools have also been created with the production of a short video focusing on Nida and, more impressively, virtual reality tours have been developed to increase the outreach potential but also accessibility to the geosite.

Keywords: Nida Plateau, doline, karst, virtual tour, Psiloritis, Crete
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A SURVEY OF GEOSITES AND HUMAN LANDSCAPES IN LEIQIONG UNESCO GLOBAL GEOPARK, CHINA

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In order to promote the sustainable economic development of Leiqiong UNESCO Global Geopark, a survey of geosites and human landscapes have been carried out in the region. The survey encompassed a total of 87 geosites, which included 54 newly discovered sites, along with 54 sites of natural and human landscapes. Through investigation, analysis, and comparison, the number and type of geosites in Leiqiong have been significantly increased. The basic information such as the distribution location, preservation status and characteristic parameters have been greatly enriched. The genesis, development and changes of the geosites have been better acquired. Geosites are more fully integrated with natural and human-made elements. The scientific and aesthetic values of geosite resources have been further enhanced. The survey results provide valuable information for geological science popularization, geosite protection and tourism development for Leiqiong.

Keywords: Geosite Survey, Science Popularization of Geology, Geosite Protection, Tourism Development, Sustainable Development.
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CARBONATES RESOURCES INVENTORY OF PALEOZOIC IN TABAS UNESCO GLOBAL GEOPARK (IRAN); SCIENTIFIC AND GEOTOURISTIC VALUES

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The Tabas UNESCO Global Geopark (UGGp), covering an area of 22,771 km², became the third UGGp in Iran and was joined to the GGN in 2023. It is located in the Central-East Iranian Microcontinent (CEIM) zone. This Geopark is rich in cultural, historical, and especially geological attractions and presents a remarkable array of sedimentary rocks from the Precambrian to Quaternary. In particular, it has the most complete succession of Paleozoic sedimentary rocks in Iran and West Asia, along with significant Mesozoic deposits. Key evidence for three major Paleozoic extinction events (Ordovician-Silurian, Late Devonian, and Permian-Triassic) is prominent throughout the region. Also, the most continuous Cambrian-Ordovician boundary in Iran is located in this Geopark. Due to these features, this region of Iran is considered as a very important treasure and reference. The Geological Paradise and Fossil Museum of Iran is the name given to this area by geological thinkers and scientists.

Paleozoic outcrops, particularly carbonate rocks ranging from the Cambrian to the Permian, cover a large area of the Geopark. These formations are of exceptional quality and resolution, revealing the geological history of the ancient supercontinent of Gondwana and the Paleotethys Ocean. The diversity of fossil species - including stromatolites, trilobites, brachiopods, corals, and types of microfossils, especially foraminifera, trace fossils, etc., along with unique geomorphological features such as valleys and escarpments, lithologic and facies differences, biological extinctions and ancient unconformities, are some of the prominent features of Paleozoic carbonate rocks in this UGGp. In addition, the karst landscapes formed from these carbonate rocks contribute to the biodiversity of the region, karst aquifers, springs, and valleys support various plant species and allow recreational activities such as rock climbing.

The rich scientific and geotouristic assets of the Tabas UGGp offer significant opportunities for geoconservation and the development of sustainable tourism initiatives. This study aims to highlight the geological treasures of the Geopark (especially the Paleozoic carbonate rocks), promoting both scientific research and tourism development.

Keywords: Tabas UGGp, Tabas Geopark, Iranian Geoparks, Geotourism.
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DISCUSSION ON THE EXPLORATION OF NATURAL AND CULTURAL VALUE OF THE XIANGXI UNESCO GLOBAL GEOPARK

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The Xiangxi UNESCO Global Geopark is located in Xiangxi Tujia and Miao Autonomous Prefecture in Hunan Province, China, covering a total area of 2,710 km². The geopark lies on the marginal slope in the east of Yunnan-Guizhou Karst Plateau. It is noted for the two GSSPs in the Cambrian system-the GSSP for Guzhangian Stage and the GSSP for Paibian Stage. The geopark also features some geosites, including the world's largest red carbonate rock Stone Forest and spectacular plateau incised platform-canyon group. The geopark's traditional ethnic minority culture perfectly combines with the natural ecology of platform-canyon to form a beautiful and harmonious living environment.

Natural culture refers to a series of cultural phenomena triggered by natural landscapes that exhibit unique charm in terms of resource utilization and artistic appreciation. Its value is reflected in four aspects: aesthetic, educational, ecological, and economic values. Exploring the values of natural culture can help geoparks accurately define the positioning of their resources and develop geo-tourism with a targeted approach. The Xiangxi UNESCO Global Geopark is rich in natural cultural landscapes, which can be categorized into three types: geosites, ecological resources, and cultural heritage. The geopark's administration enhances the exploration of natural cultural values to achieve its sustainable development by improving infrastructure, strengthening science popularization, and deepening scientific research about the geopark.

Keywords: Xiangxi UNESCO Global Geopark, natural and cultural value, exploration, sustainable development.
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EFFORTS TO CONSERVE AND UTILISE SEAMOUNT-TYPE LIMESTONE AT MINÉ-AKIYOSHIDAI KARST PLATEAU GEOPARK, JAPAN

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Miné-Akiyoshidai Karst Plateau Geopark is located in western Japan and is a basin area surrounded by mountains with a maximum elevation of 700 metres. It was certified as a Japanese geopark in 2015, and is working towards being certified as a UNESCO Global Geopark.

The geopark has an area of 472 square kilometres, of which approximately 100 square kilometres is Upper Carboniferous to Permian limestone. This limestone formed from coral reefs that grew on the top of seamounts near hotspots far from the land. As a result, sediment from the land did not mix with the coral reefs, which produced limestone with highly pure calcium carbonate. The limestone of the geopark area is significantly unique and valuable geologically, particularly since the coral reefs did not become part of the Earth's deep interior when the oceanic plate reached the trench, but accreted on to the continent and later became exposed on the surface.

The geopark has made efforts to both conserve and utilise this limestone for sustainable tourism. Part of the eastern side of the karst plateau is registered as a Special Natural Monument, and the limestone is conserved according to plans such as the Conservation and Utilisation Plan. Demonstration experiments that address the vegetation which is thriving inside caves due to artificial lighting are being conducted in line with this plan.

A key aspect of the geopark's sustainable tourism initiatives is geotours, where local residents who have received training as geoguides conduct educational tours of the geopark. In the most popular geotour, participants are taken to view limestone (marble) that is used as stone material and the open-pit mining of limestone from a distance, and are asked questions that encourage them to consider how to strike a balance between conserving and utilising limestone. Participants can take part in such geotours at the geopark’s information centre without booking in advance, which makes it easy for all kinds of tourists to learn about and consider how we can protect and utilise geological heritage together.

Keywords: Miné-Akiyoshidai Karst Plateau Geopark, limestone, sustainable tourism, conservation
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EMPOWERING COMMUNITIES FOR SUSTAINABLE BEEKEEPING OF TRIGONA HONEY IN TANJUNG KELAYANG RESERVES

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Trigona honey, known locally as "Madu Teran" in Belitung, is a notable product sourced from stingless bees of the genus *Heterotrigona*. Renowned for its distinctive flavor profiles and health benefits, this honey sets itself apart from conventional honey produced by traditional honeybees. A particular case is the Trigona honey produced in the biodiverse setting of Tanjung Kelayang Reserve, where the bees forage on nectar from a variety of native flowers. This foraging process results in honey with diverse flavor profiles, influenced by the nectar sources. For instance, honey with a bitter taste typically originates from the "Pelawan" tree (*Tristaniopsis sp*), while sweeter honey comes from the "Mentepongan" tree (*Vernonia arborea*). Citrus notes are imparted by trees in the Myrtaceae family, such as the Samak tree (*Syzygium urceolatum*). Seasonal variations in flowering cycles contribute to the flavor diversity of Trigona honey throughout the year. The bees, being smaller and without stingers, not only make handling easier but also foster sustainable beekeeping practices. The development of Trigona honey within the Tanjung Kelayang Reserve highlights a collaborative effort between the Reserve and the local community, aimed at enhancing local livelihood and promoting environmental stewardship. Historically, honey production involved harvesting nests from felled tree trunks. Our initiative, however, uses reclaimed wood, thereby reducing environmental impact and emphasizing material reuse. This shift underscores a strong commitment to sustainable practices. The integration of traditional and sustainable methods is vital for the local economy within the reserve, showcasing innovative beekeeping practices that align with both ecological and economic objectives. Beekeepers, organized into cooperatives, apply traditional techniques to manage bee colonies, ensuring their health and productivity while conserving essential habitats. The use of reclaimed wood and “Resaman” straw, a fern stem from *Dicranopteris linearis*, helps maintain a low carbon footprint and supports biodiversity conservation. This approach benefits both the environment and the local economy by utilizing native materials and vegetation. Combining traditional beekeeping practices with modern sustainability efforts is crucial for ensuring high-quality honey production while supporting environmental conservation and local community development.

Keywords: Trigona honey, stingless bees, sustainable beekeeping, Tanjung Kelayang Reserve, reclaimed wood, resaman straw, UNESCO Global Geopark, Natural Site, environmental conservation.
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GEOCONSERVATION IN THE LESVOS PETRIFIED FOREST - LESVOS ISLAND UNESCO GLOBAL GEOPARK, GREECE

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The Petrified Forest of Lesvos is a unique natural monument formed 20 million years ago due to the intensive volcanic activity in the North Eastern Aegean area and consists the main geological heritage feature of international significance for the recognition of Lesvos island as a UNESCO Global Geopark (2000, 2012, 2015). The protected area of the Lesvos petrified forest covers an area of 15.000 ha located in the western part of Lesvos island, Greece.

The Natural History Museum of the Lesvos Petrified Forest, is a public institution aiming the protection and rational management of the Lesvos Petrified Forest and is the body responsible for the operation of the Lesvos island UNESCO Global Geopark.

Rescue excavations are conducted by the Museum in the protected area of the Lesvos Petrified forest in case of fossil findings during the construction of public and private works. During the last decade a new road is constructed connecting Kalloni with Sigri which is the westernmost village of the Island, crossing the protected area of the Lesvos petrified forest. During the construction of this new road, a large number of astonishing fossil sites with impressive fossilized tree trunks have been unearthed, which lay on the verge of the road. The Museum in collaboration with the Ministry of Public Works took all the necessary measures changing the road construction plan, to secure the preservation of the most significant fossil sites along the road.

The rescue excavations along the Kalloni-Sigri road revealed a huge number of leaf macro-remains. More than 15 fossil sites where mass-occurrences have been unearthed from the volcanic rocks of the area, rendering the Petrified Forest among Europe's richest fossil floras. In particular, numerous leaf impressions from several plant fossiliferous outcrops have been found, the characteristic morphotypes of the studied plant assemblages have been described and the palaeoecological interpretations of the identified taxa have been evaluated.

The Museum implemented a comprehensive plan to enhance the new fossil sites, to protect them and to create new visiting parks along the Kalloni-Sigri road. This geoconservation plan includes a series of interventions for the protection of the improvement of the accessibility to the fossiliferous sites, interpretation and information, signage and infrastructure for visitor services. The various fossiliferous sites along the Kalloni-Sigri road, are now part of a new open air museum, unique in the world, which will offer to the Lesvos Geopark visitors a new geotouristic attraction. In addition to various awareness raising activities, a new campaign entitled "Walk the Forest" introduces the new petrified forest parks to the public. The project is funded by the Regional Operational Program "North Aegean 2014-2020".

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GEOHERITAGE MANAGEMENT IN KOREA: A DECADE OF PROGRESS AND FUTURE DIRECTIONS

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Geoheritage documentation in Korea began in 2014 with a nationwide survey to create an inventory of geoheritage sites. This initiative, led by the National Geopark Secretariat and funded by the Ministry of Environment (MoE), aimed to support geoparks. Over the past decade, 1,004 sites on the mainland and Jeju Island have been registered, with approximately 400 additional sites expected by 2025 after completing the survey of inhabited islands. The documented geoheritage is compiled into a GIS database providing online services that display each site's spatial distribution and current ratings. The geoheritage database also serves as a resource for e-books to raise public awareness about geoconservation and geotourism. The geoheritage evaluation system includes three modules: fundamental value, associated value, and institutional conditions, totaling 20 criteria. The fundamental value module covers scientific, educational, and scenic value. The associated value module addresses ecological, economic, historical, and cultural significance, while institutional conditions focus on accessibility, infrastructure quality, and legal status. Although all criteria are assessed in the field, only the fundamental value criteria are used to evaluate geoheritage on a five-grade scale, emphasizing geological value. Despite the inventory system's development, the legal framework has not been adequately enforced. From a managerial perspective, the current system lacks criteria to indicate degradation risk from natural and anthropogenic factors. To address these issues, a diagnostic chart was created to assess management priority based on geoheritage value and degradation risk, along with legislative efforts to support geoheritage management and conservation. In 2024, efforts will focus on developing a monitoring protocol for the wise use and better conservation of geoheritage within geoparks.

Keywords: Geoheritage, Geoconservation, Korea Geoparks, Diagnostic chart
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GEOLOGICAL HERITAGE IN UNESCO'S WORLD HERITAGE LIST

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The UNESCO World Heritage Convention (WHC), established in 1972, aims to protect and conserve cultural and natural heritage of outstanding universal value (OUV). Properties nominated for inscription on the World Heritage List must demonstrate OUV and meet at least one of ten criteria. The importance of geological values with respect to global heritage was recognized early on and is specifically outlined in criterion (viii). The Advisory Bodies of UNESCO evaluate nominated properties, including geological ones, with input, in this case, from the International Union of Geological Sciences (IUGS). A systematic analysis of geoheritage properties on the list reveals marked trends and patterns, highlighting a persistent geographic imbalance, along with a predominance of aesthetic aspects of abiotic nature, with less emphasis on less evident geological themes. Thus, the more visual aspects of geology prevailed in the selection of geoheritage properties. In this way, geological heritage in the WHC remains subordinated to landscape aesthetics and ecological aspects, and there is a striking concentration of properties (50%) in Europe and North America. While only seven properties from the World Heritage List coincide with a UNESCO Global Geopark (UGGps). The rise of the UGGps program signals a shift towards greater recognition and conservation of geological heritage at both community and international levels.

Keywords: Geoheritage; Natural heritage; UNESCO Global Geoparks; Global North-Global South inequalities; Aesthetics.

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GEOLOGICAL HERITAGE OF INTERNATIONAL SIGNIFICANCE IN THE LANG SON ASPIRING UNESCO GLOBAL GEOPARK

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Many researches and surveys have been carried out in the area of the Lang Son aspiring UNESCO Global Geopark, but it was not until around 2021-2023 when a comprehensive inventory of heritage, including geological, biological and cultural (both tangible and intangible), was conducted. Hundreds of sites have been identified, which enabled the demonstration of geological heritage of international significance of, and the distinction between Lang Son Geopark and the two existing Dong Van and Non Nuoc Cao Bang UNESCO Global Geoparks in the neighbouring provinces of Ha Giang and Cao Bang in the same northeastern region of Vietnam. Among the geological heritage of international significance, most noteworthy are: 1). A complete Phanerozoic (especially MZ-KZ) history of geological evolution, which is illustrated by the abundant, diverse and successive complexes of rock types (terrigenous, igneous, carbonate, metamorphic) and fossils of different origins and ages; 2). Existence of the Na Duong pull-apart depression, which is considered "an exceptional window into Eocene ecosystems from Southeast Asia", "a key for understanding Paleogene basin evolution...", possessing a very rich and diverse complexes of faunas, including both vertebrates and invertebrates, and floras, representative of tropical forest riverine-lacustrine-swampy paleo-environment of the Late Eocene and thereafter; and 3). A large limestone area, whose special location facilitated particularly strong karstification, which, in turn, made the area the earliest cradle of ancient humans (*Homo erectus*) in Vietnam since c.500 kya and continuously thereafter till the present-day. The article provides some insights into these heritage values.

Keywords: Phanerozoic, geological evolution, pull-apart depression, faunas and floras, karst, ancient humans.
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GEOPARK MODEL IN VIETNAM - VIEW FROM THE DONG VAN KARST PLATEAU GLOBAL GEOPARK

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Dong Van Karst Plateau Global Geopark, a member of the Global Geopark Network, stands as a model for effective geopark management and sustainable development. Located in Ha Giang province, Vietnam, this geopark has significantly contributed to the cultural and economic development of the region, particularly across the four mountainous districts of Quan Ba, Yen Minh, Meo Vac, and Dong Van. Since its establishment, the Geopark has fostered community development, improved livelihoods, and preserved cultural heritage. Biodiversity conservation is one of the priorities, with policies implemented to protect the Geopark's natural heritage. The balance between conservation and exploitation activities remains a focal point, particularly in relation to local communities' awareness and interaction with heritage conservation and tourism development.

However, the Geopark faces several challenges that need addressing. Coordination among management agencies requires improvement to better align development and conservation efforts. Illegal construction and stone mining pose significant threats to the natural landscape, while tourism services and community engagement need enhancement for sustainable tourism. Additionally, the Geopark is vulnerable to natural disasters such as landslides, flash floods, and erosion, which pose significant risks to its infrastructure and heritage sites. The overlapping and unclear regulations further complicate management, highlighting the need for a unified legal approach.

The lessons learned from Dong Van Karst Plateau emphasize the potential of sustainable tourism, particularly community-based tourism, to drive economic growth while preserving natural and cultural heritage. The implementation of effective conservation strategies is contingent upon the allocation of sufficient financial resources towards the development of requisite infrastructure, the provision of social security policies, and ensuring active involvement of communities and international organizations. Integrating conservation efforts with broader socio-economic policies ensures that development is sustainable and that benefits are long-term. In conclusion, Dong Van Karst Plateau's success in combining biodiversity conservation with socio-economic growth offers a blueprint for other regions. It also underscores the need for a consistent legal framework, the prioritization of ecotourism, and the mobilization of diverse funding sources. Strengthening international partnerships will further enhance conservation practices and support sustainable development across Vietnam's geoparks.

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GEOPARK RESEARCH – WHAT, WHY AND WHERE?

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Given our busy lives in developing and managing geoparks it's important to be reminded of the place of research in the quest for sustainability. In this presentation the 'What', 'Why' and 'Where' questions of geopark research are emphasised so we can gain an appreciation of what has recently been completed in the Asia-Pacific region. We can then reflect on what remains to be done. Allied to the 'What' question is a consideration of the complexity that surrounds geopark research and the relationship of geoparks to geotourism, as specified in the main dimensions and extended content of geotourism as proposed by (Newsome and Ladd (2022). Furthermore, Chen et al., (2020) give particular importance to geopark research in the areas of geoheritage, environmental protection, sustainable use and interpretation for the popularization of geology. In emphasizing the 'Why' of geopark research a selection of geotourism destinations are profiled and consideration is given to research questions surrounding effective management and protection of geoheritage. It is important to re-visit the various approaches we take to the marketing of geoparks, the situations that mitigate sustainability in geoparks and consider the rise of inappropriate recreational activities taking place in some geoparks. Chen et al., (2020) also highlight that it is important to share the research we undertake so that we can learn from each other, undertake comparative studies and facilitate the popularization of geoheritage. This is achieved via publication of scientific research results, but today there are hundreds, if not, thousands of journals to choose from. We increasingly must navigate through a literature that is constantly expanding and that contains a mix of the 'geo', 'park' and 'tourism' components of geopark research. Accordingly, the 'what', 'why' and 'where' of geopark research is explored in the context of where you could place your research to promote sharing and promote the visibility that all geopark science needs.

Keywords: Geopark, Research, Sustainability, Publishing
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GEOTOURISM AND REGENERATIVE INITIATIVES IN BOHOL ISLAND GEOPARK, PHILIPPINES: CULTIVATING STEWARDSHIP AND SUSTAINABILITY

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Bohol Island is recognized as the first UNESCO Global Geopark in the Philippines. It is a pioneering example of the harmonious integration of geotourism and regenerative development. The Geopark's initiatives emphasize the conservation of its unique geological formations, such as the Chocolate Hills, Danajon Double Barrier Reef and Alicia Schist. At the same time it promotes sustainable tourism practices which bolster the local economy as well as the preservation of its cultural heritage.

The core of Bohol's strategy is its commitment to becoming a regenerative island, integrating Nature-based Solutions (NbS), revitalize the island's natural ecosystems and enhance resilience to climate change. These efforts include integration of a wide range of regenerative practices such as watershed restoration, regenerative agriculture and active restoration of critical habitats which not only contribute to environmental recovery but also provide new avenues for educational and immersive ecotourism and regenerative tourism opportunities. Additionally, Bohol UGGp has developed thematic geotrails that engage visitors and educate them on the significance of geological heritage and environmental stewardship.

Through a blend of traditional knowledge, innovative practices and stakeholder collaboration, Bohol Island Geopark exemplifies a holistic approach to geotourism. This approach not only attracts visitors but also ensures that tourism activities contribute positively to the environment and local communities. This is setting a precedent for other regions in the country aiming to balance development with ecological integrity. The challenges met with this approach are being addressed through collaborative governance and nature based solutions positioning Bohol as a living model of sustainable geotourism and regenerative development.

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INVENTORY AND GEOLOGICAL SIGNIFICANCE OF GEOHERITAGE IN ARXAN UNESCO GLOBAL GEOPARK, CHINA

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The scientific classification and characterization of geoheritage is the premise and foundation of rational utilization and protection of geoheritage. Arxan UNESCO Global Geopark has distinctive and extremely rich geoheritage, which has high tourism value and certain geological research significance. Based on the geological survey and evaluation of the geoheritage, the authors divided the geoheritage resources into two categories: geomorphological landscape and water landscape; 6 categories: volcanic landform, rock landform, fluvial landform, structural landform, and spring water landscape; 9 subcategories: volcanic institutions, volcanic lava landforms, volcanic lakes, granite landforms, fluvial erosion landforms, fluvial accumulation landforms, structural landforms, hot springs, and scenic river sections, 47 geosites in total. Among them, volcanic landforms and hot spring landscapes are of great significance in the comparative analysis of global geoheritage. Studies have shown that the geoheritage of Arxan UNESCO Global Geopark have important scientific value in the fields of geomorphology, hydrogeology and geotourism. It provides a scientific basis for the protection of geoheritage and tourism route planning, and promote the sustainable development of geoscience research, science popularization and geoscience tourism in Arxan UNESCO Global Geopark.

Keywords: volcanic landform; geoheritage; geological significance; Global Geopark; Arxan

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NEW HERITAGE DISCOVERIES IN DAK NONG UGGP AND THEIR SCIENTIFIC AND PRACTICAL SIGNIFICANCES

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Dak Nong UGGp was designated in 2020 and is the third UGGp in Vietnam, after Dong Van Karst Plateau UGGp - in 2010, and Non Nuoc Cao Bang UGGp - in 2018. The Geopark contains heritage values of volcanic geology, including a unique volcanic cave system and other outstanding heritage values.

In order to further explore the scientific values and provide more and more tourism resources and products for the Geopark, a number of new heritage sites - both geological and non-geological - have been continuously discovered and added to the heritage inventory of Dak Nong UGGp from 2020 up to the present.

Some typical new heritage sites will be introduced in the article, including:

1. Geological heritage:

- A new palaeontology heritage site contains ammonite fossils in the Dak Nang area, Dak Som commune, Dak Long district in the southern part of the Geopark. It was discovered on March 23, 2024;
- T66 Lava Cave is a new unique primary volcanic cave full of typical lava formations. It was discovered on June 6, 2021;
- T22 Cave is a new secondary cave that was discovered on April 22, 2022, in the boundary between sedimentary rock and basaltic rocks;
- Ta Dung 1 Cave is a new secondary type of cave in basaltic rocks. It was discovered on April 22, 2023;
- Silver Star Cave contains many unique lava formations that have never been found before in the Geopark. It was discovered and explored for the first time on March 24, 2024.

2. Non-geological heritage:

On the archaeological side, we have discovered a number of paleolithic tools, and prehistoric pottery scattered around the Krongno area. An archaeological site was selected and excavated in April 2024. The site was considered equivalent to the Hoa Binh culture in the northern of Vietnam, estimated to be 10,000 years old. In addition, prehistoric artifacts were found in Ta Dung 1 Cave and the adjacent areas. They are reliable archaeological evidences, that provide a picture of the prehistoric period of the human community living in the Geopark.

All the above new heritage discoveries – geological and non-geological heritage - in Dak Nong UGGp contribute to the heritage inventory of the Geopark and promote scientific research, making it more and more diversified. They also provide new tourism resources and products for the socio-economic sustainable development of the Geopark.

More details of the new heritage discoveries will be provided later.

Keywords: geological heritage; volcanic cave; palaeontology heritage; non-geological heritage; paleo-lithic; prehistoric; artefact.

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PROGRESS AND ACHIEVEMENTS OF SUSTAINABLE DEVELOPMENT OF FUNIUSHAN UNESCO GLOBAL GEOPARK, CHINA

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In recent years, Funiushan UNESCO Global Geopark, China always adhered to the principle of "Priority to Conservation, Utilization with rationality", and fully played to the functions of "Protecting the eco-environment and geoheritages, popularizing the geological knowledge, promoting the local economic development and enhancing the international exchanges and cooperation", which actively promoted its sustainable development in various aspects. Firstly, the Geopark constantly strengthened the protection of geoheritages and carried out the prevention and control of geoharizards. Secondly, Funiushan UGGp promoted the geotourism in all aspects through various sustainable geotourism measures to attract the tourists for improving the economic level of local residents and promoting the sustainable development of the local economy. Thirdly, during the significant science popularization days, the Geopark carried out a series of activities such as science education and lectures in schools, as well as live broadcasts to expand the influences of the Geopark. Fourthly, we actively participated in the conferences organized by UNESCO, GGN, APGN, etc. to deeply exchange with other geoparks and establish the sister geoparks with them, which greatly enhanced the visibility and influence of the Funiushan UGGp.

Keywords: Geoheritages, Geotourism, Prevention and control of geohazards, sustainable development
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PROMOTING SAM SIB SANG GEOSITE OF KHORAT UNESCO GLOBAL GEOPARK, TO COMMUNITIES AND PUBLIC AS A GEOEDUCATION AND GEOTOURISM

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The Sam Sib Sang (SSS) Hill geoheritage, the geosite (KR27) of the Khorat UNESCO global geopark, is a significant part of the inner row of cuesta range within this renowned geopark. It also holds rich historical significance, serving as a prominent cultural and natural resource for the communities for decades. From the year 2023 to 2024, the Department of Mineral Resources, Ministry of Natural Resources and Environment, carry out the community-based tourism support project. This project, the tourism income boosting integration plan year 2024 in collaboration with Khorat UGGp and communities, aims to propagate the knowledge on geology and geopark of the area and to plan tourism development at SSS hill guideline and boosting up to reach tourism standard. During the investigation by field surveying, various forms of potholes were found according to the strength and direction of the stream current. Pothole sets were found from three major elevations with different hole dimensions. The new knowledge gained will elevate the significance of the geosite from a local to a national level. Additionally, studying geodiversity for geosite inventory improvement is a vital tool for advancing geoconservation efforts and promoting geotourism. Further collaboration among partners is vital to inventing this geoheritage to promote sustainable living with this geoheritage site to meet the SDGs.

Keywords: Multilevel partner cooperation, pothole landform, Phu Phan Formation, early Cretaceous, Khorat UGGp
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REVIEW OF SHILIN UNESCO GLOBAL GEOPARK'S PROTECTION AND DEVELOPMENT DURING THE PAST 20 YEARS

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The stone forests of Shilin UGGp represent spectacular example of subtropical karst landscapes worldwide. Over the past 270 million years carbonate rock (Permian Period) formed in the ocean has been shaped into “stone forest” (pinnacle karst). And Shilin area experienced a vicissitude from sea to land and from lowland to plateau due to tectonic movements. During the evolution it was covered by volcanic lava and lake water and was re-exposed; in this sense the stone forest of Shilin is truly a geologic legend in the world.

20 years’ building makes Shilin a paragon of geopark protection as follows: an legal management body was set up for daily protection and management; implemented relevant national laws and regulations and issued local regulations to further strengthen protection; implemented smart tourism projects, installing satellite monitoring and protection systems for efficient management; full-time patrol team was established to prevent geoheritage from being misused and damaged; set up a four-tier resource protection system of county-bureau-township-village to have stakeholders involved in the Geopark protection; increased awareness by website, brochures and panels; conducted rocky desertification control projects to make Shilin greener, and so on.

Because of its significant scientific and aesthetic value, Shilin was approved as a WHS, one of the first 100 IUGS Geological Heritage Site, national science popularization base, all-for-one tourism demonstration zone of China, national civilized tourism area, etc. Billions of ticket income contributes to local economic growth and improved people’s livelihood. Geopark international training course and WHS international forum were hosted to share our experience. Tourism cultural and creative products are created to promote local culture. More regular events make the visitors have more enjoyable experience.

In brief, Shilin, a perfect example of geopark protection and development after 20 years’ building and operation.

Keywords: protection, development, sustainable use
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SALT AND SALT UTILIZATION FOR THE GEOLOGICAL HERITAGE SUSTAINABLE USE IN KHORAT UNESCO GLOBAL GEOPARK, THAILAND

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Phan Dung Subdistrict is in the north of the Khorat UNESCO Global Geopark, Thailand. Most of the area is covered by salt-affected soils due to being influenced by thick beds of rock salt as a baseline underground in between mainly sandstones, and siltstones. It affects the growth and yield of crops. During the rainy season, many of the low-lying areas are flooded. Then, during the dry season, the water table drops, and salt seeps up through the soil, crystallizing on the surface in exposed areas with little or no vegetation. Villagers then collect these mixed sediments and leach out the salt for personal use and subsistence, or occasionally as trade goods, barter, or an additional source of income. An ancient traditional method of salt production has been transferred from generation to generation.

About 10 tons of salt are produced annually by 7 families using their traditional methods and started from January to April under the supervision of the Phan Dung Subdistrict Municipality. In 2020, Khorat UGGp formally established a partnership with the Phan Dung Subdistrict Municipality to promote and raise awareness about the sustainable use of the area's geological heritage. The local knowledge, living heritage, and traditional salt production methods were reintroduced, integrated, and promoted to the public through public education activities, field visits, exhibitions, trainings, workshops, etc., and ensured that all activities aligned with the Sustainable Development Goals, especially ending poverty (SDG1), promoting well-being (SDG3), promoting lifelong learning (SDG 4), ensuring that women and men, and girls and boys, enjoy equal rights, resources, opportunities and protection (SDG5), and protecting, restoring and promoting sustainable use of terrestrial ecosystems (SDG15).

The Phan Dung Subdistrict Municipality, Khorat UGGp, and partners have taken more than 3 years to implement, collaborate, and promote the sustainable use of the geological heritage by establishing the local community enterprise called *"Phan Dung's Salt and Local Herbs Korat Geopark Community Enterprise"* which is led by local people. About 180,000 baht ($5,200) in cash and in-kind support was provided for infrastructure, equipment, and activities to make it a reality. More than 2,000 visitors and 80 % were students. Visitors were impressed and left positive feedback. The local community felt hopeful and saw an opportunity to improve their lives. There were many challenges and difficulties but the key that keeps us going is "The Hometown Pride".

Keywords: Salt, Geological heritage sustainable use, Khorat UNESCO Global Geopark, Home pride model, Phan Dung Subdistrict Municipality.
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SIGNIFICANCE OF TOTALLY PROTECTED AREAS INSIDE THE SARAWAK DELTA GEOPARK

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The Sarawak Delta Geopark (SDGp), situated on Borneo's island, is a region where unique ecological and geological features converge. This paper examines the essential role of Totally Protected Areas (TPAs) within the SDGp, which are vital for conserving biodiversity, maintaining ecological balance, and preserving cultural heritage. Key TPAs like Santubong National Park, Bako National Park, and Talang-Satang National Park serve as sanctuaries for rare and endemic species and offer valuable insights into Earth's geological history, while also safeguarding sites of cultural and historical significance.

The management of these areas is driven by collaboration among government bodies, local communities, and non-governmental organizations, emphasizing legal protection, community engagement, and sustainable tourism. Despite environmental threats, resource limitations, and balancing development with conservation, TPAs provide opportunities for scientific research, innovation in conservation technologies, and building international partnerships.

This paper emphasizes the need for continuous collaboration and innovative strategies to ensure the long-term protection of the SDGp's TPAs. By enhancing management practices and fostering global cooperation, these areas can continue to play a critical role in biodiversity conservation, cultural preservation, and sustainable development, benefiting future generations.

Keywords: Sarawak Delta Geopark (SDGp), Totally Protected Areas (TPAs), biodiversity conservation, ecological balance, cultural heritage, community engagement, sustainable tourism and conservation strategies.
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SITES OF GEOLOGICAL INTEREST DEVELOPMENT IN MALAYSIA'S GEOPARKS: CHALLENGES AND OPPORTUNITIES

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Inventory and mapping are crucial for identifying and characterizing internationally significant geological heritage sites, which are essential for their conservation and sustainable use. In Malaysia, geoparks like Langkawi and Kinabalu showcase the nation's rich geological diversity, attracting local and international tourists. However, the development of these sites presents challenges and opportunities. One of the main challenges is inadequate geological mapping and delineation, which hinders conservation efforts and sustainable utilization. Development pressures from tourism, infrastructure expansion, and urbanisation also stress these fragile ecosystems, leading to potential degradation of geological features. Limited public awareness and understanding of the significance of geological heritage also pose a challenge. Resource constraints, including funding shortages and a lack of trained professionals, exacerbate these challenges. Natural threats like erosion, climate change, and biodiversity loss further complicate the conservation landscape. To enhance the development of geological sites within Malaysia's geoparks, a comprehensive geological heritage database can be established, facilitating better mapping and documentation of geological sites. Promoting geotourism can drive economic development and conservation efforts, while educational programs can raise public awareness about geological heritage. Seeking international recognition for Malaysia's geoparks can attract funding, expertise, and collaborative partnerships, strengthening conservation efforts. By leveraging these opportunities, Malaysia can enhance its geological heritage conservation efforts and promote sustainable development.

Keywords: mapping, heritage site, conservation, geotourism, sustainable development
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THE POTENTIAL OF MARINE ARCHEOLOGY AS A SUPPORTING CULTURAL HERITAGE AND SUSTAINABLE USE IN BELITONG UNESCO GLOBAL GEOPARK

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Belitong Unesco Global Geopark is an island area located at maritime international trade, called Nusantara Spice Route for trading from China and Europe passing through the Sunda Strait. Therefore it was a stopover place for international ships. Many ships eventually drowned around the waters of Belitong Island. Factors causing the sinking of this ship include natural factors such as bad weather which caused the ship to crashed into a coral reef, and human factors including the presence of pirates, war and overloading. According to Reserch Centre of Marine Affairs and Fisheries Ministry in 2004, 60 of 463 spots of historical shipwreck sites have been indentified located in water of Bangka Belitung islands. This research is aiming to explore/updating maritime archaelogy site and create policies for the management and protection of Shipwreck sites to support cultural heritage for Belitong Unesco Global Geopark. Data collection is performed through historical archieve studies and literatures, field surveys, and interviews. Field surveys were conducted using underwater acoustic equipment, consisting of bathymetry and side scan sonar CHIRP with 450 kHz frequency and maximun scanning width of 200 meters. The results showed that there are marine archaeological potentials in 4 waters area which are around the waters of Keran, Memperak, Pekandis, long and Berlian Islands. This sites must be protected and preserved because of its high historical value. The Government has also collaborated together to create Marine Protection Area, especially for area that have shipwreck. Site Utilization can be directed to marine tourism or diving activities by developing local communities/ fishermen to be trained as supporting agents for tourism industry. The highly valued artifacts that vulnerable of commercial illegally looting will be excavated soon by the Indonesian Goverment. The artifacts will be stored and showed in Maritime Gallery as a cultural geopark site for Belitong Unesco Global Geopark and as an educational center for students, local people/community and tourists.

Keywords: Marine Archeoloy, Nusantara Spice Route, Marine Protection Area, Geopark.
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VIEWPOINT GEOSITES: KEY GEOSITES FOR INTERPRETATION IN GEOPARKS

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Recent research identifies viewpoint geosites as specific geosites that provide panoramic views of diverse geological features and landscapes. Despite their intrinsic and additional values, viewpoint geosites require evaluation and specific criteria for their optimal utilization. These geosites are invaluable for geotourism and geoeducation, as they facilitate understanding of the landscape, its history, and the interconnections among its components. Ideally, every georoute should include a viewpoint geosite, particularly at the starting point in geoparks. This study offers recommendations for enhancing the value of viewpoint geosites within Vietnamese geoparks.

Keywords: viewpoint geosite, geopark, geotourism

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THE VITAL ROLES OF TOTALLY PROTECTED AREAS IN CONSERVING GEOSITES AND BIOSITES IN SARAWAK DELTA GEOPARK

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The Sarawak Delta Geopark (SDGp) in East Malaysia, currently a National Geopark, aims to become a UNESCO Global Geopark by 2026. Covering 3112 square kilometres, it includes the districts of Kuching, Bau, Padawan, and Siburan. The geopark seeks to uplift local communities by conserving natural treasures, enhancing heritage-based tourism, and fostering economic development. It encompasses three primary heritages: geological, biological, and cultural. The geological heritage includes diverse rocks, minerals, fossils, landscapes, and geological processes, while the biological heritage features unique flora and fauna species. Cultural heritage encompasses tangible and intangible elements of local culture. Within SDGp, eleven Totally Protected Areas (TPAs) are designated, including six national parks, four nature reserves, and one wildlife sanctuary. These TPAs protected under the National Parks and Nature Reserves Ordinance 1998 and the Wild Life Protection Ordinance 1998, play a crucial role in preserving geological features and biodiversity. Geosites defined as geological site that uphold scientific, aesthetic, recreational, and cultural value, are key components of SDGp, with 27 identified sites contributing to education and tourism. Biosites serve as research and educational platforms, facilitating the study of flora and fauna, promoting ecosystem balance and raising conservation awareness. This paper underscores the importance of TPAs in safeguarding geological heritage, biodiversity and overall ecological well-being. It highlights the significance of government support, effective management strategies, and community involvement in ensuring the long-term sustainability and protection of these valuable assets within SDGp.

Keywords*:* Sarawak Delta Geopark, Totally Protected Areas, Geosites, Biosites
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PRESERVATION OF UNIQUE LOCAL CULTURE FOR FUTURE GENERATIONS: CULTURAL CONNECTION WITH VOLCANOES OF SAKURAJIMA-KINKOWAN GEOPARK

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In this presentation, I would like to introduce the unique "local culture" developed in Sakurajima-Kinkowan Geopark area and discuss the role of the Geopark in passing on valuable cultures to the next generation.

Sakurajima-Kinkowan Geopark is located in the Kyushu area, the southernmost part of Japan's main islands. Our Geopark encompasses Sakurajima, which is an active volcano, and Kinko Bay, which was formed by caldera eruption. The area's volcanic activity has significantly influenced local cultures.

At the center of our Geopark is Aira Caldera, which erupted about 30,000 years ago. This eruption deposited ignimbrite, forming the Shirasu plateau, which is prevalent throughout southern Kyushu. The land drains so well that only certain crops can thrive, necessitating the cultivation of those well-suited to this environment since ancient times. The post-caldera eruption also produced welded tuff, a soft, easy-to-process stone created from compressed pyroclastic flow deposits. Many historical structures in Sakurajima-Kinkowan Geopark were built using welded tuff. Besides Aira Caldera, the Geopark area and its surroundings also feature two other calderas (Kakuto Caldera and Ata Caldera), each producing welded tuff with unique characteristics. Consequently, different types of welded tuff have been used for various purposes.

Sakurajima-Kinkowan Geopark offers educational opportunities for people to learn about how the local culture was formed and emphasizes the importance of cultural heritage. By engaging both residents and tourists, our Geopark plays a crucial role in fostering cultural appreciation and contributing to the preservation of these cultural assets for future generations. We aim to ensure that the unique cultural heritage shaped by volcanic activity continues to be recognized and valued.

Keywords: Sakurajima-Kinkowan Geopark, volcano, caldera, shirasu plateau, welded tuff
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THE SUSTAINABLE DEVELOPMENT OF GEOLOGICAL TOURISM WOULD BE PROMOTED BY PROTECTING THE DIVERSITY OF GEOLOGICAL RESOURCES IN SHILIN UNESCO GLOBAL GEOPARK

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This study focuses on the protection and management of precious geological resources in Shilin UGGp, and explores the legal mechanisms for protecting the diversity of geological resources, and analyzes their role in promoting sustainable development of geological tourism.This article provides a comprehensive overview of the characteristics and value of Shilin UGGp, revealing the profound impact of geological resource diversity on the ecological environment and socio-economic aspects of the park. By reviewing existing protection regulations, this study identified issues and areas for improvement in the current legal system for protecting these non renewable resources. In addition, it also explores how to use scientific management and rational planning to achieve sustainable development of geological tourism, ensuring a balance between park functional diversity and environmental quality. Shilin UGGp is a scenic spot with abundant geological resources and enormous potential for geological tourism. Protecting the diversity of geological resources in Shilin UGGp in accordance with the law can effectively promote the sustainable development of geological tourism. Firstly, protecting the diversity of geological resources can enhance the attractiveness of scenic spots and attract more tourists to visit. Secondly, protecting the diversity of geological resources is beneficial for long-term operation and management, enabling geological tourism to sustainably bring economic benefits to society. Meanwhile, the rational development and utilization of geological resources can also help enrich geological tourism products and meet the diverse needs of tourists. This study is of great significance for protecting China's unique geological heritage, preserving biodiversity, and promoting local economic and social development.

Keywords: Geological resource diversity; legal protection; sustainable development; Shilin UGGp; geological tourism

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TWO EXAMPLES OF INTERNATIONAL GEOLOGICAL SIGNIFICANCE & THEIR HOLISTIC APPROACH OF INTERPRETING GEOLOGICAL HERITAGE: VOLCANIC EIFEL UGGP & MESSEL PIT FOSSIL SITE UNESCO WH (GERMANY)

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One of the core elements of a UNESCO Global Geopark are sites and landscapes with "International geological significance that are managed with a holistic conept of protection, education and sustainable development" as a Bottom up process.
In recent years, numerous geoparks have overcome the hurdle of demonstrating 'international geological significance' as one of several criteria for UNESCO Global Geoparks status and have been recognised as 'UNESCO Global Geoparks'. However, developing a holistic concept, as required by the UNESCO guidelines, is a major challenge for many applicants. This is not surprising, as it requires the history of the geological formation of the area to be brought together in all its elements: geological, cultural, historical and natural heritage. It is not difficult to identify and catalogue individual outcrops, quarries or road sections that can be visited by guests. These, with their geoscientific content, need to be linked to the other elements in order to use them for activities and offers in tourism and education. To do this, a so-called corporate identity needs to be defined and that all residents identify with.
The aim of this article is to present two successful examples of this: the Vulkaneifel UGGp and the UNESCO World Heritage Site of Grube Messel in Germany. Based on the main visitor groups and their requirements, it is explained by way of example which steps and considerations lead to the identification and definition of a corporate identity. They are linked to a headline that shows the holistic approach which is important in the context of subsequent communication, visibility and the promotion and advertising of offers from the geopark territory. Examples of Corporate Identieis and their use on advertising brochures, signposts and for geotourism offers and educational activities are given, as well as the use of anthropomorphic characters: mascots and an indication on future media.
The topic requires an intensive exchange with the local population. The population is the first ambassador to the guests and, after they see their identity visually in the geopark territory, expresses their pride through word-of-mouth enthusiasm which is an invaluable treasure.

Keywords: UNESCO Global Geoparks geoidentity, geotourism, geoeducation, geoheritage, geopoetry, anthropomorphic characters
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A KARSTIC RIVER BASIN ON CHINA-VIETNAM BORDER AND ITS GROUNDWATER-SURFACE WATER INTERACTION

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Guichun River (Song Quay Son in Vietnam) is an important river on the China-Vietnam border. The river originates from Dalongtan, Jingxi city, Guangxi and flows into Vietnam from Yuexu town. After runoff in Vietnam, it returns to Guangxi at Detian waterfall (Ban Gioc Waterfall – Viet Nam) and becomes a Sino-Vietnamese boundary river. The exposed carbonate area in the basin accounts for 88%, including two typical karst landscapes: peak-cluster depression on plateau and peak-forest on plain. Numerous of waterfalls, subterranean rivers and valleys are distributed in the river basin. The upper reaches of the Guichun River are formed by the convergence of four large subterranean rivers, and the main water source comes from the groundwater recharge in the plateau peak cluster depression area. The total recharge area of subterranean rivers reaches 761 km^2, accounting for 57% of the catchment area. The average discharge of the underground river is 9.4 m^3/s, which almost contributes to the total flow of the river in dry season. The rainfall infiltration coefficient in the karst area is 0.2-0.7, indicating karst groundwater is the main source of the river. Karstification has a great impact on the river water chemistry. Groundwater recharges from the subterranean river is rich in calcium ions and bicarbonate. CO_2 degassing strengthens when water runoff through waterfall and rapid flow river, resulting in carbonate deposition and forming a travertine riverbed. The carbonate dissolution type of riverbed, combined with the development of travertine in the river and groundwater recharge continually, make the change of water temperature quite gentle, constituting a unique water environment and aquatic ecosystem. The phytoplankton species range from 21-50, with the highest number in the upstream river. For the phylum, bacillariophyta accounts for 50% and chlorophyta accounts for 30%. The diversity index of Shannon H is even distributed in samples, with an average value of 2.37. The species of zooplankton is low, ranging from 1 to 6 in samples, in which rotifer and protozoa account for 44% and 25%, respectively. The biomass of zooplankton is highest in the lower reaches of the river. Because many mining is distributed in the river basin, the storage of solid waste in the depression poses a threat to the ecological environment of the river. China and Vietnam need cooperate to carry out a hydrogeological investigation in Guichun River Basin, to better understand the interaction between groundwater and surface water and the environmental effects on the basin.

Keywords: Guichun River; subterranean river; peak-cluster depression; transboundary aquifer; waterfall
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A STORY OF WORKING MOTHERS IN GEOPARK, JAPAN

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After giving birth, I feel that “childbirth” is a turning point in a woman's life. I made the choice to manage both work and child rearing, and returned to work after a one-year maternity/childcare leave period. During that year, I felt unconscious bias in society (i.e., I found social bias in childcare and stereotyped mother's role in Japan. There is also a perception gap between men and women within even our team). By using the “dialogue” that Aso Geopark’s basic approach, I was able to smoothly return to work, and here I am.
As an International Coordinator, I am responsible for regional coordination, education, and networking. After returning to work, my challenge was a business trip to Langkawi Geopark in Malaysia. The decision to go with my baby made the trip difficult for both of us, but we were warmly welcomed at the Langkawi Geopark and were able to fulfill my duty. I was also able to learn from their way of thinking, which I have not seen in Japan. In Langkawi Geopark, the profession was established as geopark and has operated stably. Many women were leading the program as team leaders.
In the Aso region, most of the stakeholders are male. Why only a few women are in the field of community development? I still do not have an exact answer for it but I believe that the generation raising children, who bear the future, are the exactly necessity for community development. Leading this answer will be my challenge to encourage women empowerment.
What is needed to create an environment where women of child-rearing age can easily participate in community building? Are there any social factors? We would like to learn about their needs through “dialogue”.

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ACHIEVEMENTS AND FUTURE DIRECTION RESULTING OF THE WORK OF CHINA´S UNESCO GLOBAL GEOPARKS OVER THE PAST 20 YEARS

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The development of China's UNESCO Global Geoparks has gone through four stages: initial recognition and start, construction and development, deepening and upgrading, maturity and internationalization. Until 2024, China has 47 global geoparks, 281 national geoparks and more than 300 provincial geoparks. A global, national and provincial geoparks system has been established to protect territorial geoheritage, and 280 geoscience museums and 280 geoscience research lines have been built. Over the past two decades, the establishment and advancement of China's UNESCO Global Geoparks have safeguarded geoheritage resources essential for Earth science research. These initiatives have raised the public awareness regarding the protection of natural and geological heritage, established platforms for enhancing cultural experiences, popular science research and patriotic education bases, expanded geological initiatives, and introduced innovative methods for utilizing geological resources. Additionally, they have fostered the growth of local tourism products and enhanced employment opportunities for the community. This initiative has improved the appeal of touristic attractions and increased revenue from tourism, contributed to poverty reduction in underprivileged regions, facilitated the development of transportation, energy, and telecommunications infrastructure, and advanced the establishment of UNESCO Global Geoparks.
The future direction of work is to strengthen the formulation of China's UNESCO Global Geopark construction and management methods. Strengthen scientific research and protection planning and management of geological heritage in these territories. Strengthen the investment in geoheritage protection at both national and provincial levels, while also deepening the professional technical support team building and the international networking. Commit to a scientific approach that is both inspiring and engaging, improving the development of research pathways in a comprehensive manner. Any UNESCO Global Geopark will be built into the people's breathing, hearing, vision, smell, skin, and knowledge of the "six nutritional bases".

Keywords: UNESCO Global Geoparks, development, management, GGN 20th anniversary, China
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ADVANCING INTEGRATED REGIONAL DEVELOPMENT WITH THE EXAMPLE OF QINLING ZHONGNANSHAN UNESCO GLOBAL GEOPARK (PR CHINA)

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The Qinling Zhongnanshan UNESCO Global Geopark (UGGp) encompasses a classic section in the central Qinling orogenic belt of China. It serves as a quintessential example of the scientific significance and surface topography of the Qinling orogenic belt, reflecting the distinctive features of the geological landscape in this region. The geopark staff made some beneficial attempts in geological tourism, geological science popularization, and community assistance. While protecting geological heritage, it has also broadened the scope of science communication, fostered the sustainable growth of geological tourism, and improved the development of neighboring communities.

The Qinling Zhongnanshan UGGp science popularization venue system features extensive coverage, a diverse range of display types, and meticulously crafted exhibition content. This system has significantly contributed to the dissemination of Earth Science knowledge, the enhancement of national scientific literacy, and the improvement of the relationship between humans and the environment. At the same time, it enhances the quality of science communication within the Geopark, evolving geoscience tourism from a "two-dimensional" experience to a "three-dimensional" one.

According to the goal of "one village, one brand, one area, one industry", the Qinling Zhongnanshan UGGp connects the scenic area with the neighboring communities, and offers professional travel routes packages with rural tourism routes. In this context, the geopark staff also created the model of "scenic spots+cooperatives+farmers". This includes new tourism products and offers such as parent-child farming research. The adoption of farms is welcomed by the neighboring community residents. The expansion of these initiatives, led by the geopark staff into rural regions, has created job opportunities for local residents and enhanced their overall income.

The management team perfectly integrates the creation and design of various aspects of the geopark with the Qinling culture and geological wonders. Unique natural landscapes, diverse science popularization activities, regional cultural activities, and distinctive agricultural products have been continuously enriched and updated over the years. This transforms the idea of coordinated development between Qinling and the surrounding area into a tangible reality.

All of these works made Qinling a showcase to demonstrate the territorial relevance of the Qinling Zhongnanshan UGGp.

Keywords: Qinling Zhongnanshan Global geopark, coordinated development
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CONTRIBUTION FOR SDG3 OF MUDEUNGSAN UGGP: FOCUSING ON MUDEUNGSAN GEO – MARATHON

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The Mudeungsan UGGp which was designated as a UNESCO Global Geopark, encompassing Gwangju-City, Damyang-gun County, and Hwasun–gun County including geological and historical cultural site. As a UNESCO Global Geopark, Mudeungsan UGGp of Korea strives to implement the UNESCO's Sustainable Development Goals(SDGs), particularly contributing to SDG 3, 'Good Health and Well-being'. A prime example is the Mudeungsan Geo(park)-Marathon, first held in 2019. After a pause due to COVID-19, it resumed in 2023, and the third event is scheduled for October this year. This unique marathon, held within a UNESCO Global Geopark, incorporates geological and historical cultural sites into its course, allowing participants to fully experience the Mudeungsan. Especially, the Mudeungsan Geo-Marathon, held in collaboration with Korea's famous broadcaster MBC(Munhwa Broadcasting Corporation), was broadcast live nationwide. The use of helicopters for live broadcasts introduced various angles of the landmarks, drawing the attention of the entire nation and widely promoting Mudeungsan UGGp. The first and second Mudeungsan Geo-Marathon events saw over 3,000 participants, and the third event had more than 1,000 people applied. The previous event featured 1,187 participants and introduced a 5.18km course, with these numbers holding significant meanings. The number 1,187 represents the height of Mudeungsan, while 5.18 commemorates the May 18 Democratic Movement in Gwangju. The Mudeungsan Geo-Marathon goes beyond a mere marathon event. At the Mudeungsan Geo-Marathon, promotional booths were set up to introduce Geo-food and Geo-partners within the Mudeungsan UGGp to citizens, enabling them to purchase these products, thus contributing to SDG 12. Additionally, the Mudeungsan UGGp holds 'The Mudeungsan Love Hiking Event' and 'Mudolgil Trail'. These events are held together with local public and private organizations and aim to improve the health of citizens. In addition, it contributes to SDG 15 through conservation activities through plogging. Through such activities, the Mudeungsan UGGp actively leads efforts in public health, regional economic revitalization, and environmental protection. By continuously hosting the Geo-Marathon and ‘the Mudeungsan Love Hiking Event’ annually, the Mudeungsan UGGp aims to enhance public health, raise awareness of the UGGp, foster a sense of belonging among citizens, and encourage their involvement in protecting the ecosystem within the geopark.

Keyword: Mudeungsan UGGp, Mudeungsan Geo-Marathon, SDG3, Mudeungsan Love Hiking Event, Mudolgil Trail
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DAK NONG GEOPARK'S GREEN LIVING CAMPAIGNS

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In order to promote sustainable development as well as to promote the mindset of recycling and creating green living habits, Dak Nong UNESCO Global Geopark (DNUGGp) Management Board (MB) organised the "Green living campaign" in 2022 and 2023. The variety of interesting activities attracted a large number people to participate. The main activity of the campaign was "Exchange recyclable waste for gifts". Five types of waste were collected, including: used clothes, used batteries, electronic equipment, milk box cartons, glass, and plastic bags. Local people could exchange these for goods such as soap, shampoo, toothpaste, hand sanitizer and bags.

After collecting, the garbage was delivered to recycling plants in Ho Chi Minh City for treatment as Dak Nong Province does not as-yet have any recycling facilities. This activity aimed to encourage locals to sort garbage at home and reduce the amount of garbage dumped in the environment.

In addition, the campaign also promoted the green products of Dak Nong UGGp's partners through the "Green Products Booth". This booth introduced a variety of green products such as bamboo thermal bottles, ferns straws, herbal soaps, etc. as well as local environmentally friendly products. The "Zero waste - Secondhand Exchange" activity created a platform for people to exchange used items such as books, backpacks, etc. with the aim of extending the life cycle of products.

In 2023, in addition to the 2022 series of activities during the Green Living Campaign, the Dak Nong UNESCO Global Geopark also organised workshops on waste recycling in collaboration with Gen Xanh Social Enterprise and Dak Nong Community College. This programme attracted 70 students from Dak Nong College and more than 30 volunteers of Dak Nong Geopark.

The waste from old clothes was transformed into various useful goods such as hair bows, bookmarks, and water bottle bags. In addition to renewing the product's life cycle, this activity contributes to reducing the quantity of trash released into the environment. The workshop also encouraged the participants to utilize local fruit to make a Kombucha drink which is helpful for digestion and health.

After the success of the first two Green Living Campaigns, DNUGGp has signed the MOA with Gen Xanh - Environmental NGO to cooperate to hold this event annually for the period 2022 - 2025. Dak Nong Geopark's Green Living Campaigns contribute to SDG 12 (Responsible consumption and production and SDG 17 (Partnerships for the Goals).

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ECONOMIC DEVELOPMENT OF SURROUNDING COMMUNITIES OF JIUHUASHAN GLOBAL GEOPARK

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Global Geoparks are high-level, high-quality ecological tourism areas. One of the goals of the global geoparks is to enhance the well-being of residents within and around the geopark and promote sustainable regional economic development.

Since Jiuhuashan was designated as a global geopark in 2019, the world-class brand effect has become prominent and has shown spillover characteristics, which has profoundly influenced the spatial organization of eco-tourism around Jiuhuashan.

Based on the analysis of the brand and economic spillover effect of Jiuhuashan UGGp, the tourism economic activities around towns and villages such as Lingyang, Zhubei, Yangtian, Rongcheng, Miaoqian, Ducun, Dunshang, Tangxi, and Meijie Street are highly correlated with the brand of Jiuhuashan UGGp, forming community economic development belt around Jiuhuashan with an area of about 320 km2.

The managers of Jiuhuashan Global Geopark (Jiuhuashan UGGp) and surrounding communities have established a tourism marketing alliance of Jiuhuashan UGGp, implementing brand promotion initiatives and developing partners for Jiuhuashan UGGp. Based on the ecological, production, and living characteristics of each community, five characteristic eco-cultural tourism towns (Zhubei Zen Meditation Town, Lingyang Cultural and Creative Town, Miaoqian Sports and Leisure Town, Dunshang-Liujie Intangible Cultural Heritage Experience and Inheritance Town, and Tangxi Original Ecological Tourism Experience Town). More than 20 special agricultural tourism complexes integrating sightseeing, tourism, and leisure have been created in places such as Nanyang Village, Zhubei Town, Shimengao Village, and Duchun Village. More than 100 characteristic homestays have been renovated, forming a unique homestay cluster. We created a series of characteristic route products connecting with Jiuhuashan UGGp, such as landscape culture three-day tour, natural study three-day tour, sightseeing experience two- day tour, sports and leisure two-day tour, health and wellness five-day tour, intangible cultural heritage inheritance five-day tour; have jointly cultivated and developed new agricultural business entities led by ecological agricultural products such as tea and sealwort, authorized the product brand of Jiuhuashan UGGp, and provided venues for the sale of special agricultural products within the Geopark. The income of residents in communities surrounding Jiuhuashan UGGp has been increased overall (from 16,945 yuan in 2019 to 23,555 yuan in 2023, an increase of 39.01%), contributing to the realization of regional sustainable development goals of Jiuhuashan UGGp.

Keywords: sustainable development, geopark, peripheral coordination area, Jiuhuashan
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EMPOWERING COMMUNITY THROUGH GIANT CLAM CONSERVATION AT BATUL BEDIL GEOSITE, BELITONG UNESCO GLOBAL GEOPARK

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Batul Bedil Geosite, part of the Belitong UNESCO Global Geopark, has developed into a popular tourist destination managed by local fishermen and their families. Since 2019, giant clam (*Tridacna sp.*) conservation activities, with the species being classified as endangered by IUCN and listed in Appendix II of CITES, have been initiated. This conservation effort is supported by PELINDO, a state-owned enterprise in Indonesia, which provides financial, technical, and training support. This study aims to explore how the giant clam conservation effort not only preserves the local marine ecosystem but also enhances the economic well-being of the community. Utilizing qualitative methods through participatory observation and in-depth interviews, the study found that local communities have successfully developed various marine tourism packages, such as snorkeling, educational tours, and research, attracting 40-50 international researchers annually who stay for up to one month. In 2023, PELINDO expanded its collaboration with coral transplantation activities involving 1,000 planting media. This conservation effort demonstrates significant potential for creating new economic opportunities through income diversification and supports the sustainable development of coastal geosites.

Keywords: Coastal Geosite, Economic Empowerment, Edutourism and Research, Giant Clam Conservation, Income Diversification, Marine Biota Conservation, Marine Tourism.
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EMPOWERMENT OF FISHERMEN'S WIVES IN MENDANAU ISLAND GEOSITE AT BELITONG UNESCO GLOBAL GEOPARK

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Traditionally, the wives of fishermen on Mendanau Island have been limited to producing seafood-based products such as fish and crackers, shrimp paste, salted fish, fish floss, *rusip*, and *pekasam*. Given that traditional fishermen are heavily dependent on natural conditions, extreme weather often prevents them from going to the sea. Meanwhile, the Mendanau Island Geopark Site, part of the Belitong UNESCO Global Geopark, possesses a rich and diverse range of plants that have remained underutilized. As an island geopark site, Mendanau Island is preparing to become a tourist destination with various geopark products. This study examines the empowerment process of fishermen's wives through a qualitative approach using participatory observation and in-depth interviews. The fishermen's wives have successfully created innovative non-seafood products, notably Eco-print, by utilizing local plant resources. The Belitong UGGp Management Body, in collaboration with the Ministry of Marine Affairs and Fisheries, Bank Indonesia, and other stakeholders, has conducted multi-year training programs in production, marketing, and financial management. As a result, numerous home industries have flourished, leading to a significant increase in their income. The eco-print products, branded as "De Gual Eco-print," have become flagship Geopark products for the Mendanau Island Geopark Site, contributing to the island's economic resilience and diversification.

Keywords: Economic Resilience, Empowerment of Fishermen's Wives, Income Diversification, Island Local Economic Development, Utilization of Local Plant Diversity
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ETHNO FOOD AND THE FUTURE GENERATION

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Ijen Geopark has become a recognized area for conservation and sustainable development, acknowledged by UNESCO and part of the UNESCO Global Geoparks. One of the key roles of Ijen Geopark is to support the achievement of the Sustainable Development Goals (SDGs), with significant potential coming from traditional foods. The increasing cases of stunting in Indonesia and globally are alarming issues that need to be addressed. It is crucial to take action in preventing stunting and ensuring the proper growth and development of children from an early age.

The Ethno Food program, initiated by Ijen Geopark, offers a solution to these challenges. This program emphasizes the preservation of traditional culinary practices and the use of local ingredients, which not only enrich cultural heritage but also make significant contributions to community health and well-being, especially in addressing the major challenge of stunting in Indonesia.

Driven by the rise in stunting cases in Indonesia, the program plays a crucial role in raising nutritional awareness and promoting traditional foods that are becoming increasingly rare. By empowering local communities to use natural ingredients and traditional cooking methods rich in nutrients, while also supporting sustainable farming practices, the program not only contributes to achieving SDG 2 (Zero Hunger) and SDG

Good Health and Well-being) but also supports SDG 12 (Responsible Consumption and Production) and SDG 15 (Life on Land) through environmental preservation and biodiversity.

The Ethno food program at Ijen Geopark also plays a vital role in shaping a healthier and empowered "golden generation" by improving access to nutritious and healthy food and strengthening the local economy through the empowerment of farmers and local producers. By providing ongoing nutrition education and encouraging innovation in traditional cuisine, the program helps build a deeper awareness of the importance of healthy eating, which will serve as a foundation for future generations in tackling global health challenges.

Keywords: Ijen Geopark, Stunting, Ethno Food, SDGs

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GENDER EQUALITY AND EMPOWER ALL WOMEN IN THE KHORAT UNESCO GLOBAL GEOPARK, THAILAND

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A UNESCO Global Geopark uses its geological heritage, in connection with all other aspects of the area's natural and cultural heritage. It also strongly emphasizes the empowerment of women through educational programs or the development of women's cooperatives to provide opportunities for women to obtain an additional income in their area and on their terms. (Global Geoparks Network, 2017).
Khorat UNESCO Global Geopark is the second UNESCO Global Geopark in Thailand. It adopted the fundamentals of UNESCO Global Geopark and created Khorat geopark in 2015 aims to raise awareness of the importance of geological heritage of its area especially petrified woods and mammal fossils while local communities have new opportunity to sell their products and services for the additional income. Khorat UGGp was created under the support of many stakeholders. Khorat UGGp is managed by the board of management. It has gender diversity. Management board members are gender diversity, and they are the representatives of local communities and indigenous, local universities and local government organizations. They have the responsibility to manage their tasks and fulfill geopark goals. Some management board members are women and leaders of local community enterprises on geotourism and more than 8 geopark local community enterprises on geotourism established under the support of Khorat UGGp as geopark partners. Furthermore, there are 11 groups of local communities and schools that develop their own local products and services to sell with geopark local community enterprises. Most of local enterprises and groups leaded by women. Women play an important role in Khorat UNESCO Global Geopark and crucial driven force of sustainable geopark management.

Key words: Khorat UNESCO Global Geopark, Gender equality, Women empowerment
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GEOLOGY AND GEOLOGICAL SIGNIFICANCE OF UBON RATCHATHANI GEOPARK, THAILAND: THE EROSIONAL LAND OF MESOZOIC SANDSTONE

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One of the important criteria for establishing a geopark is that it must be geologically outstanding both nationally and internationally. This is usually verified through papers published in scientific journals.Ubon Ratchathani Geopark was certified by the Thai National Committee on Geoparks in 2019 as as a National Geopark and now there is a plan to push towards becoming a UNESCO Global Geopark. This study collected information on the region's geology at both the national and international levels by collecting the results of research studies that have been studied before, as well as organizing meetings and forums for exchange between geological researchers in the area. The results of the study reveal that Ubon Ratchathani Geopark is outstanding in both geology and paleontology including the erosional processes of the Early Cretaceous continental red-bed sandstone of the Khorat Group. As the result of the uplift of the Mesozoic sandstone Khorat Group since the Paleogene, together with the erosion by the Mekong River, there are a number of outstanding landforms including a large area of potholes (Sam Phan Bok), a giant rock pillar (Sao Chaliang), a waterfall, rapids and river beach. In regard to paleontology the Khok Pha Suam locality represents the most diverse vertebrate fossil assemblages in Thailand of the late Early Cretaceous from the Aptian-Albian stages of the Khok Kruat Formation. It contains the hybodonts, ray-finned fishes, turtles, crocodyliforms, pterosaurs, and dinosaurs. In addition it is the best reference section of the Mesozoic continental red bed Khorat Group along the Mekong River. It has a clear sequence of strata found in the Phu Kradueng, Phra Wihan, Sao Khua, Phu Phan, and Khok Kruat Formations which are considered as one of the best reference sections of the Khorat Group in Thailand and in Southeast Asia.

Keywords: Ubon Ratchathani Geopark, Thailand, Sam Phan Bok, Khorat Group, Mesozoic Sandstone, Erosional Land.
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GEOTOURISM FOR COMMUNITY ENGAGEMENT, INCLUSIVE AND EQUITABLE DEVELOPMENT

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Non nuoc Cao Bang Geopark, Viet Nam

Non nuoc Cao Bang UNESCO Global Geopark (CBUGGp) is a remote frontier area located in the North of Viet Nam. The Geopark was designated as a UNESCO Global Geopark in 2018 and revalidated in 2022. This designation has been assisting Cao Bang province moving towards embracing inclusive, equitable and conservation-based socio-economic development. The criteria of a UNESCO global geopark in the operational guideline have been working as an operational guideline for the protection and conservation of traditional culture, tangible and intangible heritages. The UNESO global geopark designation is a milestone and an acceleration for tourism development of Cao Bang province. The infrastructure system has been improved, supports have been provided by the Geopark to build capacity for the Geopark partners to take the lead in the communities in sustainable tourism practice. The increased number of visitors has been contributing to lift up living standards of population catchman in the geopark territory. In spite of undenied economic benefits from touristic activities in the geopark territory, the equitable and inclusive tourism growth remains a concern.

The presentation will focus on examining the initiation and efforts of CBUGGp particularly the "community engagement" activities and conservation of embedded heritages of in Cao Bang province as a solution for the sustainable development approach to the tourism industry of Cao Bang.

Key words: Community engagement, equitable, inclusive development, conservation, livelihood improvement

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HERITAGE CONNECTION IN KHON KAEN ASPIRING GEOPARK (THAILAND)

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Khon Kaen aspiring Geopark, covering 1,038 km^2 in Khon Kaen Province (Thailand), which includes the districts of Wiang Kao and Phu Wiang, with 60,273 residents. This survey aimed to study and promote sustainable use of the geopark's geological heritage by analyzing data with local geologists. Key findings reveal that the geopark features significant geological formations, including the Khorat Group of sedimentary rocks dating back 210-100 million years. The area contains six major rock formations: Nam Phong, Phu Kradung, Phra Wihan, Sao Khua, Phu Phan, and Kok Kruat. These formations of Khorat Group (Berriasian-Aptian, Lower Cretaceous) provide insights into the region's dynamic geological history. Approximately 130 million years ago, the Sao Khua Formation accumulated in a rich sedimentary basin, supporting diverse prehistoric life. Fossils of dinosaurs and other animals from this age have been found.

Around 90 million years ago, geological changes, including marine incursions and salt deposition, influenced the area's climate and ecology, potentially leading to dinosaur migrations. The region uplifted around 50 million years ago due to tectonic collisions, resulting in distinctive structural features shaped by erosion and weathering. These geological processes has resulted in the synclinal area in the West and anticlinal area in the East, leading to different local lifestyles between the two areas. The varied geology and fertile land attracted human settlement from prehistoric times, evidenced by ancient tools and artifacts. Today, the local economy includes agriculture, weaving, and fishing, reflecting a long-standing relationship between people and their environment. In the eastern part of the geopark, the Phu Wiang District features anticlinal landscape comprised of the Nam Phong and Phu Kradung formations. Evidence of iron casting and ancient settlements are discovered. The area's geological diversity and resource richness highlight its historical and ongoing significance to local communities.

In conclusion, we have studied the heritage connection of Khon Kaen aspiring Geopark territory and the potential to be applied to the sustainable use and development of the area.

Keywords: Heritage, Khorat Group, sustainable use, communities, fossils
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IMPLEMENTING SDG 14 FOR MARINE ECOSYSTEM CONSERVATION IN JEJU ISLAND UNESCO GLOBAL GEOPARK

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Jeju Island UNESCO Global Geopark is actively pursuing the implementation of Sustainable Development Goal (SDG) 14, which focuses on the conservation and sustainable use of oceans and marine resources. The region not only protects its unique natural environment but also fosters sustainable development within the local community. The strategic initiatives undertaken by Jeju Island play a crucial role in preserving its distinctive marine ecosystem and serve as exemplary practices for marine conservation.

One of the key initiatives includes winter beach plogging activities, where collected marine debris is repurposed into sea glass crafts, promoting both environmental protection and creative reuse. These initiatives are instrumental in maintaining clean coastlines while raising public awareness on marine litter issues. Additionally, in collaboration with the central government, Jeju Island engages in marine forest creation projects, which provide critical habitats for diverse marine life, contribute significantly to coastal erosion prevention, and bolster ecological resilience. The island also manages several marine parks, including areas designated as national cultural heritage sites, ensuring effective marine conservation.

Environmental education programs, integrated with practical activities such as the 'Plastic Zero' campaigns during Geo-trail events, are pivotal in boosting community participation and fostering environmental consciousness. These initiatives have not only elevated public awareness but have also yielded tangible outcomes, including cleaner beaches and enhanced marine biodiversity. Moreover, the conservation and promotion of Haenyeo culture Jeju's traditional female diving practice emphasize sustainable economic activities aligned with marine ecosystem preservation. Recognized by UNESCO as an Intangible Cultural Heritage in 2016, Haenyeo culture has gained international recognition.

In addition to its conservation efforts, Jeju Island stimulates the local economy by identifying Geo-Partners and supporting Geo-Brands, which highlight locally sourced ingredients through the designation of Geo-Foods. This initiative preserves local culinary traditions while contributing to the preservation of regional heritage. These activities reflect Jeju's commitment to harmonizing economic development with environmental sustainability.

The comprehensive measures adopted by Jeju Island contribute significantly to achieving SDG 14 by fostering a sustainable marine environment. The island's approach serves as a model for effectively integrating community efforts with policy initiatives, playing a pivotal role in advancing the global sustainable development agenda.

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PROGRESSES OF GEOPARKS NETWORK AND COMMITTEE IN JAPAN

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This year commemorates both the 20th anniversary of the Global Geoparks Network (GGN), and the 15th anniversary of the the Japanese Geoparks Network (JGN). JGN which is an NPO and currently consists of 46 Japanese National Geoparks (regular members), including 10 UNESCO Global Geoparks (UGGps), and seven associate members aspiring to become National Geoparks. Last year, the GGN presented the Strategic Plan for the next two years, and the GGN has stated that the key to further promoting UGGps activities internationally lies in the activities of "national networks". These networks are crucial for fostering a deeper comprehension of the UGGps concept in a shared language and for advancing their initiatives within local communities. In Japan, even National Geoparks conduct their activities in accordance with the Statutes of the IGGP, the Operational Guidelines for UGGps and the SDGs, and are evaluated, revalidated and advised by the Japan Geopark Committee (JGC). The JGC, whose membership is in line with UGGps Operational Guidelines, is an organization independent of government agencies and accredited for its operations by the Japanese National Commission for UNESCO. In this sense, we understand that the JGN can be substantially positioned under the umbrella of the GGN, where the JGN can show good examples of its experience.

The JGC organized the Japan Geopark Academic Support Union (JGASU) in 2021, an external body that supports the academic aspects of Japanese National Geoparks, consisting of representatives from eight Japanese geoscience-related academic societies. This is similar to the collaboration between UGGp Council and IUGS. The IUGS Guidelines for the assessment of the international significance of geological heritage in UGGps applications were used by JGASU to verify the international significance of the geological heritages of geoparks in the application process of JGC prior the application to UNESCO. In addition, the selection of the Japanese candidate sites for the first and second 100 IUGS Geological Heritage Sites was also carried out under supervision of JGASU. We believe that such a system will contribute to balanced and fair international promotion of Japan’s geological academic value through UGGps.

Keywords: Japanese Geoparks Network, Japan Geopark Committee, Japan Geopark Academic Support Union, GGN Strategic Plan, UNESCO Global Geoparks

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PROMOTING SUSTAINABLE DEVELOPMENT IN THE DANXIASHAN UNESCO GLOBAL GEOPARK BY NATURE EDUCATION

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Danxiashan UNESCO Global Geopark (DUGGp) is located in Shaoguan City, Guangdong Province, China, with a total area of 292 km^2. It is the namesake of danxia landscape. In 2004, it was selected as one of the first batch of global geoparks, and it was included in the World Heritage List in 2010. The territory has a unique geological landform, ecological environment and cultural history. The management organization of DUGGp has insisted to exploring the promotion of sustainable development through nature education. Mass tourism of DUGGp began in the 1980s and educational tourism began to develop in 2004. DUGGp has attracted many operators, both locals and immigrants, to conduct educational tourism programs. After years of exploration and practice, a large number of nature education experts have emerged in the community, the Science Popularization Town and the nature education industry have taken initial shape. Nature education and educational tourism, as rapidly developing industries in China, have provided new ideas for sustainable development in DUGGp. There are over 12,000 indigenous residents living in the territory. Facilitating the growth of the local economy to its fullest potential while safeguarding the DUGGp has consistently been a critical concern that requires careful consideration in the development process. As an eco-friendly approach, educational tourism plays a significant role. It alleviates the conflicts between conservation and utilization in this World Heritage Site and builds community capacity in terms of livelihood and local knowledge. Moreover, this article sheds light on why educational tourism should be introduced in heritage sites and nature reserves, and how local communities can participate in and contribute to the sustainable development of this type of tourism.

Keywords: Danxiashan UNESCO Global Geopark; Nature education; Educational tourism; Sustainable development.
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PROTECTION AND SUSTAINABLE USE OF PALEONTOLOGICAL FOSSIL GEOLOGICAL SITES IN ZIGONG GLOBAL GEOPARK: A CASE STUDY OF THE QINGLONGSHAN DINOSAUR FOSSIL SITE

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Zigong Global Geopark is located in Zigong City, Sichuan Province, China, covering an area of 1,630.46 km^2. The geopark joined the Global Geoparks Network in 2008. It is renowned for its Jurassic dinosaur fossils, Triassic well-salt relics and colorful lantern. The geopark has 103 geosites, including 5 world-class ones, 7 national-level ones, 22 provincial-level ones, and 69 municipal-level ones.

Zigong Global Geopark is abundant in Jurassic paleontological fossil resources. There are 47 species of paleovertebrates under 36 genera in total, including 26 species of dinosaurs under 21 genera, accounting for about half of Sichuan's total and approximately one-twelfth of the national total. It is the most important dinosaur fossil site in China and one of the most important paleontological fossil sites in the world.

At present, the dinosaur fossil sites available for visitors in the Zigong Global Geopark include the Dashanpu Dinosaur Fossil Site, the *Omeisaurus jiaoi* Dinosaur Fossil Site, and the Qinglongshan Dinosaur Fossil Site, which are also the most important fossil sites in the geopark. The geopark has effectively implemented measures to protect and utilize these fossil sites. The Dashanpu Dinosaur Fossil Site and the *Omeisaurus jiaoi* Fossil Site are both located in the Zigong Dinosaur Museum, with the Dashanpu site in the exhibition hall and the *Omeisaurus jiaoi* site in the exploration hall. Each year, a large number of tourists come to visit. This article focuses on protection and conservation methods, scientific research, public education, local legislation, and the Geopark Plan, highlighting the protection and sustainable utilization of the Qinglongshan Dinosaur Fossil Site in the Zigong Global Geopark.

Keywords: dinosaur fossil site, protection, sustainable use
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REFORESTATION OF DEGRADED EX-MINING LAND THROUGH WOMEN'S WORKFORCE EMPOWERMENT: A CASE STUDY IN BELITONG UNESCO GLOBAL GEOPARK (INDONESIA)

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Mining exploitation in the Belitong UNESCO Global Geopark area has left behind degraded land that is no longer productive, reducing ecological carrying capacity and impacting the livelihood of the local community. This land, once a source of sustenance, can no longer be optimally utilized by the community, necessitating interventions to restore its ecological functions. This study employs participatory observation and in-depth interviews to explore the impact of a reforestation program involving women aged 23-70 as the primary workforce. The program includes training in cultivating productive crops such as eggplant, chili, and pepper on degraded land, as well as training in composting using a mixture of water hyacinth and grass. After 14 years of implementation, the study's findings show significant improvements in biodiversity and ecosystem conditions. Additionally, the program contributes to the economic improvement of the local community through the sale of harvested crops while empowering women as key actors in climate change mitigation efforts. This study underscores the importance of women's economic empowerment in environmental initiatives and offers recommendations for community-based reforestation approaches in other regions facing similar challenges.

Keywords: Biodiversity Improvement Reforestation, Climate Change Mitigation, Women's Economic Empowerment
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RESEARCH ON GEOPARK SUSTAINABLE DEVELOPMENT PATH: A CASE STUDY OF TAINING GLOBAL GEOPARK

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The sustainable development of geopark is a key subject in academic research and a hot topic in industry. This paper analyzes the market demand of China's culture and tourism and the development trend of related industries in recent years, and the practical case of Taining Global Geopark's construction and development over the past 20 years, then puts forward ideas such as enriching the supply of culture and tourism products, promoting the consumption of culture and tourism, and optimizing the service environment from the perspectives of concept integration, industry integration and market integration. In this way, it will fully mobilize local stakeholders to participate in the construction of geoparks, so as to achieve protection and management, industrial cooperation, business innovation, and service upgrading on a broader, deeper, and higher level and promote the sustainable development of global geoparks.

Keywords: Integration of culture and tourism, development strategy, sustainable development, path analysis, Global Geopark

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ROLE OF THE GEOPARK GUIDE FOR SDGS

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Oki Islands UNESCO Global Geopark comprises four inhabited islands and numerous uninhabited islets. The geopark area includes marine areas as well, because its remote island environment, aquatic life, and fisheries industry are important heritages of the geopark. The primary role of a geopark guide is to safely conduct tours, communicate the Geopark's fundamental knowledge and philosophy, explain the characteristics of the area, and support participants in deepening their knowledge. Guides have many responsibilities, but I believe the most important role is contributing to the Sustainable Development Goals (SDGs).

In recent years, as the term SDGs (Sustainable Development Goals) has become more recognized, people are taking steps toward a sustainable society. Some of the SDGs align well with the philosophy of Geoparks. I believe that geopark guides have a crucial role in communicating to visitors the importance of conserving nature in their region through the SDGs, and in actively participating in nature conservation efforts themselves.

Researchers and experts from the Geopark management team studies on local nature to convey its value. However, they are not always able to monitor nature on their own. Therefore, the management and monitoring of the field are made possible by collaborating with geopark guides who are familiar with the area. The goal of the NPO Oki Shizen Mura, to which I belong, is to preserve nature, and we carry out conservation activities in cooperation with the Geopark. The use of the term "SDGs" makes it easier to convey the importance of the natural environment and connect environment issues on a personal level. However, it takes time for the natural environment to show improvement. We believe that Geoparks, which utilize and sustain the region, are closely aligned with the SDGs. Additionally, guides who work in Geoparks play a crucial role in conservation efforts.

Keywords: geopark guide, nature conservation, SDGs, role of geopark guide

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SUSTAINABLE GEOPARK STRUCTURE

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Chairperson - Nannup WA Geopark, Australia

The Nannup WA Geopark was established in 2023. The region holds extraordinary Abiotic, Biotic and Cultural value. The Nannup WA Geopark holds within its boundaries the world's longest basalt valley flow at 220km long. The geopark sits within one of 24 biodiverse hot spots in the world. Southwest Australia Global Diversity Hotspot.

The area also has strong past and present indigenous culture as well as strong present-day culture. The present-day culture also has strong links to the Abiotic and Biotic elements within the Nannup WA Geopark.

The Nannup WA Geopark as we know is the world's first paperless geopark. We believe we have established a model that supports the paperless model and slashed the operating costs of our geopark. The geopark structure was designed around the concept of paperless and we have incorporated other policies into the geopark to ensure future financial sustainability and the ability to ensure we have minimal impact on the environment within our operating structure.

The Nannup WA Geopark team has also designed our structure to incorporate Volunteer sustainability.

We would like to share with the remainder of the Geopark community how we have achieved our sustainability structures and policies. We will also share how we have also included in the structure the ability to continue to grow trails, citizen science programs, educational programs and much more at low cost.

Keywords: Nannup WA Geopark, Sustainable Geopark Structure, paperless geopark
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SUSTAINABLE TOURISM IN DONG VAN KARST PLATEAU UNESCO GLOBAL GEOPARK

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Dong Van Karst Plateau UNESCO Global Geopark (DVKPUGGp), located in Ha Giang Province, Vietnam, is a region of profound geological significance and cultural richness. Recognized as a UNESCO Global Geopark (UGGp) in 2010, this area is renowned for its striking karst landscapes, ancient rock formations, and the diverse cultures of its ethnic minority communities, such as the H'Mong, Dao, and Tay. As the region's tourism sector grows, the need for sustainable tourism practices has become increasingly critical to ensure that economic development does not compromise the integrity of its natural and cultural heritage.

This presentation explores the principles and practices of sustainable tourism within the DVKPUGGp, highlighting how tourism can be a driving force for local development while safeguarding the area's natural and cultural heritage. Key topics include the strategies for minimizing environmental impact, promoting eco-friendly tourism, and engaging local communities in the tourism industry. The presentation will highlight the significance of safeguarding the cultural identity of ethnic minorities, emphasizing that their traditions and ways of life are essential to the region's attractiveness.

Furthermore, will be discussed the ongoing challenges, such as managing the growing number of tourists, mitigating the risks to cultural and natural sites, and ensuring that infrastructure development does not compromise the area's ecological balance. Through case studies and best practices, this presentation aims to provide insights into how sustainable tourism can be effectively implemented in UGGps like DVKPUGGp, ensuring long-term benefits for both the environment and the local population.

In conclusion, sustainable tourism in DVKPUGGp is essential to maintaining the balance between development and conservation. By focusing on environmental stewardship, cultural integrity, and community participation, the region can continue to thrive as both a natural and cultural sanctuary, benefiting current and future generations.

Keywords: Dong Van Karst Plateau UGGp, sustainable geotourism, local ethnic groups, visibility, traditional architecture, tourist capacity

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TAKING MULTIPLE MEASURES TO SHOW SOLICITUDE FOR LIVES ON EARTH IN YIMENGSHAN GEOPARK

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Yimengshan UNESCO Global Geopark is located in Linyi City, Shandong Province, China. In recent years, combining the concept of SDG15, Yimengshan Global Geopark Administration has actively made efforts to protect, restore and promote the mountainous-hilly ecosystem through multiple channels. It has achieved significant results in ecosystem restoration, geological heritage conservation, promoting the sustainable development of geopark communities and supporting biodiversity research.

Keywords：Yimengshan UGGp, ecosystem, SDGs

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THE CHALLENGES IN MAINTAINING SUSTAINABLE DEVELOPMENT GOALS IN RINJANI-LOMBOK UNESCO GLOBAL GEOPARK, INDONESIA

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The Rinjani-Lombok UNESCO Global Geopark, Indonesia, has emerged as a beacon of sustainable development and transformation, positioning itself as the exemplary model among Indonesia's 24 geoparks. This transformation underscores the critical role that sustainable development plays in the geopark's evolution, highlighting a multifaceted approach to addressing a range of challenges.

The key to the Geopark's success has been the adept handling of political, managerial, and marketing challenges. Political challenges encompass the will and continuity of leadership, requiring strong governance and the ability to navigate political changes seamlessly. Managerial challenges focus on the competencies needed to manage the geopark effectively, demanding robust administrative skills and adaptive strategies. Marketing challenges pertain to how the geopark is promoted and perceived, necessitating innovative and effective marketing techniques to attract and engage visitors and stakeholders.

Strategic approaches have been pivotal in overcoming these challenges. Enhancing networks has facilitated better collaboration and resource sharing among stakeholders, fostering a supportive community around the geopark. Developing an agile structure has enabled the geopark to remain flexible and responsive to changing conditions, ensuring resilience and sustainability. High-value promotion has been instrumental in elevating the geopark's profile, attracting tourism and investment while promoting conservation and education.

The cornerstone of Rinjani-Lombok's achievements lies in its collaborative management model, which brings together various stakeholders to work towards common goals. This collaborative approach has not only helped in overcoming challenges but has also ensured the sustainability of the geopark's initiatives. Through strategic prowess and sustainable evolution, the Geopark stands as a testament to the power of resilience, innovation, and cooperation. Thus the Rinjani-Lombok UNESCO Global Geopark exemplifies how transformative strategies and collaborative management can successfully address the intricate challenges of sustainable development. As a role model for Indonesia's geoparks, it sets a high standard for its future development and allied conservation efforts, showcasing a pathway to achieving long-term sustainability goals.

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THE EFFECT OF SOIL COMPACTION FROM THE HIKER'S FOOTPRINT ON ECOSYSTEM AND OUR CHALLENGE TOWARDS ITS RECOVERY

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When incorporating trekking into Geotourism, there is something that must be considered. It is the effect by soil compaction of hiker's footprints on ecosystem. When people walk on trails, eventually tread pressure erosion occurs and vegetation disappears. The area becomes a channel where rainwater flows, soil runs off, and erosion deepens.
According to the former restoration method in Aso, the trails had been restored by only building the stairs to make it easier to walk from the viewpoint of climbers. Such restoration leads to further erosion and collapse within a year or two. This is called human-caused erosion. Why this former restoration method leads further collapse? It is because they are restored from the human perspective and ignore the root cause why the erosion has occurred. The main root cause is a channel where rainwater flows. The former restoration creates a vicious cycle of further erosion and destruction, destroys the mountain ecosystem.
Therefore, we are working with the Ministry of the Environment on a new approach to the restoration of these damaged trails. The restoration method we are working on now is, mainly to restore the ecosystem of the damaged trails. Firstly, we observe the causes of erosion and restore the trails along with it. For example, control the flow of rainwater and restore lost soil, and create an environment where the base of the ecosystem can live again. As a result, the vegetation will be restored and trails will be restored that are difficult to break. In order to restore the ecosystem, it is basically necessary to recreate the soil of the surrounding environment, thus materials to be used are often taken from the area around the trails.
By restoring the trails from a nature-centered perspective rather than a human-centered, we can restore a trail that can be sustainably conserved. We have been in part of this professional team and have been teaching it to people who maintain for 5 years in Aso.
When incorporating trekking into Geotourism, we should create trails by predicting the root cause of ecosystem.

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THE MANAGEMENT MODE OF MEGA GLOBAL GEOPARK: TAKE ALXA DESERT GLOBAL GEOPARK AS AN EXAMPLE

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Alxa Desert UNESCO Global Geogeopark is located in the westernmost of Inner Mongolia, China, the major geoheritage is desert and gobi, wind-eroded geomorphology, flowing water geomorphology and lakes and swamps. The Geopark is vast and sparsely populated, with an area of 270,000Km^2, It is currently the world's largest global geopark and the only desert geopark.

Since joining the Global Geoparks Network in 2009 and becoming an UNESCO Global Geopark in 2015, Alxa Desert UNESCO Global Geopark has made remarkable achievements over the past 25 years, especially in management mode, desert research, heritage protection and conservation, utilization and sustainable development.

The Administration for Alxa Desert UGGp, with a total of 43 staff members, the management functions includes geoheritage protection and conservation, planning, supervision, science popularization, etc.; In order to have full cover of the entire geopark, 3 branches were set up in respective administration counties, which are the Zuoqi (Left or East) Banner Branch, Youqi (Right or West) Banner Branch , and Ejina Banner Branch, Each branch has a Geopark Department, a Protected Area Department and a Scientific Research and Popularization Department, dedicated to the protection and conservation of geoheritage, wildlife and popular science education. As a public institution supported by local finance, the Administration for Alxa Desert UGGp receives approximately 2 million project funds annually, mainly used for the conservation, infrastructure and management of the geopark. Especially in the past three years, through geoheritage investigation projects, the current status of existing geoheritage has been clarified, and many new geoheritage with important potential values have also been newly discovered, enriching the geological resources of the geopark and enhancing its scientific value and attractiveness. Under the close co-operation with authorities of tourism, science & technology, cultural heritage protection, public education, the geopark management capabilities, construction and publicity have been strengthened, the popularity and influence have steadily increased.

Keywords: Desert Global Geopark; management mode; Alxa

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THE TOURISM PROMOTION OF THE TAK PETRIFIED WOOD GEOPARK

Nuthawut Thawikuakulkit

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This academic article aims to publicize and raise awareness of the Tak Petrified Wood Geopark among tourists. The discovery of petrified wood in Ban Tak District, Tak Province, has garnered significant attention, leading to its recognition as the longest petrified wood in the world by Guinness World Records (GWR) on July 11, 2022. This recognition has increased the visibility of the petrified wood domestically and internationally. With the collaboration of the Tak Provincial Administrative Organization, the Tak Petrified Wood Geopark has undertaken efforts to elevate its profile by establishing eight tourist routes within the park. These routes include key attractions, which are 1) the Tak Petrified Wood Geopark, 2) Bhumibol Dam, 3) Pha Sam Ngao, 4) Wat Phra Borommathat (Ban Tak), 5) Wat Phra Phutthabat Doi Lon, 6) Doi Soi Malai, 7) Granite Stone Mortar, and 8) palm leaf weaving products. Additionally, various informative materials have been developed to promote Tak Province's tourism, including directional signs for the Tak Petrified Wood Geopark, a travel guidebook for Tak Province, promotional videos on YouTube, and a QR Code for more information. These materials provide comprehensive information on Tak Province's tourism offerings, including cultural landmarks, local traditions, rural lifestyles, local cuisine, and natural attractions. The promotional content includes details about accommodation services, restaurants, coffee shops, souvenir shops, OTOP goods (One Tambon One Product), and travel routes in Tak Province. The objective is to enhance the economic and social value of local tourism, resulting in an expansion that will bring both domestic and international visitors to Tak Province. This will subsequently increase the demand for goods and services, including accommodation, restaurants, and souvenirs, distribute income to local, provincial, and regional communities, and preserve the natural resources and fossils in the area for future generations.

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THE TRANSNATIONAL HANTANGANG UNESCO GLOBAL GEOPARK: A PATHWAY FOR TRANSBOUNDARY COOPERATION AND SUSTAINABLE DEVELOPMENT BETWEEN SOUTH AND NORTH KOREA?

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The Hantangang River UNESCO Global Geopark (HRUGGp) is located in the northernmost part of South Korea, near the border with North Korea. The Geopark shares similar geological features with the North Korean lava plateau region, offering potential for a transboundary Geopark. When the HRUGGp was first designated in 2020 and revalidated in 2024, recommendations were made to consider collaboration with the North Korean region, and research on this has been conducted.

The HRUGGp is unique not only for its natural scientific features, such as geology and ecology, but also for its historical and cultural significance formed due to the Korean War and ongoing division of the peninsula. This makes it distinct from other Geoparks around the globe.

Given these unique characteristics, the HRUGGp has strong potential as an attractive tourist destination. This could positively contribute to sustainable regional economic development, aligning with the United Nations' Sustainable Development Goals.

To move forward, instead of immediately including a large area of North Korea, it may be more effective to begin by incorporating smaller Sites of Geological Interest near the border. This could quickly demonstrate the economic benefits of HRUGGp tourism to North Korea, encouraging cooperation.

Although this is a politically sensitive issue, sustained efforts and gradual dialogue through the HRUGGp could pave the way for collaboration between South and North Korea. Currently, HRUGGp is jointly managed by five local governments in South Korea (Gyeonggi Province, Gangwon Province, Pocheon City, Yeoncheon County, and Cheorwon County), but there is no unified management system. Therefore, establishing a unified management system for the Geopark in South Korea is a necessary first step before engaging in discussions with North Korea.

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TOWARD THE DEVELOPMENT OF A NEW VISIBILITY STRATEGY OF ASO UNESCO GLOBAL GEOPARK WITH SDGS CONCEPT: PRELIMINARY REPORT

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Aso UGGp is challenging to improve its visibility, which was pointed out during the recommendation in 2022. Recently, some important developments regarding visibility improvement have been observed in several Geoparks. For example, Salpausselkä UGGp's Accessibility in Geotourism (Oksanen, 2023), Swabian alb UGGp's Criteria for Geotrail evaluation (Julian and Heidi, 2022), and Raja Ampat UGGp's GGN best practice award for integrated offline and online visibility. They all have in common the obvious need for SDGs, universal design, and integrated information dissemination strategies that go beyond the mere dissemination of geological information and the Geopark concept.

Therefore, Aso first decided to improve the situation from the perspective of SDG 12, especially Target 12-8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

In Aso, the "people everywhere" referred to in the SDGs are the residents who have lived in Aso for generations, migrants from Japan. And also we have a small number of migrants from Germany, Belgium, France, England, Thailand, Indonesia, Vietnam, Kenya, and other countries.

And the above people include seniors, youth, and kids, with diverse values and religions. In addition, there are the socially vulnerable, such as the sick, the disabled, the elderly, pregnant women, and those with mental health problems. The so-called "local people" are so diverse in the case of Aso. Add to these situations, after COVID-19, the number of travelers is rapidly increasing. So, the target is very complex.

In this context we think that our approach should not be a simple redesign, but rather a method that communicates as much as possible to" all people". And we, as Aso, would like to find a method that uses all five senses, not just visual expression. In this presentation, we will introduce our findings through discussions with local collaborators, activities conducted with our partner, National Aso Youth Exchange House, and lessons given to an international vocational school in the Aso area. We would then like to build a good visibility strategy based on the feedback from the participants and good practices.

Keywords: SDGs, Visibility, Universal design
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TWENTY YEARS OF CHINA'S UNESCO GLOBAL GEOPARKS: GEOHERITAGE, GEOCONSERVATION AND GEOTOURISM IN CHINA'S UGGPS

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Since the Global Geoparks Network was established in 2004, China has begun to develop UNESCO Global geoparks. Thanks to its vast territory and complex geological and geomorphic features, China has diverse geoheritage and some geological features can even be considered as world-class. The geoheritage can be divided into four categories and 20 subcategories. In order to conserve geoheritage and develop geotourism, China has established 289 National Geoparks and 47 UNESCO Global Geoparks during the last two decades. This paper analyzes the geological and geomorphological setting of China, and classifies the geoheritage in China; reviews the historical development and the status of the geoparks in China; and discusses geoconservation and geotourism in Chinese geoparks, as well as the main challenges and sustainable development goals in the future.

Keywords: geopark; geotourism; geoheritage; geoconservation; sustainable development goals

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ADVANCES ON GEOHERITAGE RESEARCH AND SCIENCE POPULARIZATION IN ZHANGJIAJIE UGGP OF CHINA

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Zhangjiajie UNESCO Global Geopark (UGGp) is located in the western Hunan Province of China, with landscapes characterized mainly by more than 3000 sheer vertical sandstone pillars, peaks and walls of 30-350 m high. These spectacular features have made it the first national forest park of China in 1982, a UNESCO natural heritage site in 1992, and a member of Global Geopark Network in 2004. However, the outstanding landscapes were made well known to the public only in early 1980, and detailed research work has been lacking on the mechanisms and timescales of the longer-term evolution of this spectacular type of geoheritage.

Using cosmogenic dating method combined with GIS analysis, the erosional processes and their relative roles in the formation and decay of the landscapes in Zhangjiajie UGGp have been investigated in detail recently. The results of the study demonstrate clearly that the model maximum-limiting bedrock erosion rates are the highest along the narrow fluvial channels and valleys at the base of the sandstone pillars (~83–122 mm kyr^{-1}), and lowest on the peak tops (~2.5 mm kyr^{-1}). Importantly, the study identifies that the sandstone landscape formation in Zhangjiajie UGGp commenced in the Pliocene, and that the general evolution of the landscape followed a sequential refined model: (i) slow lowering rates following initial uplift; (ii) fast plateau dissection by headward knickpoint propagation along joints and faults followed by; (iii) increasing contribution of stonewall retreat in the well-developed pillars and peaks and a gradual decrease in overall denudation rates, leading to; and (iv) the final pillars and peaks.

In light of the study results, a series of international academic exchange and science popularization activities have been conducted in Zhangjiajie UGGp. These include the launch of the products of Research-Study-Tours in March, 2023, the organization of the International Workshop on Theory and Modelling of River Systems and Zhangjiajie Landscape during November 13 to 15, 2023 and more. This presentation will provide a detailed introduction of the research and activities.

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APPLYING DISASTER MITIGATION AND GEOPARK PHILOSOPHY TO AN EDUCATIONAL TOUR: ENVIRONMENT AND DISASTER MITIGATION LEARNING PROGRAM IN MUROTO UNESCO GLOBAL GEOPARK, JAPAN

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Muroto City located in western Japan, faces the Nankai Trough, a plate subduction boundary, and has been hit by major earthquakes and tsunamis many times in the history. One of the aims of the Muroto UNESCO Global Geopark (MUGP, hereafter) is to create a sustainable city by learning from the Muroto peoples who have traditionally co-existed with nature including natural disaster. Based on this aim, we started an educational tour program, the Environment and Disaster Mitigation Learning Program, in October 2020, by applying disaster mitigation initiatives of Muroto and the philosophy of geopark to the content.

By July 2024, total of 2,500 pupils and students from 36 schools had joined this program mainly in western Japan. Most participants join this program as a part of their school trips and visit MUGP by bus arranged by their school. First, they learn about the relationship between strata and earthquakes at Cape Muroto, a represented geological site of MUGP, and then learn about tsunami measures in Muroto City at the tsunami evacuation shelter. Finally, they learn two-sides of nature (disasters and blessing) through a lecture by specialists of MUGP.

This program is currently the most popular program in MUGP in terms attract visitors, with an average of about 500 pupils and students per year participating over the past five years. Local resident guides and instructors join the program as staff and generate their own income. The program brings in ca. 9,000 USD (1.4 million JPY) per year in revenue to MUGP and is successful as sustainable tourism.

Keywords: Educational tour, Disaster Mitigation Learning, two-sides of nature (disasters and blessings)
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BECOMING A GOOD STORYTELLER OF GEOSCIENCE, MAKING A GOOD START OF THE UGGP BRAND

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Longyan Global Geopark is located in Longyan City, the western part of Fujian Province, covering 25 townships and 222 administrative villages in Xinluo District, Shanghang County and Liancheng County, with a population of 312000 and an area of 2175km^2. It boasts abundant geo-heritages including the Meihuashan granitic complex, the Guanzhaishan red bed sedimentary rocks and the Zijinshan super-large copper-gold deposit. Besides, it has not only rare biodiversity resources represented by Panthera tigris amoyensis (South China tiger) and the Taxus chinensis var. Mairei (Chinese Yew), but also a long history of Hakka culture preserving many national intangible cultural heritages such as Western Fujian Hakka Spring Lantern Celebrations and the art of woodblock printing, etc. All in all, Longyan Global Geopark is a comprehensive geopark that integrates rich geological landscapes, excellent ecological environment, and profound cultural heritages.

In recent years, Longyan Global Geopark has been committed to the topic of education, taking multiple measures to promote geoscience education and popularization such as building hardware facilities, improving software strength, actively carrying out science popularization work, etc., which has achieved fruitful results. Next, our geopark is planning to make efforts in innovating science popularization forms, expanding science popularization content, strengthening cooperation and communication and activating social science popularization forces to further enhance education and science popularization work, becoming a good storyteller of geoscience and making a good start of the UGGp brand.

Keywords: Longyan Global Geopark; Hardware facilities; Software strength; Science popularization forms; Cooperation and communication;

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CHEONGSONG GEOPARK EDUCATION PROGRAM FOR THE POPULARIZATION OF GEOPARK

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The Cheongsong UNESCO Global Geopark education program aims to promote sustainable development and conserve geological sites by popularizing geopark programs. The program's key elements include collaboration with local institutions and initiatives targeting various age groups. Due to low birth rates and an aging population, the number of children in the area is limited. To foster local pride among children and students, the Geopark team works with the Education Office and local schools to offer educational programs that make learning about the geological features of Cheongsong Geopark both accessible and engaging. A prominent initiative in this collaboration is the "Geopark Cooperation Schools" program, which includes three elementary schools, two middle schools, and one high school. The Geopark team works with these schools to provide students with enjoyable and easy-to-understand geopark education activities. Examples include exploring geological sites, conducting volcano explosion experiments, participating in fossil excavation experiences using coffee grounds, and creating geological sites using recycled materials. In elementary schools, "Geopark" is even included in the regular curriculum, with teachers working together to develop and use textbooks.

Additionally, the Geopark has expanded its educational outreach to raise awareness among the elderly, who make up over 42% of the local population. To accommodate elders with mobility issues, programs are conducted at senior colleges, community centers, and welfare centers. These activities also provide a platform for elders to share their personal experiences of living in Cheongsong with the interpreters. Through these efforts, the Cheongsong Geopark education program not only disseminates knowledge about the geopark but also raises awareness of the importance of conserving geological sites, thereby contributing to the region's sustainable development.

Keyword: Geopark
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CREATING PICTURE BOOK FOR THE INHERITANCE OF REGIONAL CULTURE

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The Nanki Kumano Geopark in Wakayama Prefecture, Japan is currently facing rapid population decline and aging, posing a risk of losing the bearers of regional culture. Folktales, in particular, reflect the lives and cultures of the local people, while dialects contain information on regional values and social customs passed down through words. These are invaluable cultural assets, but modern children have fewer opportunities to engage with them. To address this issue, we have been working since 2021 to convey folktales and dialects to children through the creation of picture books, aiming to preserve regional culture.

The picture books we create feature folktales set in the scenic spots within the geopark. By expressing these stories in the local dialect, we strive to pass down regional culture to the next generation. To capture children's interest and curiosity, we use the frottage technique for the original illustrations. This technique involves placing paper over real rocks and plants within the geopark and rubbing with a pencil to create textured patterns for the backgrounds. Additionally, we include explanatory pages with diagrams and photographs of the folktale settings to enhance children's understanding.

The picture books are distributed to all kindergartens, elementary schools, and libraries within the geopark area and are utilized in various educational activities. For example, teachers in elementary schools read the books to children, libraries offer them for lending and promotion, and middle school students engage in geopark studies through folktales, participating in the book creation process. In high schools, students learn about the geopark's history and culture based on the folktales and conduct dialect-based storytelling activities for younger children in libraries.

Given the ongoing decline in the child population and aging demographic in the Geopark area, opportunities to engage with regional culture are expected to decrease further. Schools and libraries have expressed a strong desire for the continuation of picture book production. Therefore, we plan to continue providing opportunities for children to familiarize themselves with folktales and dialects through picture book creation, thereby contributing to the inheritance of regional culture, promoting intergenerational exchange, and fostering regional pride.

Keywords: Education, Dialect, Cultural Heritage, Picture Book, Teaching Material
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CROSS-MEDIUM GEOPARK EDUCATION: A CASE STUDY OF ASPIRING GOMBAK HULU LANGAT GEOPARK

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The more comprehensive evaluation of primary students (age 7-12) in education in Malaysia had taken the element of the curriculum, co-curriculum and self-development. Embedding geopark knowledge to all the aspects of evaluation for the primary school level is through a series of discussions and workshops with teachers and district or state education departments. This process is crucial to minimize imposed syllabubs with minimal understanding of the environment while maximizing the usage of the geopark. The simplified process includes a series of workshops known as Introduction to Geopark, connecting subjects to geopark, creating curriculum, co-curriculum and self-development before a refining workshop to come out with a booklet to be used by teachers in their classes. This program involved three selected primary schools representing three main local authorities within the geopark, 46 teachers and two officers of district education.

Keywords: aspiring geopark, urban geopark, Selangor Malaysia, SDG 4 Education
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DEVELOPMENT OF SCIENCE EDUCATION AND ASTRO-TOURISM IN KHON KAEN GEOPARK

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The unique geological features of Khon Kaen Geopark include the formation of syncline and anticline mountains. The syncline structure is located on the eastern side, while the anticline structure is on the western side. Over time, erosion has worn away the less resistant rock layers, forming a flat plain in the middle, while the more erosion-resistant Phra Wihan rock formation remains as high mountains with lush forests, serving as a source of water. These high mountains and forests are preserved within Phu Wiang National Park, which is far from human light pollution, maintaining an environment conducive to astronomical observations. The natural heritage site's dark sky allows for naked-eye observation of celestial objects. Given these features, Khon Kaen Geopark has recognized the importance of developing astronomical education and astro-tourism. Collaborations with various partners include:1. National Astronomical Research Institute of Thailand (NARIT): Conducting training programs to promote astro-tourism, providing fundamental knowledge and astronomical equipment training to youth, students, educators, hotel operators, and local guides.

Khon Kaen Provincial Administrative Organization (KKPAO): Supporting astronomy education by providing telescopes to network schools in Khon Kaen Geopark for use in both core and elective astronomy courses. 3. PHU WIANG NATIONAL PARK: Registering as a Dark Sky Park to serve as a learning and eco-tourism site, raising awareness about the impact of light pollution on ecosystems among students and the public. 4. Khon Kaen Office of Tourism and Sports: Developing artistic photography media for professional and amateur photographers, showcasing astronomical natural beauty such as planets, constellations, and the Milky Way to promote Khon Kaen Geopark tourism. 5. Baan Rai Nai Kiew Café and Restaurant: Collaborating to register as a private Dark Sky area, raising public awareness about light pollution's ecological impacts. These efforts to develop science education and astro-tourism in Khon Kaen Geopark aim to enhance local and public appreciation for natural heritage, reduce light pollution's ecological impact, and contribute to sustainable development.

Keywords: Science Education, Astronomical Education, Dark Sky, Astro-tourism, light pollution
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EDUCATION AND SCIENCE POPULARIZATION OF THE GLOBAL GEOPARKS FEATURING DANXIA LANDFORMS

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Global Geoparks featuring Danxia landform have extremely high value in geology, geography, and natural science education. These geoparks not only showcase the wonders of natural forces, but also provide important windows for us to explore the history of the Earth and understand geological processes.

Danxia landform is famous for its vibrant red sandstone layers and steep cliffs. In China, Danxia landforms are widely distributed and have formed several well-known geoparks, such as the Danxiashan UGGp, Taining UGGp, Longhushan UGGp, Zhangye UGGp, and Linxia UGGp. These geoparks not only attract many tourists to visit but also serve as important bases for geological scientific research and popular science education.

In terms of popular science education,geoparks of the Danxia landform type play an irreplaceable role. Firstly, they provide the public with an opportunity to have a direct and intuitive understanding of Earth history and geological processes. Moreover, by highlighting the similarities and differences between the evolution of Danxia landforms in the south and north China regions, visitors can better comprehend landscape evolution under joint influences from Earth's history and external forces. These hands-on experience helps ignite public interest in natural sciences while enhancing their comprehension about Earth's environment.

Moreover, Danxia landform, with its unique red cliffs and varied shapes, has become a treasure of China's natural scenery. This geological feature not only has high aesthetic value, but also carries rich cultural connotations. In Chinese culture, red has always been regarded as a symbol of good luck, joy, and solemnity. The red of the Danxia landform perfectly aligns with this cultural emotion, making the Danxia landform area an important place for people to pray for blessings, seek good fortune, and express their emotions. In addition, the Danxia landform area has close ties with China's religious culture. Taoism and Buddhism, as traditional religions in China, have left profound marks in the Danxia landform areas. In summary, geoparks of the Danxia landform type play a crucial role in science popularization by showcasing not only the natural beauty and geological wonders but also offering valuable insights into the development of Chinese culture.

Keywords: Danxia landform, geoparks, science popularization, culture
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EFFICIENT SCIENTIFIC RESEARCH RESULTS THE HEXIGTEN UGGP SCIENCE FEAST

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Hexigten UNESCO Global Geopark is located in the eastern part of Chifeng City, Inner Mongolia Autonomous Region, China, with the administrative boundary of Hexigten Banner as the Geopark's boundary. It is a comprehensive global geopark that integrates natural scenery, geoheritage, rich biodiversity, and ethnic culture. Since joining the Global Geoparks Network in 2005, Hexigten UNESCO Global Geopark has achieved remarkable results in scientific research and popular science education after 20 years of thoughtful planning and working. The field of scientific research covers a wide range, the transformation of scientific research results is effective, the forms of popular science reading materials are diverse, and the popularity of science is widely received. Through 14 scientific research projects, such as "*Survey and Research of Quaternary Glacial Geoheritage in the Hexigten UNESCO Global Geopark*", geology, climate, hydrology and other fields were covered. Moreover, there are 15 scientific research monographs such as "*The Impact of the Ecological Environment of the Global Geopark on the Protection of Geoheritage*" and 22 popular science books such as "*The Electronic Guide Manual of the Global Geopark of China (Chinese, English and Mongolian)*", which are written in Chinese, English and Mongolian languages, facilitating the popularization of education and international exchanges. The documentary video "*Guarding the Nature*" and 11 other audio-visual products, together with picture album *"Hexigten UNESCO Global Geopark*", leaflets, popular science interpretation boards and exhibitions, enrich the form of popular science, enhance public participation. These achievements have not only promoted the sustainable development of the geopark but also actively responded to the United Nations Sustainable Development Goals, such as quality education, climate action, and life on land. Hexigten UNESCO Global Geopark attracts people from all over the world with its unique geoheritage, rich natural landscape and profound cultural heritage. Looking to the future, Hexigten UNESCO Global Geopark will continue to deepen the integration of scientific research and popular science, promote the protection and inheritance of geoheritage, and make greater contributions to the cause of geological scientific research and popular science education.

Keywords: scientific research; popular science education; Hexigten
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ENRICH EDUCATION PROJECT THROUGH MULTILATERAL SUPPORT

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In 2020, Huangshan UGGp started an education project - Huangshan Nature Lecture - to transfer nature related science and Huangshan regional knowledge. This project evolves from various education activities of Huangshan UGGp carried out within the last decade. The project is launched by Huangshan Geopark Museum, which is responsible for main education activities of the Huangshan Geopark Administrative Committee. The project has gotten strong support from multiple sides like the Huangshan Municipal Association for Science and Technology, the Huangshan Municipal Library, and the 332 Geological Team of the Provincial Bureau of Geology and Mineral Resources, and some NGOs.

The project is free for the public and serves mainly the entire Huangshan city, and holds activities in other cities occasionally. It focuses on geology, bio-ecology, meteorology, climate and other natural science information of Huangshan, taking into account local and hot natural phenomena.

It takes various forms such as lectures at designated venue, activities in diffident schools in different districts and counties, and outdoor nature observation to attract young people and parents, letting them better understand the nature around us, and spread the idea of "respecting , conforming to, and conserving the nature".

Since its implementation, a total of 60 science education activities have been carried out, with over 4500 families participating and nearly 200 thousand beneficiaries. In 2021, during COP26, the Huangshan Nature Lecture was selected as one of the ten best practices of UNESCO Global Geoparks in response to climate change.

And as a UNESCO multi-designated sites, Huangshan presents not only the geopark information, but also world heritage and biosphere information to the public. The Huangshan Nature Lecture is launched by the geopark museum, and supported by our 3 offices dedicated to the three UNESCO designations. Each office provides their own contents for the public and staff in other departments to learn and get better known about different UNESCO designations.

Keywords: education, community involvement

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EXPLORATION OF SCIENCE POPULARIZATION WORK IN GLOBAL GEOPARKS

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Qinling Zhongnanshan Global Geopark is one of the important global geoparks in China. Its unique geological structure and diverse landscape attract a large number of tourists to visit and explore. However, in the process of geopark development and construction, there are some areas that need to be improved, such as the science education. Therefore, this article aims to study the current construction status and popular science methods of Qinling Zhongnanshan Global Geopark, in order to provide valuable references for the management and popular science education of the Global Geopark. Firstly, an overview of Qinling Zhongnanshan Global Geopark is provided, including its geological features, beautiful sceneries and science popularization constructions etc; secondly, analyze the science popularization conditions of Qinling Zhongnanshan Global Geopark and present its science popularization modes; finally, several suggestions are proposed to improve the science popularization work of Qinling Zhongnanshan Global Geopark. This article proposes corresponding improvement suggestions based on the current situation of the science popularization construction in the geopark, in order to improve the quality of science popularization among geopark visitors. The significance of this study is to help geopark managers better understand the current situation of the geopark, master effective methods of science education, and further enhance the popularity and attractiveness of Qinling Zhongnanshan Global Geopark.

Keywords: Qinling Zhongnanshan Global Geopark, Science Popularization, Suggestions

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EXPLORING NATURAL WONDERS AND EXPERIENCING THE CHARM OF CHANGBAISHAN UGGP-CASE STUDIES IN SCIENCE POPULARIZATION

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Changbaishan UGGp is in the southeast Jilin Province, People's Republic of China, bordering the Democratic People's Republic of Korea in the south and east boundaries. The Geopark is characterized by the Quaternary volcanic landform, with crater lake-Tianchi Lake at the top of Mount Changbaishan, grand gorges, thermal spring groups, waterfall, forest at the valley bottom, vertical vegetation zone and abundant wild animals and plants, as well as profound cultural history, covering an area of 2,723.832 m^2. Changbaishan UGGp is one of the best examples of well-preserved natural and richest biodiversity on the same latitude around the globe, many wild animals and plants species have enjoyed the national key protection. The well developed and preserved five vertical vegetation zones from the Temperate to polar ones are of great scientific value. Meanwhile, Mount Changbaishan has a cultural history of over 2,000 years, it has been a homestead of many minorities. Relying on the resources of the Changbaishan UGGp, we have regularly organized educational activities. Such as organizing themed events, summer camps, hiking and field trips, popular science seminars, painting and calligraphy competitions, etc. Changbaishan UGGp is richly endowed by unique gifts of geological and Natural resources, as well as pure and hard-working local people, marking an example of harmonious coexistence between human beings and nature.

Key words: Changbaishan UGGp; Science Popularization; educational activities.

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GEOPARK ACTIVITIES IN A SOCIETY WITH AN AGING AND DECLINING POPULATION

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Japan is facing a unique challenge with its aging and declining population, which is occurring at a pace never experienced before. This is a challenge that other countries will encounter in the future. Interventions to cope with the aging and declining population, as well as a lower birth rate, are a significant challenge for Miné-Akiyoshidai Karst Plateau Geopark in terms of conducting sustainable operation management. While there are various approaches to address these issues, such as introducing measures to boost the birth rate, the geopark is currently focused on reducing population outflow.

At Miné-Akiyoshidai Karst Plateau Geopark strongly promotes geopark learning for children aged 6 to 14. The program aims to provide systematic and long-term connections with people from various regions over nine years. This approach enables children to engage in proactive, interactive, and learning experiences that enable them to gain an in-depth understanding of the region where they were born and raised, how the Earth was formed, and how this formation process has influenced the economic, cultural, and artistic activities of the region's inhabitants. as well as how it has shaped the world we live in today. To facilitate the further development of these learning experiences at schools, a comprehensive booklet has been developed to provide the explanation of the international significance of the geopark area and introduces relevant educational activities has been prepared for teachers.

Furthermore, by engaging the geopark's network and interacting with people from various regions, children can enhance their understanding of the area where they live. Young people need a reason for deciding to settle in a certain area. It is important to nurture children who feel love and pride towards their hometown and have a mindset where they seek to improve the present and future circumstances even through small steps. This will take a steady and long-term effort but will surely contribute to the sustainable development of the geopark area.

Keywords: Miné-Akiyoshidai Karst Plateau Geopark, aging society, population decline, geopark education, learning

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GEOPARK EDUCATION AND SCIENCE POPULARISATION OF TUBA GEOTRAIL, LANGKAWI UNESCO GLOBAL GEOPARK, MALAYSIA

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The Tuba Geotrail in the Langkawi UNESCO Global Geopark, Malaysia, is the latest design of a geotrail for geotourism after the Kubang Badak Biogeotrail. It is a crucial platform for geopark education and science popularisation. Located within the Dayang Bunting Marble Geoforest Park, the geotrail showcases the region's diverse geological heritage and landscapes, providing visitors with insights into the area's 490-million-year-old history. Pulau Tuba, the third largest island in LUGGp, has a population of around 5,000 people, mostly traditional fishermen. Despite its location near Kuah City (only 15-min boat ride), it has not been developed yet as a geotourism product. The Tuba Geotrail was, thus, developed to increase the number of geoproducts and opportunities for community involvement on geopark, and to produce multi-geotrails to provide choices for tourists to enjoy the diversity of geological, biological and cultural heritage of Tuba Island. The trail uses interpretive panels and guided tours to communicate the scientific significance of the geosites, biosites, cultural sites, and other interesting sites, fostering appreciation for the region's geological wonders. It also serves as an outdoor classroom for students and researchers to engage in hands-on learning activities, such as rock identification and geological mapping. The geotrail's role in science popularisation extends beyond the local community, attracting both domestic and international visitors who will gain a better understanding on the importance of geoparks and the need for natural and cultural heritage conservation efforts. By highlighting unique heritage features and the interconnectedness of the natural environment, the Tuba Geotrail contributes to the Langkawi UNESCO Global Geopark's objectives of promoting sustainable tourism and stewardship for the region's natural heritage.

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GEOPARK EDUCATION AND SCIENCE POPULARIZATION ON THE WEBSITE OF CHINA'S GLOBAL GEOPARKS

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By the end of June 2024, China had 47 UNESCO Global Geoparks.
Each geopark has its own website. There are two main functions of the geopark website: output and input. The output function is to display the geopark characteristic scenery to the public through the website, release the latest news of the geopark, and provide tourists with tourism service information. Through the browsing statistics, the content of the geopark websites mainly include the following aspects: about the geopark (brief introduction, resources, management structure), news (announcements, activities), education and research (basic knowledge, geopark knowledge, educational programs, research programs, protection and conservation), partnership and networking (geopark networks, sister geoparks, partnership, communities and sustainable development), geotourism (resource maps, geotourism routes, geotourism services), resource downloads (pictures, videos, sheets, maps), contact us and links (related websites such as UNESCO, GGN, Regional Geoparks Network, sister geoparks, partners, etc.). Input function means to communicate with the public through the website, such as online questionnaire, online consultation, message area, or leave the email address and phone number of the geopark management department, which is the most common way. About a quarter of the websites set up a message area, only a few geopark websites set up an online questionnaire function.
In addition, the main languages of the geopark websites are Chinese and English, three geopark websites are also set up in Japanese and Korean, and two other geoparks are set up in indigenous languages. Geopark websites need to be updated regularly, of which 6 geopark websites update 5-10 articles per month, 5 geoparks update about 5 articles per month, and most geoparks update 1-3 articles per month.

Keywords: geopark education, website, update
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LUCID WATERS AND LUSH MOUNTAINS ARE INVALUABLE ASSETS: GEOPARK EDUCATION AND SCIENCE POPULARIZATION OF LUSHAN UNESCO GLOBAL GEOPARK

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Lushan Global Geopark is located in the north part of Jiangxi Province. It is located south of Yangtze River and to the east of Poyang Lake. It covers an area of 548 km^2. In 1996 Lushan was included on the UNESCO World Heritage list as the 1st World Cultural Landscape in China. In 2004 Lushan became one of the 1st Global Geoparks in the Global Geoparks Network.

Lushan is well-known for its unique and complex multi-genetic landforms, which are composed of Quaternary glacial erosion, horst fault block mountain and metamorphic core complex landforms of mountains in eastern China. Its landforms are closely integrated with botany, culture and history. There are areas of fantastic natural beauty, including dense forest, running streams, waterfalls, gorges, ridges and peaks. Villas of Chinese and western architectural styles are scattered among the mountains. Five religious cultures coexist in harmony here. A strong historical inheritance and the deep Chinese and western culture roots make this a cultural sacred mountain.

Since the Geopark became the member of the family of Global Geoparks Network in 2004, adhering to the idea of "Celebrating Earth Heritage, Sustaining Local Communities", focusing on the three major goals of protection, education, and sustainable development, and firmly upholding the idea that "lucid waters and lush mountains are invaluable assets", Lushan UGGp enhances the conservation of geological relics, promotes the infrastructure construction, promote the geopark visibility and interpretation system, and promote geo-science education to support the sustainable development of local economy so as to realize a harmonious and long lasting co-existence of human and nature, and made contribution on protecting the global ecological environment and achieving green and low-carbon development.

Keywords: education and science popularization
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MANAGING VISITOR EXPERIENCE AND APPRECIATIVE ATTITUDES: APPLYING TRADITIONAL ECOLOGICAL KNOWLEDGE TO GUIDED TOURS IN SARAWAK DELTA GEOPARK, MALAYSIA

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A Traditional Ecological Knowledge (TEK) is a sub-set of indigenous knowledge which represents a cumulative body of knowledge, practice and belief acquired over thousands of years by indigenous peoples through direct human contact with the environment. A plethora of studies over the past decade found that the application of TEK can help improve natural resource management and biodiversity conservation practices. Despite its progressive erosion worldwide, there has been little efforts in promoting and reviving the TEK in the context of ecotourism and biodiversity conservation, particularly in totally protected areas. In conservation area management, thematic interpretation is commonly regarded as a strategic communication tool in helping to achieve desired educational, behavioural and conservation outcomes. An experimental quantitative research, underpinned by the TORE model of interpretation was employed in selected Sarawak national parks located within Sarawak Delta Geopark. This was done to investigate the efforts of trained tour guides to examine whether their planned TEK theme-based interpretive guided tours could make a difference in influencing tourists' cognitive, affective and behavioural outcomes. Data was collected through post self-assessment questionnaire from the survey of 380 visitors immediately at the end of their guided tours and were analysed using Statistical Package for Social Sciences (SPSS). Analysis revealed strong correlation of the overall quality of the guided tours that had affected the levels of visitor's knowledge, beliefs and experiences. The study found out that the TEK theme-based interpretive guided walks produced significant levels of cognitive, affective and behavioural outcomes among visitors. These findings confirm that well-crafted and delivered TEK theme-based interpretive guided tours can make a difference in how tourists think, feel and behave with respect to the natural history, geosites, biosites and cultural sites of the parks the tour guides had interpreted. The study concluded that the use of TEK in thematic interpretation can help park managers, interpretive planners and tour guides to improve visitors' experiences and promote appreciative attitudes while they are in the parks. By extension this contributes to the better protection and conservation objectives of protected area management. The study also helped to promote and revive some of the elements of much eroded TEK of local communities.

Keywords: Malaysia, Sarawak Delta Geopark, traditional ecological knowledge, thematic interpretation, national park, guided tours, park guides, ecotourism.

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NINGDE UGGP'S EXPLORATIONS AND ACHIEVEMENTS IN SCIENCE POPULARIZATION AND STUDY TOURS

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Ningde UNESCO Global Geopark, located in Ningde City, Fujian Province, China, is renowned for its unique geological landscapes and abundant geological relics. Our geopark's core scenic areas include Taimushan, Baishuiyang-Yuanyangxi, Baiyunshan and Liyuxi-Jiulongji, covering a total area of 2,829.82 square kilometers. It encompasses a variety of landforms, such as miarolitic landform, volcanic landform, fluvial erosion landform, and coastal landscapes, making it the geographical grand sight in the southeastern coastal area of China. In terms of science outreach, Ningde Global Geopark actively participates in various domestic and international science popularization activities, collaborating closely with CGN to organize thematic events like Earth Day, Cultural and Natural Heritage Day, and National Science Popularization Day. Our geopark also expands its scientific outreach influence through various forms, such as online courses, science brochures, and geological heritage exhibitions. In recent years, particularly, our geopark has collaborated with universities, research institutions, and sister parks to develop educational programs catering to all age groups, which have been widely promoted nationwide and have been well-received by teachers and students. Moreover, our geopark is committed to creating nature education bases, such as the Fu'an Baiyunshan National Scenic Area Nature Education Base, which integrates science education, research and study practice, and tourism experiences, providing students with a platform to get close to nature and understand science. The park also actively develops research courses with local characteristics, enriching course content and improving service quality, which has garnered positive social feedback. Looking ahead, Ningde UGGp will continue to utilize the resources of universities and research institutions to hold science education activities, raise public awareness of geological heritage protection, and actively participate in domestic and international science popularization activities. By collaborating with sister geoparks, it aims to jointly promote the development of science education.

Keywords: science popularization, study tour, nature education base

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PRIMARY SCHOOL PROGRAM FOR GEOPARK EDUCATION: A CASE STUDY OF PUBLIC ELEMENTARY SCHOOL IN BELITONG UNESCO GLOBAL GEOPARK (INDONESIA)

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Geopark education for primary school students (ages 7-12) plays a crucial role in enhancing their awareness of the world heritage around them, including geological, biodiversity, and cultural heritage. This study explores the implementation of a Geopark education program at a Public Elementary School in Belitong UNESCO Global Geopark. The program includes various activities such as visits to Geopark sites, learning about biodiversity, and understanding local culture, as well as integrating Geopark material into the local curriculum and the creation of a Geopark-related book by the school. The methods used in this research are observation and interviews to gain in-depth insights into the program's implementation, student responses, and the challenges and benefits experienced by the school and the community. The findings indicate that the Geopark education program has a positive impact on students' understanding of the local environment and culture, as well as increasing awareness and concern for the preservation of geological and cultural heritage. This research is expected to serve as a model for the development of Geopark-based education in other schools and provide recommendations for future program improvements.

Keywords: Belitong UNESCO Global Geopark, Geopark Education, Primary School, Local Curriculum, School goes to geopark
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PROMOTING SUSTAINABLE DEVELOPMENT IN HONG KONG UNESCO GLOBAL GEOPARK: THE PHILOSOPHY OF CONNECTING PEOPLE, THE ENVIRONMENT AND SOCIETY

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As a prominent brand under UNESCO, UNESCO Global Geoparks are obliged to adopt the 17 Sustainable Development Goals (SDGs) of Agenda 2030. Based on past experience and insights from the GGN Working Group on SDGs, Hong Kong Geopark has summarised and developed a new approach, emphasizing the relationships (i) between people and nature, (ii) people and people, and (iii) people and society, in different aspects of the work of Hong Kong Geopark. The aim is to advance the sustainable environmental, social and economic development of the Geopark.

The relationship between people and nature is developed by creating opportunities that allow geopark stakeholders and activity participants to directly interact with nature. For example, the use of plants by villagers for herbs and medicine is part of our intangible cultural heritage, and it is recalled and passed on through training on local herbs and displays in exhibitions. In geological excursions, participants are encouraged to touch, observe and experience rock and plant specimens. The process of engaging with nature enables visitors to have a deeper experience and appreciation of the value and importance of nature, thus raising support for environmental protection.

The relationships among geopark staff have been developed through the various networking activities. This concept has recently been extended to local communities and students. Mutual visits are arranged between different local communities; and exchange activities, both in-person and online, are organised between Hong Kong students and students from other geoparks. These initiatives foster sharing, understanding and cooperation, as well as friendship and peace, ultimately supporting the overall well-being of our societies.

Strengthening the relationship between individuals and society plays a crucial role in fostering a deeper understanding of social structures and issues such as poverty and gender inequality. This can be achieved through various geopark activities and events, such as visits to and volunteer work for the underprivileged, and supporting people with handicaps and their artworks. By deepening social awareness and concern, we can promote positive change and strive for equality and justice in society on a broader scale.

Keywords: sustainable development goals, environmental protection, student exchange, social awareness, peace, equality.

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RESEARCH ON THE SEONGSAN ILCHULBONG TUFF CONE TO EXPLORE THE VALUE OF THE JEJU ISLAND GEOPARK GEOSITE

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Seongsan Ilchulbong is a Surtseyan-type tuff cone that was created by explosive interactions of ascending magma and shallow seawater. Its current form is the result of erosion by waves for a long period of time. Previously, it was known to be a monogentic volcano created by a eruption but recent research shows that there might have been earlier volcanic activity whose eruptive products have been removed by erosion, based on the bed attitude, discontinuity, or erosion surface, and chemical composition changes side Ilchulbong.

In order to confirm the traces of the past volcanic activity, undersea geological exploration such as high-precision seafloor topography, seismic surveys, and offshore drilling were conducted in the sea area around Ilchulbong Peak. Additionally, chemical composition and age analysis were conducted using samples obtained through drilling. As a result of precise seafloor topographical exploration, a circular and flat terrace-like terrain presumed to be an earlier crater was identified at a location approximately 600 meters southeast of Seongsan Ilchulbong Peak. Offshore drilling showed that it was made of volcanic rocks such as tuff, scoria, and lava. From a stratigraphic perspective, it can be seen that it was formed before the current Seongsan Ilchulbong.

Therefore, the circular terrace-like topography is interpreted as the remnants of a volcanic body that was formed by an early-stage volcanic activity of Seongsan Ilchulbong. Based on the above result the formation process of Seongsan Ilchulbong can be reconstructed. First, a tuff ring and a tuff cone were formed through early hydrovolcanic activity (StageI,II). Afterwards, the eruption pattern transitioned from hydrovolcanic activity to magmatic eruption, forming a scoria cone and lava pond inside the crater (Stage III). After that, the eruptive center of the volcano moved to the current location of Seongsan Ilchulbong and formed a new tuff cone on the flank of the earlier volcanic body, forming a composite tuff cone with three overlapping volcanic bodies (Stage IV). Afterwards, a significant part of the volcanic body was removed by wave erosion, resulting in the current Seongsan Ilchulbong (Stage V).

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SCHOOL WITH THE UNESCO GLOBAL GEOPARK: EFFECTS ON MUROTO HIGH SCHOOL STUDENTS THROUGH THE ACTIVITIES OF MUROTO UNESCO GLOBAL GEOPARK, JAPAN

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"Muroto City is entirely Muroto UNESCO Global Geopark (MUGGp, hereafter)," meaning its territory encompasses the entire land area of Muroto City. The city's only high school, Muroto High School (MHS, hereafter), currently has106 students. In 2021, MUGGp established a partnership with MHS, and has since been offering both formal and non-formal educational opportunities through Geopark activities. As a result, the students have shown positive impact on students, leading to increase proactivity and self-confidence, as well as greater engagement with both the local community and beyond Muroto City."

The students of MHS developed self-confidence through their participation in Geopark exchange programs. Through the Geopark Networks, MUGGp has facilitated these programs with UGGps in Japan, Malaysia, and Hong Kong as well as provided opportunities to attend the Geopark Symposiums. Before participating in these programs, students gain hands-on experience by visiting the geo-sites, joining geo-guide tours, and learning to introduce their Geopark in their own words. Successfully presenting their work to an audience brings a sense of accomplishment and recognition for their efforts.

Furthermore, MHS students have fostered a stronger affection for their hometown and a greater sense of pride in it. Although many initially complain about Muroto being a rural area with no MacDonalds, shopping malls, cinemas, or extracurricular educational opportunities, involvement in Geopark-related activities provides them with valuable connections. They engage with charming locals working to revitalize Muroto and knowledgeable elderly guides who share profound insight about the area. These experiences help them realize that their hometown has international significance due to its unique geological, natural, and cultural features.

It is essential for MUGGp to support the only high school in the territory to ensure the sustainability of Muroto City. MUGGp plays a crucial role in continuing to serve as a gateway for MHS students to connect with the outside world and to strengthen their civic pride in their hometown.

Keywords: Collaborative Education with Geopark, SDGs: Quality Education
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SHARING OF THE ACADEMIC CAMP EXPERIENCES IN KHORAT UGGP, THAILAND

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The community enterprise group "Go Together, Go Far" in cooperation with Khorat Geopark and Fossil Association and Khorat UGGp network hotels organized the educational camp activities. The participants ranged from pre-school to secondary school level who participated with their parents and teachers. The camps were an intensive academic camp combined with art creative activities, including Nature Advance Camp and Fossil 101 Camp. A total of 40 people registered to attend. The activities were designed to emphasize hands-on experience and interaction with local resources in the geosites. These activities are in line with Sustainable Development Goals (SDGs) 4, 5, 13 and 15.

The Nature Advance Camp was a learning activity in an important geosite, the Khao Chan Ngam Prehistoric Painting and Dry Evergreen Forest site. Some activities also applied the GLOBE learning activities to the learners. Participants learned about the following activities: 1) What is hidden in the forest? 2) Biodiversity: What covers the ground? 3) What birds live in the dry forest? 4) Amazing community products from local resources, and 5) Art Creative and Happy Nature. The Fossil 101 Camp was a learning activity in the sand pit area of Chaloem Phra Kiat district, which is an important fossil geosite of Khorat UGGp. Participants learned about the following activities: 1) Learning inside the Khorat Fossil Museum, including activity stations: 1.1) Exploring the ancient sea, 1.2) Ancient elephants, petrified wood, and interesting dinosaurs, and 1.3) Fossil conservation activities and becoming a youth paleontologist; 2) Sediment and stratigraphy; 3) Exploring the Miocene fossil site; 4) Fossil data recording and storage; and 5) Art Creative and Happy Fossil. The activities were evaluated and rated on a 5-point satisfaction scale, with 5 being very good and 1 needing improvement. From both camps, most were rated at levels 5 and 4.

After the learning activities at each camp, the knowledge gained was simplified, summarized, and presented in the form of Art Creative. This activity also received the highest evaluation rating of 5 in both the Nature Advance Camp and the Fossil 101 Camp. Through the Art Creative activities, the participants were able to share their knowledge in an engaging way that promoted awareness of the environment, fossil resources, and global conservation. Therefore, it can be concluded that adapting in-depth research into an easy-to-understand format using artistic processes allows learners to learn with greater enjoyment and effectiveness. Acquired knowledge and understanding enables learners to evaluate, apply, and use in both the classroom and in everyday life.

Keywords: Academic Camp Experience, Nature Camp, Fossil Camp, Art Creative, Khorat UNESCO Global Geopark
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SIGNIFICANCE AND ENLIGHTENMENT OF VISIBILITY OF UNESCO GLOBAL GEOPARKS

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Visibility is one of the four elements any UNESCO Global Geopark (UGGp). It is not only a channel for the public and local residents to obtain information about the UGGps, but also an important way to promote geotourism and sustainable development of the local economy. UGGps should broaden the public and local residents' access to information from all aspects and perspectives, including the use of the official logo and various signage such as promotional slogans, science popularization signs, and interpretation boards. In addition, online platforms provide an efficient method to enhance the visibility of UGGps, including the website, TV, transportation media, social media and other methods. For the main public and students with different educational backgrounds, UGGps could develop some science popularization brochures and education materials, etc. in order to contribute to the promotion and protection of natural (abiotic and biotic) and cultural (material and immaterial) heritage, and improve the visibility of the territory. For the local residents, UGGps should establish partnerships with them in different fields. The management structure could improve the visibility through the promotion of the local agricultural products and the local cultural activities, among others. Within the extensive community of the Global Geoparks Network (GGN), engaging in international conferences and associated activities plays a crucial role in enhancing the visibility and impact of the geopark. This is achieved through the sharing of valuable experiences and collaboration with other members of the GGN.

Keywords: UNESCO Global Geopark, Visibility, sustainable development, geotourism
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STRENGTHENING GEOSCIENCE RESEARCH AND POPULARIZATION, BOOSTING GEOPARK SUSTAINABLE DEVELOPMENT BY GEO-VILLAGE CONSTRUCTION

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Fangshan UNESCO Global Geopark of China, the first Global Geopark located in the capital city of a nation, and birthplace of Geopark Concept, has achieved great progress in terms of geo-heritage protection, geo-science research and popularization, and region sustainable development by geo-tourism.

The work of geo-science research and popularization was comparatively weak point of the Geopark in the past. In accordance with the GGN Guidelines and recommendation raised by GGN experts, we have carried out a wide variety of geo-science popularization materials and activities, developing multi-functional popularization site, information system, perfecting geo-science explanation panels, and establishing geo-village boosting visibility and reputation of the Geopark.

Keywords: Geopark, Geoscience popularization, Geo-village, Sustainable development
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STUDY ON SCIENCE POPULARIZATION AND COMMUNICATION IN NEW MEDIA ERA – TAKING CUIHUASHAN SCENIC AREA OF THE QINLING ZHONGNANSHAN UNESCO GLOBAL GEOPARK (CHINA) AS AN EXAMPLE OF GOOD PRACTICES

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An UNESCO Global Geopark (UGGp) is established on the basis of its geological heritage of international value. One of the main tasks of an UGGp is to popularize the knowledge of Earth Sciences and promote the improvement of public scientific literacy. New media is a brand new means of communication. The utilization of new media for science popularization can enhance the effectiveness of disseminating scientific knowledge and inject fresh energy into the efforts of science communication. This work analyzes the influence of new media on five aspects: main body, medium, mode, content and effect of science popularization. Based on the theory of science communication, this paper takes Cuihuashan Scenic spot of Qinling Zhongnanshan UGGp , which has "the first in China and the third in the world" landslide relic landscape, as the research object. In light of the existing challenges and circumstances surrounding geoscience communication in this picturesque location, along with the public's interest in geoscience knowledge, this paper recommends several strategies. These include enhancing content innovation, optimizing communication channels, fostering interaction, building a strong brand, and investing in talent development. These measures aim to effectively advance the innovation and growth of science popularization efforts, disseminate earth science knowledge to the UGGps, and significantly enhance the public's scientific literacy.

Keywords: new media; Science popularization in geoscience; Communication: innovation.

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THE CLOSEST HIGH SCHOOL TO FOREIGN COUNTRIES: INTERNATIONAL EXCHANGE INITIATIVES AT KOCHI PREFECTURAL MUROTO HIGH SCHOOL, JAPAN

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In 2021, Kochi Prefectural Muroto High School (MHS) established a partnership with Muroto UNESCO Global Geopark (MUGP). Since then, MHS has been engaged in various Geopark-related activities, including Geopark Studies, "Land Formation Play" for preschoolers, invasive plant removal and utilization, and international exchange programs. In this presentation, we highlight the international exchange programs as MHS has recently begun branding itself as 'the closest high school to foreign countries' in an effort to attract more new students.

First, the 'Ship for World Youth Program' (SWY), organized by the Cabinet Office of Japan, provided an opportunity for around 20 MHS students to showcase Muroto. In February 2024, 30 young people from 13 countries, who had selected 'Environmental Conservation and Tourism' as their focus, visited Muroto. One MHS student presented the 'Dual Mode Vehicle' (DMV), a measure for revitalizing Muroto while the others conducted an English guided tour to the geological sites within MUGP.

Second, under a sister city agreement between Kochi Prefecture and Jeollanamdo (South Korea), MHS students took on the challenge of organizing an exchange program for six students from Yeocheon High School. Twelve MHS students brainstormed ideas to welcome the guests. A shared cooking experience of *Takoyaki* (Japanese octopus dumplings) and *Buchimgae* (Korean Pancakes) provided a valuable opportunity to appreciate each other's food cultures.

Third, at the '*Glocal* Leader Development Forum' organized by Kochi International Youth Exchange Organization in July, six MHS students interacted with people from various age groups. Additionally, two MHS students delivered a speech promoting the unique features of Muroto and MHS which received a positive response from the audience. Finally, in cooperation with MUGP, MHS students have more opportunities to connect with people outside of school. This not only helps them to meet new people and learn new things but also to foster their personal growth.

Keywords: Muroto Japan, Muroto High School, Muroto UNESCO Global Geopark, international student exchange, collaborative education.
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THE ROLE OF UNIVERSITY STUDENTS IN GEOSCIENCE ACTIVITIES: AN EXAMPLE FROM QINLING ZHONGNANSHAN UNESCO GLOBAL GEOPARK, CHINA

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The Qinling Zhongnanshan UNESCO Global Geopark in China has been an important international platform since August 2009, when it was first approved to join the Global Geoparks Network. In addition to being a treasure trove of natural landscapes, the geopark plays a significant role in promoting geosciences education on an international scale. In recent years, the geopark has actively cooperated with universities to develop and promote the popularization of geoscience education. As a new force in society, the participation of university students' in the role in geoscience education is becoming more prominent. Their participation in popular science activities allows for innovative thinking and ways of injecting new vitality into the dissemination and popularization of geological knowledge. This presentation examines the case of the close cooperation between Qinling Zhongsanshan UNESCO Global Geopark and a university to cultivate volunteers for geopark popularization of geoscience. It also highlights the interdisciplinary nature of geoscience and the role of university students in assisting in the development of popularization of science and technology and in connecting geoparks with the general public. Through this collaboration it is hoped that geoparks and universities will improve the participation and benefit of university students in different geoscience popularization activities. In addition it provides a reference for other geoparks to further promote the work of science popularization education and the sustainable development of the geoparks.

Keywords: Qinling Zhongnanshan UNESCO Global Geopark, China, Popularization of Geoscience, Geosciences Education, University Students;
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TRAINER'S TRAINING IN ARAS UNESCO GLOBAL GEOPARK

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Geoeducation is one of the most important tools of informing the local community about the need to preserve geological phenomena in a geopark.
Schools are considered as one of the main steps to start educating and informing the young generation.
Through increasing students' awareness in a more fun environment beyond school curriculums, regarding the long-term formation of geological heritage, they start being sensitive to the protection of these phenomena and as protection ambassadors, they also make their families more aware of this issue.
Noting the fact that the information of teachers in schools limits to the schools' books and they may have less knowledge about the principles and concepts of Geopark, increasing their awareness and knowledge about this issue makes it easier to transfer information to students.
On the other hand, the presence of people familiar with the knowledge and concept of geotourism in geoparks to carry out successive educational programs can may pave the way better.
To carry out geoeducational programs in a better and more complete way in Aras UNESCO Global Geopark; Actions were taken to train the trainers.
By integrating and benefiting of the experience of the Trainer Training course (TtT) of the World Federation of Tour Guides (WFTGA) and the experience of geotourguides and geological knowledge; The trainer training course was established and implemented for the first time in Aras UNESCO Global Geopark.
During a ten-to-twelve-hour course, we trained interested learners who have at least a bachelor's degree, and then by holding practical courses, we get them familiar with geological phenomena in Aras UGGP.
After that, by holding practical training courses in the schools, their skills will be assessed and the chosen ones will be able to carry out written training programs in the schools of the Geopark as Geopark partners.

Keywords: Geoeducation, Aras UNESCO Global Geopark, WFTGA, Train of Trainers
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TRAVELING EXHIBITION "A JOURNEY THROUGH EARTH TIME" UTILIZING A JAPANESE NETWORK OF GEOPARKS AND MUSEUMS

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Japan is home to 46 National Geoparks, 10 of which have been recognized as UNESCO Global Geoparks. Located in one of the most active mobile zones in the world. Japan has many geoparks characterized by dynamic geology including volcanoes and tectonics, which have created diverse topography, ecosystems, and cultures. Networking is a core feature of geopark activities and to make effective use of this network, it is important to have a deep understanding of both the individuality and commonality of each network member. Additionally, collaboration with the many museums across Japan is an effective way to widely disseminate each museum's unique charms.

In 2023, 25 geoparks and 14 museums throughout Japan came together to create a traveling exhibition featuring the charms of different Japanese Geoparks called "A Journey Through Earth Time." This project was funded through a subsidy from the Agency for Cultural Affairs, with Itoigawa UGGp acting as the secretariat. To facilitate exhibition planning, a total of four workshops were held to deepen understanding between regions and to create stories that were individual to each Geopark while remaining conscious of the connections between regions. The exhibit was completed in March 2024 and will travel to about 30 geopark facilities and museums nationwide over a two-year period.

The project resulted in a better understanding between different geoparks and their staff. Previously, the network activities mainly involved neighboring geoparks, but this project aims to promote a wider scope of collaborative activities to include common themes across the network such as geological phenomena, archaeological connections, shared industries, cultures, etc. The project has also successfully highlighted the appeal of Geoparks and geotourism to visitors. Using a common story to express the wealth and variety of each region, visitors gain a deeper understanding of each region's unique individuality and diversity. This initiative is expected to serve as a model for revitalizing network activities, not only in Japan, but throughout regional and global networks.

Keywords: Science popularization, Museology, Japanese Geoparks Network, Itoigawa UGGp.

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VOICE ACTOR EVENT SYNERGIZES POP CULTURE WITH GEOPARKS

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In December 2023, the Hakusan Tedorigawa UNESCO Global Geopark in Japan hosted a voice actor event to promote geopark education and science popularization. The event attracted 1777 attendees, with 1022 participants from Hakusan City. This initiative blended entertainment with education, leveraging the popularity of voice actors to draw a diverse audience and engage them in the significance of geological and environmental conservation.

Renowned voice actors Yūki Kaji (Eren Yeager in "Attack on Titan"), Nobuhiko Okamoto (Katsuki Bakugo in "My Hero Academia"), and Ryōta Ōsaka (Eijun Sawamura in "Ace of Diamond") headlined the event. They presented a reading of a story based on "The Journey of Water," the core theme of the Hakusan Tedorigawa UGGp.

In addition to the voice actor performances, a geography professor delivered an informative talk, engaging in a dynamic Q&A session with the voice actors. The event also featured the geopark's mascots, Yuki Mama and Shizuku-chan, and Dr. Geo, who interacted with attendees and added a playful element to the educational experience. Attendees were encouraged to submit a survey, and over 50% of participants participated.

Although guided tours of key geological sites were not included in the event, their addition would have complemented the voice actor performances, creating a holistic educational experience highlighting the interconnectedness of geology, nature, and culture.

Financially, the event cost about 6,500,000 yen, while ticket sales generated about 3,800,000 yen. The main cause for the loss was reducing the ticket price for Hakusan City residents from 5,800 yen to 2,000 yen, facilitating greater local participation and awareness of the geopark.

This initiative not only attracted a large and varied audience but also demonstrated the potential of using creative methods to foster a deeper public interest in science and the environment. By merging popular culture with educational content, the Hakusan Tedorigawa Geopark showcased how innovative outreach strategies can enhance public engagement and promote geoparks.

Keywords: voice actor event, geopark education, science popularization, public engagement, pop culture
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YOUNG GEOLOGISTS IN THE TORATAU ASPIRING UNESCO GLOBAL GEOPARK

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This paper talks about the successful collaboration and the good results of young geologists in the Toratau aspiring UNESCO Global Geopark, Republic of Bashkortostan. The Young Geologists is a children and youth movement, one of the most active in Russia, which appeared back in the 1960s. With the creation of geoparks, the movement became even more active. In cooperation with the Yangan-Tau UGGp, the Russian Academy of Sciences Institute of Geology and several schools where the most enthusiastic teachers work, the Altyntau open geological school was created, where any child can apply, starting from the first grade until graduation (more often from 4 and 5 grades). During the academic year, within the framework of this school, researchers from the Institute of Geology and leading universities of the Republic conduct online lectures on general and structural geology, paleontology, mineralogy and petrography, hydrogeology and geo-ecology for children.

In the spring, a geological session is held at the school, aiming to: 1). Create conditions for the identification, development and education of talented children interested in Earth sciences; 2). Exchange experience among students, heads of children and youth geological associations, and geography teachers; 3). Attract the most talented school graduates to apply in university mining and geological specialties; 4). Create optimal conditions for students' successful professional self-determination; and 5). Activate individual forms of work between gifted children and leading scientists and university professors.

In summer, like real geologists, the children live in an educational camp together with teachers for two weeks, cook food, participate in an educational and contest program on geological skills. In autumn, based on results of the summer camp and scientific research conducted in the Geopark, regional contests "The World of Paleontology" and "The World of karst and caves" are held.

The expected results of this Altyntau geological school are that the students will: 1). Know the structure of the planet Earth, main geological processes, basics of mineralogy, classification of rocks, basics of paleontology, rules for organizing field and laboratory research; 2). Be able to identify and characterize basic minerals, rocks, fossils, build a geological section, heavy mineral sand sampling, hydrometric and radiometric measurements, geological route, present and analyze the information received, carry out primary processing of field materials, be able to read a geological map; 3). Possess basic knowledge of the theory of geological sciences and research methodology, skills in determining rocks, minerals and fossils, organization of field geological research and processing techniques of the obtained material. Eventually, school children present their scientific papers, and the organizing committee (jury) gives points and awards the winners. This kind of education and training would not be possible without the cooperation of scientists, teachers, schoolchildren and Geopark employees.

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YOUTH DEVELOPMENT AS CONTENT CREATORS THROUGH THE CREATIVE PROCESS OF KHON KAEN GEOPARK

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The unique geological characteristics of Khon Kaen Geopark result in many heritages of the territory that affects the culture and lifestyle of the local people. Developing students in schools within the Khon Kaen Geopark network to understand and appreciate the local identity and uniqueness of the geopark, and to think creatively to communicate this identity globally, is a crucial educational mission of the Khon Kaen Geopark. We designed learning activities to develop young content creators for schools within the Khon Kaen Geopark network, integrating these activities into the curriculum as supplementary courses. The approach follows Graham Wallas's Creative Process, with four stages: 1. Preparation: Research and gather knowledge using tactile media like the KK Geopark Bingo Card and Board Game. 2. Incubation: Combine information to design content using the Geopark's unique identity. 3. Illumination: Develop new ideas and complete the content 4. Implementation/Verification: Record and edit video content. The outcome of these learning activities is that students will publish their videos on social media platforms such as TikTok, Facebook, and YouTube, participate in storytelling competitions about Khon Kaen Geopark, and have their videos featured on the geopark's website. This initiative helps youths think creatively to communicate the local identity and uniqueness of Khon Kaen Geopark globally, fostering lifelong learning and quality living as global citizens with an environmentally friendly lifestyle, aligning with the SDGs.

Keywords: youth development, content creators, creative thinking, social media, geopark education

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A REVIEW ON PALAEONTOLOGY IN KANCHANABURI, WESTERN THAILAND: IMPLICATION FOR GEOTOURISM DEVELOPMENT

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Kanchanaburi, an area in western Thailand, is a province filled with rich natural, cultural and historical attractions. In geology and palaeontology context, Kanchanaburi belongs to the Gondwana-derived "Sibumasu Terrane". Lower Paleozoic successions are generally similar to those in Satun UNESCO Global Geopark in the Peninsular Thailand. Rich and unique Ordovician-Silurian fauna including nautiloids, receptaculitids, conodonts, tentaculitids, and loboliths of scyphocrinitid crinoids were recorded (e.g. Burrett et al., 2024; Chen et al., 2022; Fang et al., 2020). The Ordovician limestones and fossils are well exposed in the area of Srinagarind Dam, Si Sawat district and nearby areas. First identification of GICE observed in conodont-bearing sections in Thailand (Sibumasu) was reported from this area suggesting a global significance of the section for future promotion for science education and tourism (Li et al., 2023). Early Silurian conodonts (upper Telychian) were firstly described and illustrated from the Kroeng Krawia Forest Park area in Thong Pha Phum district which is close to the interval of early Sheinwoodian glaciation (Chen et al., 2024). The upper Devonian Frasnian-Famennian event, based on conodonts assemblage, was observed from carbonate rock from the same area and covered the Kellwasser extinction event by the result of carbon isotope excursion (Savage et al., 2006). The western part along Thailand-Myanmar border shows extensive areas of lower Permian peri-Gondwana glacial marine siliciclastics. The widespread karst terrane, a major scenic attraction in Kanchanaburi, is an extensive Permian to Jurassic carbonate succession with low diversity fauna. The occurrence of Permian fusulines Monodiexodina in siliciclastic facies and Eopolydiexodina in carbonate facies implies the transition from cold-water to tropical zone (Ueno, 2003). A significant Palaeo-Tethys closure timing is also indicated thanks to a hemipelagic sequence containing upper Triassic radiolarian assemblages, the youngest fauna from eastern part of Kanchanaburi (Saesaengseerung et al., 2024). This preliminary report serves as a foundation for actions to support local communities in conserving the Kanchanaburi geo-sites.

Keywords: Gondwana, Kanchanaburi, receptaculitids, Monodiexodina, Palaeo-Tethys
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CHAIYAPHUM GEOPARK: GEOLOGICAL SIGNIFICANCE AND PALEONTOLOGICAL HERITAGE FOR CONSERVATION, PROMOTION AND SCIENTIFIC RESEARCH

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Chaiyaphum Geopark is recognized for housing fossils from three distinct geological eras in Thailand. Situated in the northeastern region of the country, this area is characterized by its unique plateau topography and serves as a notable site for natural tourism. In the Khon San District and nearby areas of the northwestern part of Chaiyaphum, Limestone mountains containing well preserved Late Paleozoic fossils such as brachiopods, tabulate and rugose corals, fusulinids, bryozoans and crinoids are well known. This area belongs to the Loei-Phetchabun Fold Belt within the Indochina Terrane which later subjected to the significant geological event the “Indosinian Orogeny” changing the environment from generally marine to non-marine until today.

This orogenic event is important at least on a regional scale which records SE Asia tectonic activity. However, this event could be associated with the Tethyan tectonic plate configuration adjustment during the Triassic. The Indosinian Orogenic Event believed to be a result of the collision between the Indochina and Sibumasu (or Shan-Thai) terranes, is marked by the presence of widely distributed conglomerates as regional unconformity. The conglomerates are polymictict in nature and contain mainly limestone clasts with round pebble of chert, volcanic clasts, siltstones with red pigmented or volcaniclastic matrix. The polymictic conglomerate is generally interpreted as a basal conglomerate of the Huai Hin Lat Formation. The Indosinian Orogenic Event resulted in the demise of Paleozoic carbonate platform in this region. Age of the deposits is Late Triassic.

The limestone breccia unit is also common and consists mainly of poorly sorted with high angular limestone clasts with fine, red matrix. This limestone facies is interpreted as collapsed breccia a consequence of aerial exposure of the platform, weathering, erosion, karstification and collapse of the succession. This erosion cut into at least the Roadian-Wordian limestone as indicated by the occurrence of some Middle Permian fusuline such as *Lepidolina*, *Sumatrina* and *Verbeekina* in limestone blocks. This evidence is also interpreted as a consequence of the Late Triassic Indosinian Orogeny.

In this area, the Mesozoic strata are particularly rich in fossils, including at least three groups of temnospondyls (Nonsrirach et al., 2021), the earliest sauropods (Buffetaut et al., 2000), and the largest sauropod discovered in Southeast Asia. Additionally, vertebrate coprolites containing parasite eggs have been found, providing further insight into the area's ancient ecosystems (Nonsrirach et al., 2023). The Cenozoic deposits especially in the limestone caves reveal megafauna such as pandas, hyenas, and orangutans (Filoux et al., 2015). This report highlights the importance of Chaiyaphum Geopark and lays the groundwork for efforts to support local communities in preserving this significant natural heritage for conservation, promotion and scientific study.

Keywords: chaiyaphum geopark, indosinian orogeny, fossil, limestone, loei-Phetchabun fold belt
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GEOPARKS AND PALEONTOLOGICAL HERITAGE: CONSERVATION, PROMOTION AND SCIENTIFIC RESEARCH

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In Thailand, much of the geological heritage is part of national and UNESCO geoparks. In addition to their tourist value, they are widely used for education, especially for training the scientific community during university field trips and conference excursions. One of the main tasks of the geoparks is the utilization and long-term conservation of the geosites. Geosites' being a static, unchanging heritage, geoparks are a dynamic entity that encourages scientific research, even if this involves collecting samples, as long as the conservation of the geosite is guaranteed.

The Phetchabun Geopark in the central part of the country offers a wide variety of natural wonders with nearly 50 sites, including scenic areas such as canyons and waterfalls, geological attractions such as basalt columns and potholes, cultural sites such as caves and historic quarries, and paleontological sites. The latter is of particular interest to the scientific community since the fossil sites cover both a large time interval and a wide variety of paleoenvironments, from tropical Paleozoic coral reefs and local carbonate accumulations to subtropical Cenozoic lakes.

The geological history of this area gives the Geopark a unique geological significance. This area was once a part of volcanic island arc with plate subduction from the Late Permian to the Triassic, and experienced collisions in the Middle Triassic and Late Triassic. The oldest sediment-volcanic sequence reported in this area is 'early' Carboniferous probably Early Visean in age. These oldest rocks consist of thinly bedded cherts and volcaniclastics and appear to be overlain by a sequence of Early Visean to Middle Permian limestones containing dateable foraminiferans and corals. Felsic volcanic rocks including rhyolite and rhyolitic breccia have also been identified. The Carboniferous sedimentary rocks were intruded by granites. The maximum depositional age of the Carboniferous sedimentary rocks in this area is 327 ± 7 Ma (U-Pb detrital zircon), which is Serphukovian. Rhyolitic breccia and rhyolite associated with the Carboniferous sedimentary rocks have been dated as Serpukhovian.

In northeastern Phetchabun Province, Middle to Late Permian fusulinid-bearing Permian carbonates with well-preserved corals, sponges, bryozoans, brachiopods, bivalves, nautiloids and others have been recorded. This sequence is unconformably overlain by siliciclastics, which in turn are overlain by a remarkable limestone conglomerate, suggesting erosion of the older carbonates and deposition of siliciclastics in deeper water. Further south, plant fossils and logs are found within the Late Permian siliciclastics and include a new species of *Dadoxylon* that supported the formation of the marine platform. The remarkable Late Permian carbonate conglomerates are better exposed further south in Phetchabun Province in the Phu Nam Yot Geosite part of the Phetchabun Geopark.

The Upper Triassic and Upper Jurassic continental formations in the northern part of the Geopark are known for their numerous archosaur tracks. Although isolated, the most important sites are protected and easily accessible thanks to important facilities. The awareness of the local population has led to the discovery of several new tracks in recent years, which are still being actively studied.

The central part of the Geopark is crossed by a Cenozoic intermontane basin, which has yielded a rich Miocene assemblage formed of leaves and fish remains. Recent fieldwork, usually in collaboration with local farmers, has led to the discovery of new outcrops and a significant increase in the taxonomic diversity of the basin, including the collection of rare taxa such as flowers, insects and decapods.

All of this material is left in situ or stored and exhibited in local and national institutions. Related scientific studies have greatly increased, and continue to increase our knowledge of past ecosystems in Southeast Asia.

Keywords: Geopark, Thailand, Fossil heritage, Scientific research

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PRELIMINARY STUDY ON LATE SILURIAN TO EARLIEST DEVONIAN CONODONTS FROM CARBONATE BUILD-UPS (BIOSTROMES) IN THE INDOCHINA TERRANE, THAILAND: THE OLDEST FOSSIL RECORDS IN THE LOEI FOLD BELT FOR FUTURE GEOPARK DEVELOPMENT

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The Loei fold belt which is located in the west of the Indochina (composite) terranes contains late Silurian and earliest Devonian sedimentary successions. Due to tectonism, metamorphic overprint and structural complexity in the region, this finding suggests the oldest sedimentary sequence ever recorded in this fold belt in Thailand. In fact, Silurian sedimentary section and fossil in the Indochina terrane in Thailand has been largely unknown in comparison to those reported in central Lao and Vietnam. Only a few documentations of Silurian fossils were reported from the Loei terrane including trilobites, brachiopods and corals. These fossils were reported without high confidence on their taxonomic identification partly due to poor preservation of the fossils and limited accessibility to the study area in the past.

We herein report the first occurrence of late Silurian and earliest Devonian conodonts from limestone layers and carbonate build-ups (biostormes) intercalated with a silicilclastic/volcaniclastic succession from the Sangkhom district, west of Nong Khai province. Late Silurian conodonts were observed from the BNB and WNG sections and include *Belodella anomalis* and others indicating a stratigraphical range from the middle Ludlow to uppermost Pridoli. Earliest Devonian conodonts were observed from the BNA section and include *Wurmiella tuma* or *Wurmiella wurmi*, *Belodella* spp, *Icriodus* sp. and others. This assemblage indicates the middle Lochkovian assigned mainly by the occurrence of *Wurmiella tuma* or *Wurmiella wurmi*. Other than these conodonts which are an excellent indicator for age confirmation of the sequences, we also document other fossils such as rugose and tabulate corals, stromatoporoids, ostracods, brachiopods, crinoids, trilobites and fish micro-remains.

Most of these faunas are the first recorded and are being studied in details. The result is important to promote the area and support of science education, tourism and geopark development.

During the last few years, we in cooperation with Thailand Fossil Fund (under the Department of Mineral Resources, DMR) have contacted local administration and education sectors in this area in order to organise meetings and workshops for general publics and students. The meeting aimed at educating all participants on the importance of the geological sites, geopark programme and Thailand fossil protection law. In December 2021, under the IGCP700 programme, we also conducted a workshop and fieldtrip in this area for researchers, university students and private sectors to understand more on the regional significance on geology and fossil records in this part of Thailand. For the next step we have a plan to organise the meeting in cooperation with public and private press and media on the new discovery of the fossil sites with the beauty of nature along the Mekong River. This event, hopefully, will promote and enhance higher public recognition for tourism and education for this area and being a starting point for setting up formal geosites for future geopark development.

Keywords: Indochina Terrane, Loei fold belt, Conodont, Silurian, Devonian, Geopark development
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PRELIMINARY STUDY OF UPPER TRIASSIC CARBONATE BUILD-UPS IN TECTONIC TERRANES OF THAILAND

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Typical Upper Triassic (Norian-Rhaetian) forms including the ubiquitous Tethyan taxon such as the reef-builder Retiophyllia, as well as solitary taxa such as Stylophyllum and Stylophyllopsis were observed in Sa Kaeo province east of Thailand, along the Thai-Cambodian border. A similar coral assemblage has also been observed in Uthaithani, west of Thailand near the Thai-Myanmar border. Retiophyllia is a typical reef and mound builder and is reported in several areas in the tropical Tethyan realm such as in the Northern Calcareous Alps. It was also reported outside the Tethys in the North American Cordillera of the eastern Panthalassan Ocean. The coral assemblage indicates a tropical to subtropical climate and a low paleolatitude for the paleogeography for the tectonic terranes of Thailand during the Late Triassic. Limestone containing the specimens reveals a largely micrite matrix with associated organisms such as foraminifers, calcareous algae, brachiopods, gastropods, and bryozoans. Preliminary study of the lithology and microfacies suggests that colonial corals formed a major skeletal framework in the reef-like carbonate build-ups. Foraminiferal assemblage supports a Late Triassic age including Aulotortus sinuosus, A. oscillens, A. cf. oscillens, A. cf. tumidus, Aulotortus sp., Endoteba bithynica, Involutina sp., Trocholina sp., Pilamminella kuthani, Miliolipora cuvillieri, Textularia cf. haeusleri, and others.

According to tectonic maps of SEA, the study area belongs to the Sukhothai terrane in the western margin of the Indochina composite terrane. However, structural complexity in eastern Thailand indicates a major shear zone induced by a NW-SE strike-slip faulting. Ongoing geological and paleontological exploration will reveal more details about these conclusions.

Keywords: Tethys, Norian-Rhaetian, coral, Retiophyllia, foraminifer, carbonate build-up
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ASPIRING GEOPARKS IN INDONESIA, VIEWED FROM THE PERSPECTIVE AND APPROACH OF COMMUNICATION AS THE KEY TO SUCCESS IN HARMONIOUS SYNERGY AND COLLABORATION

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Geoparks in Indonesia are present as a program carried out by the government. Therefore, the government has prepared special regulations to oversee the development of geoparks. Through Presidential Regulation Number 9 of 2019 concerning the Development of Earth Parks (Geoparks), a mechanism involving parties both at the central and regional levels is regulated for the management and development of geoparks. Referring to the regulations set by the government for the development and management of geoparks in Indonesia, with the involvement of all parties, a good communication approach is needed in order to create harmonization of coordination and collaboration in governance relationships between institutions. The right communication approach is the key to the success of a geopark. Geopark that are weak in coordinating with policy makers and interests in their regions, tend to experience difficulties, especially in obtaining financial support in running the organization of the management body. If the Management Body is present on the basis of the interests of the ruler at that time, it will be vulnerable if the power of a regional leader ends. When proposing a geopark, which begins with defining the territorial boundaries, it must involve all stakeholders in the area. It is important that every stakeholder and policymaker jointly plan how a geopark will be managed, have the same knowledge of the prospective geopark, and their willingness to be involved in management is a manifestation of the initial commitment, so that it will be easier to design a geopark development plan together.

Keywords: Geopark, communication, development
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ASPIRING LENGGONG UNESCO GLOBAL GEOPARK, MALAYSIA

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Lenggong aUGGp (2248.12 km2) is located at 4.97°-5.52°N and 100.87°– 101.45°E in the Upper Perak District, Peninsular Malaysia, was designated as a National Geopark on December 16, 2021. It is managed by the District Officer. The aUGGp is situated in a valley between Titiwangsa and Bintang Granite Mountain Range. The population is more than 60,000, consisting of Malays, Orang Asli (Lanoh and Temiar), Chinese, Indians and other ethnic groups. The primary economic sector is agriculture and especially known for being the country's major supplier of freshwater fish, venison and the salted fish industry. In 2012, an area of 22 km2 in Lenggong was declared a UNESCO World Heritage Site because of the in situ prehistory evidence since more than 1.8 million years ago. The geological history of the Lenggong aUGGp reveals evidence of (i) sedimentary deposition (Papulut Quarzite, Kroh Formation, Lenggong Limestone Formation and Kubang Pasu Formation) and volcanic tuff (Lawin and Grik) when it was originally in Sibumasu on the Gondwana continent (541-298 million years ago), (ii) massive granite intrusion that makes Peninsular Malaysia uplifted because of collision of Sibumasu and Indochina Block (237-201 million years ago) and the closure of Palaeo-Tethys Ocean, (iii) compression and rotation due to collision (145-23 million years ago) of Indian and Asian blocks produced fractures of the earth's crust that is called Bok Bak Fault and the fault had formed the Lawin Basin (23-2.58 million years ago), (iv) impact crater and suevite rocks from the meteorite impact during 1.83 million years ago, (v) river pebble terraces since early Pleistocene and (vi) Toba ash from mega volcano eruption in Sumatera during 74,000 years ago. Lenggong aUGGp currently features 31 geosites, 8 biosites, 11 geoarchaeological sites, and 21 cultural sites. As a result of the positive impact on district and community development after three years as a National Geopark and has a geological heritage of international value, therefore in June 2024, the management of Lenggong aUGGp submitted a letter of intent to UNESCO to be recognized as the second Global Geopark for Peninsular Malaysia after Langkawi (2007) and the third for the country after Kinabalu (2023).

Keywords: Peninsular Malaysia, Gondwana, Sibumasu, Paleo-Tethys Ocean, Paleozoic, Suevite
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CHALLENGES AND DIFFICULTIES OF THE NANKI KUMANO GEOPARK IN JAPAN

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The Nanki Kumano is a region where people have lived closely connected with the land since ancient times. This relationship can be understood through its geological formations and historical culture, which encompasses not only agriculture, forestry, and mining but also religious beliefs and cultural landscapes. Additionally, Nanki Kumano is known for its multiple hot springs and unique culinary culture, making it a popular tourist destination both domestically and internationally. However, Nanki Kumano faces challenges such as a declining birthrate, an aging population, and depopulation. Recently, the extension of highways has increased the number of day-trippers from large metropolitan areas like Osaka. Consequently, increasing the exchange population within the region and extending visitors' stay time are essential tasks for the community.

Nanki Kumano is situated at the southern tip of a peninsula projecting into the Pacific Ocean. Its geology, shaped by plate subduction, includes an accretionary prism from 70 to 20 million years ago, forearc basin sediments from 18 to 15 million years ago, and igneous bodies from around 15 million years ago. These geologically diverse bodies have been subjected to ongoing uplift and erosion, resulting in distinctive mountainous, river, and coastal landscapes. The influence of the warm Kuroshio Current, which flows close to the coast, creates a warm climate and one of the highest rainfall areas, contributing to a rich ecosystem both on land and in the sea. Additionally, the region is home to unique cultural landscapes featuring giant rocks, unusual rock formations, islands, and ancient trees, many of which hold local spiritual beliefs. Some of these areas are part of the UNESCO World Heritage site “Sacred Sites and Pilgrimage Routes in the Kii Mountain Range.” To address regional challenges, we are utilizing geoparks to conduct conservation and educational activities in collaboration with World Heritage sites, Ramsar Convention wetlands, and national parks. Consequently, visitor numbers are increasing, and staff exchanges are becoming more active. However, we find it challenging to clearly communicate the synergistic effects of these efforts. Additionally, we are conducting educational activities in schools, training guides, and organizing courses for local businesses to help them rediscover the region's charm and communicate the value of geological heritage through geoparks. One of our challenges is to expand these connections to a wider audience.

Keywords: Subduction Zone, Accretionary Prism, Forearc Basin Sediment, Igneous Body, World Heritage Site, Synergy
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CHALLENGES FOR APPLICATION TO UNESCO GLOBAL GEOPARK: COLLABORATIVE EFFORTS OF KIRISHIMA AND SAKURAJIMA-KINKOWAN JAPANESE NATIONAL GEOPARKS

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Kirishima and Sakurajima-Kinkowan Japanese National Geoparks (JNGs), located in the southern region of Kyushu, Japan, are adjacent territories. Both JNGs are currently in the process of merging into a unified entity, intending to apply for UNESCO Global Geopark in the future. Two main advantages are expected from integrating these areas with active volcanoes.

Firstly, the integration will allow to develop our shared characteristics further. Both areas share a history of multiple caldera eruptions and have long-established deep cultural ties, with similar cultures using stones originating from caldera eruptions. This integration has the potential to highlight the distinctiveness of the area as a territory characterized by a high concentration of calderas.

Secondly, we can highlight our respective differences. For example, Kirishima JNG's volcanoes are situated on vast land, allowing visitors to enjoy them by hiking to get close to the crater. In contrast, Sakurajima-Kinkowan JNG's volcanoes are surrounded by the sea, including a submarine volcano, allowing for marine activities like kayaking. It will be possible to offer visitors more options to enjoy volcanoes in the potential new area and share a variety of knowledge regarding volcanic disaster prevention.

The integration process is challenging, as there is no precedent in Japan for such procedure. Each step is new, and we must first create an overall vision for integrating the large area and population.

Our current efforts include extensive exchanges between staff through regular meetings and collaboration among guide groups in training, geotours, and events. Opportunities for in-person interactions have been increasing.

We aspire to set a model case for JNG integration and, in cooperation with the regional and Global Geopark Networks, demonstrate the potential benefits of such integration.

Keywords: Kirishima Geopark, Sakurajima-Kinkowan Geopark, integration, active volcanoes, caldera
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CHARACTERISTICS OF GEOLOGICAL HERITAGES AND DEVELOPMENT IN YUNYANG GEOPARK

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Yunyang Geopark is located in Yunyang County, Chongqing, China, with an area of 1124.05 square kilometers. Yunyang Geopark has abundant geological heritage resources, and is characterized by Middle Jurassic dinosaur fossil assemblages and karst landform, supplemented with the natural ecological environment and rare wildlife and plants of the upper Yangtze River, and integrated with the long history and culture of the Tujia ethnic minority. The geopark integrates science popularization education theme experience tourism, culture and entertainment tourism, leisure tourism, ethnic custom tourism and eco-tourism into a whole. In recent years, in order to apply for a UNESCO Global Geopark, Yunyang Geopark has adhered to the sustainable development action plan, including the protection and conservation of geological heritages, science popularization education, geological tourism, and online communication, striving to achieve highly unified sustainable development of ecological, social, and economic benefits, and contributing to the sustainable development of UNESCO Global Geoparks.

Keywords: Yunyang Geopark, geological heritage, dinosaur fossil, sustainable development
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'CONSERVATION IS DEVELOPMENT' IN GOMBAK-HULU LANGAT GEOPARK, MALAYSIA: SUSTAINING NATURE AND CULTURE HERITAGE FOR POSTERITY

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Conserving heritage is significant because it reflects and builds local community identities, assists in promoting sustainability and provides sense of place. The interactions between humans and their natural environment underlie cultural heritage with aesthetic, unique and outstanding universal values (OUVs). As such, there has to be conscious efforts made to protect and conserve these heritage resources, so as to ensure their sustainability for generations to come. Thus, taking into account the need to balance multiple needs and demands of development is crucial, particularly the risks or threats that may lead to its loss or destruction. Gombak-Hulu Langat Geopark, the eight national geopark in November 2022, is situated in the rapid urban setting of Selangor. The challenge to ensure sustainability amidst all planned development is imperative as the state of Selangor continues to face rising cases of environmental issues, related to water resources, natural hazards and anthropogenic disturbance. Hence, 'conservation is development' in Gombak-Hulu Langat Geopark was highlighted in reigniting the aspiration of development that meets present need without compromising future generations. Geopark is an innovative tool that strives for sustainability in integrated heritage conservation, lifelong education and local socio-economic development. In this paper, we examined the main process and justification involved to develop urban geopark in Gombak-Hulu Langat districts in Selangor. As a national geopark, the next step is getting ready to apply to be a member of the UNESCO Global Geopark accreditation. Shifting the mindset and raising awareness of all stakeholders to embracing "conservation is development" is an on-going initiative in getting local community participation and relevant authorities support as well as action. Various activities embarked together with local communities amongst them through reflexive conversations (*Sembang Santai Geopark Gombak-Hulu Langat*). The success of a Gombak-Hulu Langat Geopark not only will make this city a better place to live, but also add on to examples in the world where conservation and human development is no longer an either or proposition, and that there's still hope.

Keywords: sustainability; geopark; Selangor; community participation; integrated heritage.
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DETERMINE THE INTERNATIONAL SIGNIFICANCE GEOSITE BASED ON NEW IUGS GUIDELINES 2023, A KEBUMEN ASPIRING UNESCO GLOBAL GEOPARK CASE STUDY

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UNESCO Global Geoparks must be single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education, research, and sustainable development. This rule requires the aspiring UNESCO Global Geopark (aUGGp) to have a geoheritage of significant international value. Determining the international value of geosites must be carried out by independent institutions, including the International Union of Geological Sciences (IUGS). Equalizing perception, equal assessment, improved dossier quality, new guidelines for assessing geoheritage of international value issued in September 2023, implemented for Kebumen aUGGp evaluation which will undergo evaluation in 2024.

This paper intends to apply the IUGS assessment guidelines to the Kebumen aUGGp proposed in November 2023. Hopefully, this article can be an example for other geopark candidates that apply to become UNESCO Global Geopark (UGGp). Based on the assessment carried out, 13 geoheritages in Kebumen area have international value, namely sites G1 (Exotic blocks of bedded radiolarian chert of Sadang Wetan), G2 (Exotic blocks of radiolarian chert and calcareous red claystone of-Putri Hill), G4 (Exotic blocks of pillow-lava and radiolarian chert of Muncar River), G5 (Exotic blocks of mica schists of, Bengkok River), G7 (Exotic blocks of ophiolites of Lokidang River), G10 (Columnar-jointed diabase of Parang Hill), G11 (Olistolith of nummulitic limestones of Karangsambung Formation), G14 (Exotic blocks of phyllites of Sipako Hill), G15 (Exotic blocks of chert and calcareous red claystone of Wagirsambeng Hill), G16 (Olistolith of coral limestones of Jatibungkus Hill), G27 (Jatijajar cave complex), G28 (Barat Cave), and G30 (Petruk Cave).

Keywords: UNESCO Global Geopark, Kebumen Geopark, International Significance, IUGS, New Guideline

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DIFFICULTIES AND CHALLENGES OF IMPLEMENTING THE FIRST LAOTIAN GEOPARK

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The Hin Boun aUGGp is made up of very varied landscapes including deep valleys, canyons, plateaus, and caves. Partly inaccessible, the area appears above all as a natural fortress preserving a rich biodiversity where communities members still make part of their living from natural resources. Depicted through parietal art, this land has also been known by humans since prehistoric times with a strong historical and spiritual relationship between these exceptional karst reliefs and communities.

Despite different climates, the Ardèche region (France) has several natural and cultural similarities. The local authorities - made up of representatives from the Chauvet cave, a UNESCO World Heritage list since 2014 and the Monts d'Ardèche geopark - and the Province of Khammouane sign a commitment based on experiences and knowledge sharing on natural heritage protection management and sustainable tourism development, with the purpose to support, protect and foster the creation of the first Laotian UNESCO Global Geopark in Khammouane, a region located in central Laos.

This presentation will introduce the history and challenges of this political cooperation and technical support which has been running since 2009. Despite difficulties in the concept perception, definitions and expectations, this collaboration brought many successes, by laying the foundations for responsible tourism, by helping to create the first ecotourism community association in Laos, by gaining international recognition of the area and by opening exceptional natural sites to the public. Other challenges remain, such as the governance of the geopark that must involve local communities with a long-term commitment, while priorities for them might be different than the geopark roadmap. In parallel, sustainable financial mechanisms must be established to assure the running, autonomy and the management of the geopark. To overcome these challenges, exchanges of experiences, field trips on the field together, communication and trainings, valorization of the local heritage in links with communities and authorities are the keys for success.

These successes and challenges led the Lao French partners to imagine an even more ambitious project to reinforce and highlight their common efforts together, with the objective of submitting their first UNESCO Geopark application in Laos.

Keywords: aUGGp; challenges; difficulties; experience exchanges; cooperation; financial mechanism; autonomy; community involvement.
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EFFORTS TO ENHANCE LOCAL DISASTER RESILIENCE THROUGH WALKING AROUND TOWN: AN EXAMPLE OF KIRISHIMA NATIONAL GEOPARK, JAPAN

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Promoting town walking to local residents is expected to have the following effects. For example, (1) health improvement through aerobic exercise, (2) reduction of CO_2 emissions by not using cars, (3) promotion of human interaction in the city, and (4) discovery of previously overlooked attractions and features of the city. Among these, we would like to emphasize in this presentation that (4) has a significant effect in enhancing the disaster resilience of a region. For example, in a city developed on an alluvial plain, walking and understanding the various micro topographies formed by fluvial process is an effective way to prepare for future flood damage.

The central Kokubu district of Kirishima City, Kagoshima Prefecture, Japan, is formed on a low-lying area that includes an old river channel and is therefore at high risk of flooding during heavy rains. However, many of the generation born after the August 1993 floods and those who have moved into the area since then are unaware of such risks. Therefore, we conducted a guided walking tour of the town in October 2023 to share information with local residents about vulnerability in the event of flooding while showing them the attractions of the town.

Although this was the first attempt at such a tour, it was generally well received by the participants. Perhaps one of the reasons for the success of the tour was that the tour guide, who experienced the flood 31 years ago, gave a very realistic account of the disaster. We intend to continue to hold such events in the future to pass on the memory of disasters and to prepare for the coming times.

Keywords: Kirishima Geopark, disaster risk reduction, walking around town, guided tour, flood.
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ENGAGE IN A UNIQUE DIALOGUE BETWEEN HUMANS AND NATURE, EXPLORING THE INTERTWINED CONNECTION BETWEEN GEOLOGICAL HERITAGES AND LOCAL CULTURE – INSPIRED BY KANBULA ASPIRING UNESCO GLOBAL GEOPARK

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The Statutes of The UNESCO Global Geopark requires ful use of local heritage, in connection with all other aspects of that area's natural and cultural heritage, to promote awareness of that geopark. However in practice, how to integrate geoheritage with local culture is a challenge faced by all geoparks. Kanbula aspiring UNESCO Global Geopark took a good example of the combination of nature and culture. Geographically, Kanbula aUGGp locates in Huangnan Tibetan Autonomous Prefecture, Qinghai Province of China, it lies at the northeast edge of Qinghai-Tibet Plateau,also in the transition zone from Qinghai-Tibet Plateau to Loess Plateau. The geopark is bounded by administrative boundaries, covering Tongren City, Zeku County, and Jianzha County, with a total area of 3149.34km2 and a population of approximately 158,800, including 122,700 Tibetans. Other ethnic groups such as Han, Tujia, Hui, and Salar also reside here.

The research team of Kanbula Geopark have conducted a comprehensive investigation and study of the geoheritage in the geopark territory, and summarized 7 categories, including 2 with international significance, namely the marine records of the subduction of the ancient Tethys Ocean and the evidence of the closure and transformation of the ancient Tethys Ocean into land. In addition, the geopark is a multi-ethnic settlement area mainly inhabited by Chinese Tibetans, with the characteristics of multi-ethnic cultural integration and intersection. It has two UNESCO intangible cultural heritages of humanity - Regong Art and Huangnan Tibetan Opera. It contains rich art forms, festival activities, and folk traditions, and the culture and nature of the region complement each other. The magnificence of nature provides a source of inspiration for culture, while the profound cultural heritage endows nature with more meaning and value. This harmonious and symbiotic relationship has made Kanbula aUGGp a charming and vibrant candidate for a global geopark.

Keywords: Geological Heritage, cultural heritage, Kanbula, Huangnan
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GEODIVERSITY AND GEOHERITAGE AROUND TOKACHIDAKE VOLCANO, NORTHERN JAPAN

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The Tokachidake area in central Hokkaido Island comprises an active volcano,Tokachidake (2077m), a series of Quaternary volcanoes, and plains and hills on the northwestern foot of the Tokachidake. It was recognized as a Japanese Geopark on January 28, 2022. The area consists of two municipalities, Biei and Kamifurano, and its primary industries are agriculture and livestock. The most important historical fact since the settlement at the end of the 19th century is the snowmelt-type lahar disaster that accompanied the 1926 eruption of the Tokachidake volcano. The natural environment, local culture, and industry of the area are all related to volcanic activity. The goal of our activity as a "geopark" is to create a region that coexists with an active volcano.

The geologic history of the Tokachidake area includes four main periods: (1) formation of ocean floor basalts and accretionary complexes during the Late Jurassic to Cretaceous, (2) volcanism in central Hokkaido after the Middle Miocene, (3) eruptions of large-scale pyroclastic flow deposits between 2.8 Ma and 1.25 Ma, (4) recent volcanic activities in the vicinity of Mt. Tokachidake, including eruptions in 1926, 1962, and 1988-89.

Naturally, there are numerous UNESCO global geoparks around the world with similar geology and geohazard history to the Tokachidake area. However, there are specific unique aspects that set this area apart: (1) various stages of volcanic activity and landforms at different ages can be seen, (2) the area is located in a cold region, it allows for the observation of volcanic landforms that are hundreds of years old without vegetation cover, (3) volcanic activities have been featured as motifs in many artistic and literary works produced in the area, and (4) the local community and government are working together on volcano disaster mitigation. The diverse landscapes of the Tokachidake area, directly related to volcanic activities, are expected to attract global attention in the future.

Keywords: Tokachidake Volcano, large-scale pyroclastic flow deposits, snowmelt-type lahar, volcanic hazard.

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GOMBAK-HULU LANGAT GEOPARK: CHALLENGES FOR URBAN GEOPARK

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The Gombak-Hulu Langat Geopark is the first National Geopark in Selangor State and the 7th in Malaysia. It is an urban geopark promoting conservation and sustainable development. Covering 112,000 hectars (1,120 km2) this national geopark consists of 31 geosites that are distributed across two districts of Selangor State. The area is known as an urban geopark due to its location at the periphery of Klang valley, the most active capital city of Kuala Lumpur. Most geosites are within the green area or play a great role as water catchment or important ecological systems. Significant geosites include rocks deposited in the Early Palaeozoic (late Cambrian, c.500 Ma) to Late Paleozoic (Middle Permian, c.270 Ma), before being intruded by igneous rocks of Early Mesozoic age (Late Triassic, c.220 Ma, to Early Jurassic, c.200 Ma) that created the Malaysian Peninsula. A series of ancient tectonic activities are also being preserved in the Geopark including the suture of the Devonian-to-Middle Triassic Palaeo-Tethys ocean, Late Cretaceous fault that created basins and the fault that later filled with quartz mineral. The basins filled with the Neogene (Miocene, between 23 and 13 Ma) and Quaternary (hundreds of thousands of years ago) continental sediments that also contain coal and other minerals of economic value.

The greatest challenges of an urban geopark are the deep-fake awareness, eager community

participation and trade-off between development and conservation. Nonetheless, the Selangor State Government encourages the prioritization of environmental protection and achievement of Sustainable Development Goals (SDG) through its affiliation with the Gombak-Hulu Langat Geopark. This aligns with the First Selangor Plan (RS-1) which aims to transform the State into a smart, livable, and prosperous community by 2025. The Gombak-Hulu Langat Geopark strives to promote responsible tourism, regional growth and preserve the area's natural, cultural, and landscape heritage with the involvement of all stakeholders.

Keywords: aspiring geopark, urban geopark, Selangor Malaysia

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GOOD PRACTICES OF MINÉ-AKIYOSHIDAI KARST PLATEAU GEOPARK

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Miné-Akiyoshidai Karst Plateau Geopark is located in south-western Japan and is known for its karst plateau and limestone cavern, coalfield, and ancient copper mine. It was certified as a Japanese geopark in 2015. The geopark underwent a UNESCO Global Geopark national recommendation mission in July 2024, where various good practices were identified.

The first good practice is the measures taken to work towards eliminating the selling of geological materials within the geopark area. Mine city, which corresponds to the geopark's boundary, has played a significant role in the history of Japan by producing high-quality limestone that has sustained the development of infrastructure across the country. Byproducts from the quarrying of limestone have traditionally been used to create stone handicrafts. Geopark staff have held frequent dialogues with manufacturers and sellers, designed informative panels, developed alternative products, and tracked changes in residents' perceptions through qualitative research.

The second good practice that was highlighted is the geopark's information centre, named 'Karstar'. Karstar is a unique, modern-looking building that hosts various creative ways that attract the attention of visitors who are unfamiliar with the concept of geoparks. Karstar also acts as a hub for geopark staff and geoguides, and is the starting point for most geotours.

Miné-Akiyoshidai Karst Plateau Geopark will continue to strive for UNESCO recognition status and looks forward to sharing its experiences and good practices with members of the Global Geoparks Network.

Keywords: Miné-Akiyoshidai Karst Plateau Geopark, Japan, aspiring UNESCO Global Geopark, geological materials, geopark centre, Karstar
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HAI PHONG ASPIRING GEOPARK - POTENTIAL AND POSSIBLE ROADMAP

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Hai Phong is a coastal city in the Red River Delta, bordering the provinces of Quang Ninh, Hai Duong and Thai Binh to the mainland and the Gulf of Tonkin to the east. The city's sea and islands include the island districts of Cat Hai and Bach Long Vi and the surrounding sea. With a land area of over 1,500 km^2 and a population of over 2.1 million people, it is the third largest city in Vietnam and an important port and socio-economic center of the northern coastal region of Vietnam. Hai Phong is also famous for the Cat Ba Archipelago (belonging to Cat Hai island district), which has been recognized by UNESCO as a World Biosphere Reserve since 2024. In 2023, the Cat Ba Archipelago, as an inseparable organic part of Ha Long Bay, under the common name Ha Long Bay-Cat Ba Archipelago, was recognized by UNESCO as a World Natural Heritage according to aesthetic and geological-geomorphological criteria. In 2024, Ha Long Bay-Cat Ba Archipelago was also recognized as one of the second 100 IUGS Geological Heritage Sites. In addition to the above-mentioned geological-geomorphological and biodiversity values, Hai Phong is also very rich in cultural, historical and archaeological values. Having learned about the Global Geopark model since 2005, Hai Phong has full potential to develop a Geopark and be recognized as a UNESCO Global Geopark in the next few years, aiming to better preserve and promote heritage values, while spreading this conservation and sustainable development model to other areas of the city. This article presents in detail this potential and a possible roadmap.

Keywords: Geological-geomorphological, Geological Heritage Sites, Geopark.

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INDIGENOUS KNOWLEDGE OF GEOHERITAGE IN LANG SON ASPIRING GEOPARK (VIET NAM)

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Indigenous knowledge of natural environment reflects community awareness of both advantageous and disadvantageous characteristics, including geological features and geoheritage values, thereby helping the community adapt, live sustainably and harmoniously with the natural environment of the homeland where they live.

Located entirely in Lang Son province, Lang Son Aspiring Geopark (LSaUGGp) is located in Northeast Vietnam. It is c.50km to the North from CBUGGp (Cao Bang province), and borders China to the East. With an area of 4,852.58km2, a population of about 627,500 people (accounting for about 58% of the area and 78% of the province's population);

LSaUGGp has a long (at least since the Cambrian, c. 500 Ma), continuous (the entire Phanerozoic, especially the entire Mesozoic and Cenozoic), complex and diverse history of geological evolution (with many rock types along with an extremely rich representation of paleontological species and genera, of which many species and genera were found for the first time in the Geopark area).

LSaUGGp also witnessed many important events in the history of the Vietnamese nation, where geological and landscape features have been thoroughly understood and made use of by people in all aspects of their life (in resistance wars to protect their Fatherland and their freedom, independence and sovereignty; daily cultivation and handicraft production; internation trade and cultural/belief exchange etc.).

An interesting coincidence, being the special transitional location between the Red River Delta and the Chinese mainland lowlands, it appears not surprising that Lang Son is also the earliest and most continuous cradle of prehistoric humans on the present-day Vietnam since c.500,000 years ago, which later also became the homeland of such archaeological cultures as Bac Son (c.11,000 years ago) and Mai Pha (c.4,000-3,500 years ago).

LSaUGGp, although being basically a mountainous area inhabited by seven ethnic groups, is a very popular realm for worshiping the Mother Goddesses - a unique Vietnamese belief that can be mostly found in the deltaic and coastal areas of Vietnam.

In this special subject, we would like to introduce some indigenous knowledge values of the process of recognizing natural elements, behaving and adapting to the natural environment expressed in intangible cultural values.

Keywords: Geopark, Geoheritage, indigenous knowledge.

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MT. CHOKAI & TOBISHIMA ISLAND AUGGP, JAPAN – CONSERVATION OF BIODIVERSITY IN SATOYAMA

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Mt. Chokai & Tobishima Island is an aUGGp located on the Sea of Japan side of northeastern Japan. The main geological heritages of this aUGGp are the hill created by the subduction of the Pacific Plate and volcanic landform of Chokai Volcano that has been active since the Pleistocene. In particular, the sector collapse of the Chokai Volcano that occurred 2,500 years ago and its topography are the international geological value in the aUGGp.

The sector collapse of the Chokai Volcano that occurred 2,500 years ago formed beautiful landscape (hummocky hills) of the lagoon with many islands, the "Kujukushima". Many cultural figures visited the area in the 19th century and recorded its magnificent view in many haiku.

However, the M=7.0 earthquake that occurred in July 1804 raised the ground in this area by about 2 meters. As a result, the lagoon dried up and the beautiful scenery was lost. This scenery, which was later developed into paddy fields, was designated a national natural monument in 1934 and Chokai Quasi-National Park in 1963, respectively.

The threat facing our aUGGp is the loss of biodiversity. Japan has a natural environment that has been maintained by regular human intervention, such as paddy fields and slash-and-burn farming, which has also influenced the formation of unique local cultures. However, due to the rapid population decline, it is becoming difficult for residents to manage satoyama in rural areas. In addition, large-scale land development is also destroying the natural environment in which native species can live.

In order to maintain the original natural environment, the aUGGp promotion council is spreading and improving the visibility of the value of the natural heritages through setting up new sites, and is working with local stakeholders to achieve substantial conservation and maintenance of biological resources. In this presentation, we will introduce the conservation activities of biodiversity carried out at Kujukushima as a concrete example.

Keywords: Mt. Chokai & Tobishima Island aUGGp, Chokai Volcano, sector collapse, Kujukushima, biodiversity, Chokai Quasi-National Park.

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NAPO SUMACO ASPIRING UNESCO GLOBAL GEOPARK (ECUADOR): AN AMAZONIAN GEOPARK TERRITORY

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Napo Sumaco Aspiring UNESCO Global Geopark is an initiative with 9 years of continuous work in favor of the dissemination and enhancement of the geoheritage of the upper basin of the Amazon River, with a specific territorial interference in the Tena and Archidona municipalities, of the Napo province. The work of this geopark has focused on the joint work developed between non-profit organizations, academia, decentralized autonomous governments and organized local communities, with the aim of improving the quality of life of the Amazonian inhabitants, creating spaces for dissemination of sciences and dialogue of knowledge, promulgating geotourism as an activity that empower the local and circular economy.

During this process, it has been possible to unite the social and community participation of local indigenous groups present in this territory, strengthening the organization of groups of tourist guides (*Yuyaiwa Pushak Runakuna*), artisans (*Yachak Awakkuna*) and ancestral Kichwa cuisine (*Mikusha Kawsari*), who have been the driving force and social base of this geopark. It is important to mention the work of more than 150 volunteers led by leaders of the Napo Sumaco Geopark Foundation; These volunteers provide their contingent in person and virtually, to achieve various actions with a direct impact on the territory.

Napo Sumaco, in compliance with the Operational Guidelines for UNESCO Global Geoparks, began its regular application process in December 2019, however, this application process was affected by the Covid-19 pandemic, delaying the field evaluation, which was finally carried out from November 18 to 22, 2021. On April 21, 2022, the Napo Sumaco Aspiring UNESCO Global Geopark was officially informed that, as a result of the comprehensive evaluation, the Council of UNESCO Global Geoparks decided to Defer its application for a period of two years, which expires on April 12, 2024. During this period Napo Sumaco proved to be a resilient territory, becoming one of the national references for community participation in the management of Ecuadorian geoheritage.

Keywords: Amazonian, Ecuador, Napo Sumaco, Yuyaiwa Pushak runakuna, Yachak Awakkuna, Mikusha Kawsari

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POTENTIAL AND POSSIBLE ROADMAP OF PHU YEN ASPIRING GEOPARK, CENTRAL COASTAL VIETNAM

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Phu Yen is a coastal province in Central Vietnam, bordering the provinces of Binh Dinh to the North, Khanh Hoa to the South, Gia Lai and Dak Lak to the West and the sea to the East. Featuring nine district-level administrative units, it includes 1 city, 2 towns and 6 districts with a total area of approximately 5,000km2 and a population of 875,000 people.

A possible Geopark could consist of a number of coastal districts, city and towns such as Tuy Hoa provincial city, Song Cau, Tuy An, and the Dong Hoa district, with possible extensions to include also Phu Hoa and Tay Hoa districts.

In addition to the rich cultural heritage and abundant marine, biodiversity, the potential Phu Yen Geopark would also feature interesting geological heritage, including sites of international significance, demonstrating the long and complex geological history from over 2 billion years ago until present. This presentation will introduce this potential geopark and provide a possible roadmap forward.

Keywords: Vietnam, Phu Yen Aspiring Geopark, Geological Heritage Sites.

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SARAWAK DELTA, MALAYSIA: JOURNEY TOWARDS A UNESCO GLOBAL GEOPARK

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The Sarawak Delta Aspiring UNESCO Global Geopark (SDAG) is the first geopark in Sarawak, located in the southern part of Borneo, East Malaysia. Spanning an area of 3,112 square kilometers (sq km) it includes both land and water areas. SDaUGGp is home to diverse indigenous communities including the Iban, Bidayuh, and Malays, living in a heterogeneous landscape comprising urban, agricultural, natural forest, and conservation areas. The Geopark represents a deltaic system formed by the Sarawak River basin, stretching from the Borneo Highlands in the south to the South China Sea in the north. The geopark is situated in the West Borneo Block, which is part of the larger Sundaland region, a geological fragment formed from the collision between the Sibumasu Block and the Indochina/East Malaya/West Borneo Block around 250 million years ago. This collision has contributed to the geological diversity of international significance in the area. Sarawak Delta aspires to be recognized as a UNESCO Global Geopark by 2026. The journey towards this goal has stimulated scientific studies on the geopark's geological heritage, community development, and education. These efforts aim to enhance interpretation, provide economic opportunities, attract geotourism, promote environmental sustainability, and preserve the unique heritage of SDaUGGp. In its journey towards global recognition, various issues and challenges such as stakeholder buy-in, capacity building, and community participation need to be addressed to ensure success and inclusivity in line with the Sustainable Development Goals.

Keywords: Conservation, geopark, heritage, sustainable development
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THE DIFFICULTIES AND CHALLENGES FACED BY LANG SON ASPIRING GEOPARK

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Spanning a vast territory of 4,842 km² and accounting for 58 percent of the area and 78 percent of the population of Lang Son Province, Vietnam. Lang Son Aspiring Geopark is a gem, nestled in Vietnam's northern mountains. It's a living testament, encapsulating a journey through 500 million years ago of life's evolution through diverse landscapes. Since its establishment, Lang Son Aspiring Geopark has received support and assistance from authorities, as well as the local community, for its construction and development. Like other aspiring Geoparks, Lang Son Aspiring Geopark also faces many difficulties and challenges.

This presentation aims to provide a brief introduction to Lang Son Aspiring Geopark. It will address the difficulties and challenges that Lang Son Aspiring Geopark has been encountering during its process of building and development. Some of these challenges include the lack of support policies for guiding the establishment, management, and development of Geoparks (as the concept of Geopark is relatively new in Vietnam), the shortage of skilled personnel with expertise and experience, the lack of investment resources for building Geopark infrastructures and training, challenges in raising public awareness about the role and importance of constructing and developing the Geopark, difficulties in attracting local, national and international tourists, and challenges in creating conditions and activities to contribute to the improvement of economic and spiritual benefits for local people in the area of Lang Son Aspiring Geopark.

This presentation also proposes measurements and approaches to overcome obstacles, aiming to contribute to the preservation and enhancement of the overall value of Lang Son Aspiring Geopark's diverse heritage sites.

Keywords: Lang Son Aspiring Geopark, new concept, difficulties and challenges of geopark development, geopark development obstacles.

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THE SUCCESSFUL RESULTS OF FULL COOPERATION BETWEEN PHU WIANG NATIONAL PARK AND KHON KAEN ASPIRING UNESCO GLOBAL GEOPARK, THAILAND

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Khon Kaen Aspiring UNESCO Global Geopark / Phu Wiang National Park, Thailand

Khon Kaen, an aspiring UNESCO Global Geopark, is located in northeastern Thailand in an area known as the valley of dinosaur kingdom. The boundary covers an area of Phu Wiang National Park, Wiang Kao District, and Phu Wiang District, with an area of 1,038 sq. km. The Phu Wiang National Park itself spans 325 square kilometers, and accounts for 31% of the area of the geopark. This national park serves as a significant location for numerous geological excavations, particularly the nine excavation sites. The national park also features caves, waterfalls, cliffs, and prehistoric paintings.

Prior to 2018, Phu Wiang National Park itself faced limitations in its operations due to insufficient staff and budget. Additionally, there were numerous challenges, such as lack of understanding among the communities, illegal logging and poaching, forest fires, and constraints in conservation efforts.

In 2018, Khon Kaen Geopark was established and the team asked the national park to be its main partner. The focus was on holistic management and administration to improve the efficiency of operations. Consequently, an MOU was signed to drive the geopark forward in collaboration with the national park and relevant stakeholders. Currently, Phu Wiang National Park is recognized as one of the most progressive national parks in Thailand, with visitor numbers increasing by up to 13 times and receiving a Green National Park Award. Together the national park and geopark have achieved numerous successful projects such as implementing a smart patrol system, developing tourism destinations, nature study trails, fostering community conservation awareness through spiritual beliefs, promoting astro-tourism, afforestation efforts, tourism promotion, supporting forest fire suppression and restarting the fossil excavations. These endeavors demonstrate successful collaboration between Khon Kaen Geopark and Phu Wiang National Park, highlighting what may be achieved through a joint holistic approach.

Keywords : Thailand, Phu Wiang National Park**,** Khon Kaen Aspiring Geopark**,** Good practice , Cooperation , Challenges

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POSTER SESSION ABSTRACTS

SESSION 1 - Local and indigenous knowledge, engagement of local and indigenous people in Geopark activities (02 abstracts)

SESSION 2 - Geohazard, natural disaster risk and climate change reduction and adaptation (02 abstracts)

SESSION 3 - Heritage inventory, protection and sustainable use (03 abstracts)

SESSION 4 - Geoparks and regional sustainable development goals (02 abstracts)

SESSION 5 - Geopark education and science popularization (05 abstracts)

* Paleozoic carbonate buildups, their landforms and fossil contents: scientific and geotouristic values (01 abstract)

SESSION 6 - Aspiring Geoparks - Difficulties and challenges (05 abstracts)

(The abstracts are in alphabet order.)

COMMUNITY PARTICIPATION IN TRADITIONS AND CULTURE WITHIN THE KHORAT UNESCO GLOBAL GEOPARK, NAKHON RATCHASIMA PROVINCE, THAILAND

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Khorat UNESCO Global Geopark is distinguished by its unique geology, ancient fossils, natural beauty, educational significance, and rich cultural heritage. It also stands out for its strong local communities that drive sustainable development through a bottom-up management approach.

The Khorat Geopark community actively participates in provincial traditions, such as the annual celebration of Thao Suranari's victory in March. Thao Suranari, a heroine who saved Khorat from enemy forces in 1826, is honored through Thai's dance performances by women from every district in Nakhon Ratchasima province.

Another important local event is the Candle Festival, which pays respect to Buddhist traditions. This festival involves crafting and carving candles with beautiful designs that depict Buddhist stories. It blends traditional craftsmanship with modern techniques and is organized by both government and private sectors. Representatives from the five districts within the Geopark territory; Sikhio, Sung Noen, Kham Thale So, Mueang, and Chaloem Phra Kiat—participate in these events, playing roles in performances, parades, and crafting decorations.

Community engagement in cultural events is also celebrated in the Khorat UNESCO Global Geopark. In 2023-2024, both the Thao Suranari victory and the Candle Festival show significant participation from the local community. 252 participants took part comprising women (73)%, men (10)%, and young people (17)%. These events align with the United Nations Sustainable Development Goals (SDGs) including SDG 4.7 'Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities'. It also addresses 'Achieving gender equality and empowering all women and girls, ending all forms of discrimination' (SDG 5.1) and 'Ensuring women's full and effective participation and equal opportunities for leadership' (SDG 5.5).

These activities not only preserve and promote cultural heritage, celebrate Buddhism, and honor the brave heroine of Khorat; but also contribute to sustainable living, human rights, gender equality, and a culture of peace and non-violence.

Keywords: Khorat UNESCO Global Geopark, Community participation, Local People, Cultural Heritage

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INTRODUCING INDIGENOUS KNOWLEDGE ON GEOHERITAGE IN SOME UNESCO GLOBAL GEOPARKS IN VIETNAM

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Indigenous knowledge (IK) on geoheritage is an essential part of the broader spectrum of indigenous knowledge, It primarily pertains to the understanding and perceptions of local communities about nature and their interactions with it, encompassing their adaptations and innovative responses to the natural environment, which are transmitted through generations.

Most of Vietnam's UNESCO Global Geoparks (UGGps) have a long and complex history of geological evolution with diverse tectonic, magmatic, and sedimentary processes/activities, as well as uplift, recession, orogeny, and gradation cycles, etc., leaving behind a rich variety of unique marks. Numerous phenomena, processes, and elements have been acknowledged and thoughtfully integrated into the worldview and cosmology of local communities over generations. These insights are reflected in their daily lives through various expressions, including rituals, beliefs, legends, narratives, artistic forms, and experiences related to life and production. It is not an exaggeration to say that the more diverse, complex, and contrasting the natural characteristics and conditions are the richer and more unique the local knowledge about them, especially the local knowledge about geology and geoheritage. The more difficult and challenging the natural conditions are, the more resilient the local people are, the stronger their will to rise, and the more ardent their desire for a more favorable and prosperous life is.

However, unlike indigenous knowledge in general, indigenous knowledge on geoheritage has been mentioned for the past fifteen years in Vietnam, and has not been summarized. Meanwhile, the insight on indigenous knowledge on geoheritage, similar to the general indigenous knowledge, is certainly very useful. The research titled "*Studying Indigenous Knowledge on Geoheritage in Selected Geoparks in Vietnam*" not only enriches the heritage values of these UGGps in both quantity and quality but also improves community education regarding heritage and UGGps, particularly in the area of geoheritage. This initiative is essential and practical for fostering the conservation and promotion of heritage values while supporting sustainable socio-economic development.

Keywords: Geoheritage, indigenous knowledge, UNESCO Global Geoparks, Vietnam.
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ENHANCING CLIMATE EDUCATION AND BIODIVERSITY MONITORING THROUGH GEOTOURISM IN KHORAT UNESCO GLOBAL GEOPARK

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Climate change poses significant global challenges that require new tools and strategies for monitoring and education. Khorat UNESCO Global Geopark, Thailand, is monitoring the impacts of climate change and promoting educational and geotourism activities. By incorporating iNaturalist app into educational programs, students and visitors can collect real-time data, helping them to connect and better understand the impacts of climate change on local biodiversity and geoheritage. This hands-on approach not only helps document and analyze environmental change, but also encourages community involvement and awareness.

To create geotrails and enhance the scientific understanding of the geosites, Khorat UGGp, in partnership with the Man and Biosphere Reserve Sakaerat, conducted a comprehensive biodiversity survey and data collection from 2018 to 2020. In 2021, during the second year of the COVID-19 pandemic, Khorat UGGp collaborated with a paleobotanist, educators, and students from Geopark schools to launch Thailand's first river collective project—the Mun River Bioblitz. This initiative became part of the larger "Home River Bioblitz" project, using the iNaturalist app. This Mun River Bioblitz involved 22 observers from two Geopark schools near two watercourses: the Lam Takhong Tributary and the Mun River, both of which experienced floods. Participants gained significant insights into the effects of environmental change and weather impacts. In 2022, we continue the World Rivers Day activity in contribution to the Khorat Geopark Biodiversity Project, involving 35 observers from one Geopark school along the Mun River. The Geopark expanded its efforts with the City Nature Challenge in April 2023, involving 37 observers from three Geopark schools, featuring diverse ecosystems such as deciduous dipterocarp forests and salt-tolerant plants. Key locations included Krok Duean Ha Petrified Forest, Pru Yai Commemoration Park, and Phan Dung Saline Soil Salt Area. By the end of 2023, with support from the National Geographic Society, Khorat UGGp, Friends of Fossil Forests founder, and network researchers conducted further biodiversity investigations along Khorat Fossil Museum - Wat Pa Phu Pha Sung (temple) tourism route. These efforts aim to design one-day outdoor educational activities and create biodiversity database of four geosites to promote awareness, improve visibility, design geotourism activities, and conserve local biodiversity.

As a result of our project collaboration from 2021 to July 2024, we have more than 9,000 observations from over 400 observers as part of the project. This outdoor place-based education approach, using mobile applications and citizen science projects, effectively engages local communities in climate education and biodiversity monitoring. It improves our understanding of environmental change and fosters a sense of responsibility, stewardship, and adaptation to climate change. Our activities support SDG 13 Target 13.3, which focus on improving education, awareness and capacity on climate change mitigation, adaptation, impact reduction, and early warning, ensuring the preservation of our natural heritage for future generations.

Keywords: Climate Change, Biodiversity, Outdoor learning, iNaturalist
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STUDY ON THE COUNTERMEASURES OF GEOLOGICAL DISASTER ENGINEERING IN SHILIN UGGP UNESCO GLOBAL GEOPARK

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This research examines the engineering management of geological hazards within the Shilin UNESCO Global Geopark (UGGp). It provides an in-depth analysis of the geological structure and the characteristics of the Shilin UGGp, alongside a compilation of historical disaster events. This has enhanced our understanding of the factors influencing of geological hazards. Furthermore, the study evaluates the specific impacts of natural conditions and human activities on these hazards. Based on the findings, a disaster monitoring and early warning system has been developed, and a range of practical and effective engineering methods have been investigated and implemented. These initiatives aim to establish a scientific basis for the ongoing protection and risk management of geological parks, while also serving as a reference for disaster prevention and control in similar regions. Finally, this study identifies the primary factors influencing geological hazards in the Shilin UGGp, which includes: rainfall-induced mudslides; collapse and subsidence caused by karst landforms; the interaction of multiple fault zones and the erosion of rocks leading to structural planes that facilitate water movement and sliding; the erosion of bedrock by underground rivers, which exacerbates disasters; the impact of vegetation changes and soil erosion affect slope stability; because carbonate rocks alternate with impurity rock layers, these lead to differences in erosion. Finally, uneven erosion environment appeared; the large temperature difference between seasons and the fluctuation of annual average temperature affect rock erosion and vegetation growth; tourism development and land use changes can affect the dynamic balance between natural conditions and hazards.

Key words: Geological disasters; engineering management; disaster monitoring; early warning system; Shilin UGGp; risk management.

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ASSESSING THE CURRENT STATUS OF BIODIVERSITY CONSERVATION OUTSIDE PROTECTED AREAS IN CAO BANG UNESCO GLOBAL GEOPARK

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Biodiversity in Cao Bang Geopark has been officially conserved in the national park and some nature reserves. However, Cao Bang also has many areas of natural forests managed by local communities and authorities, which contain significant biodiversity values. From August 5-10, PanNature conducted a quick biodiversity survey in a number of local community forests in the 4 districts of the province.

In all the parts of Cao Bang, there are good remaining natural stands of *Burretiodendron hsienmu* (category VU in IUCN Red List). In the Eastern part (Quang Hoa, Ha Lang, Trung Khanh districts) the survey has recorded presence of *Pseudotsuga sinensis* (VU) and endangered orchids of the genus *Paphiopedilum* and *Anoectochilus*. Fauna in the Eastern part are reported to have Cao-vit Gibbon *Nomascus nasutus* (CR), Monkey, Squirrel, Weasel...

In the Western part (Bao Lac district) a number of endangered conifers has been found including *Tsuga chinensis* (LC), *Podocarpus pilgeri* (LC), *Pinus fenzeliana* (NT), *Taxus chinensis* (EN), *Calocedrus rupestris* (EN). Valuable orchids are also found such as *Paphiopedilum micranthum* (CR), *Anoectochilus calcareus, Dendrobium longicornu, Holcoglossum lingulatum* etc. Animals in the Western part include Coolie, Cobra, Monkey, Porcupine…

Despite possessing high biodiversity values, biodiversity of these areas has not been surveyed, assessed and applied commensurate conservation measures. Resources for conservation activities are lacking and weak. Responsibilities for biodiversity conservation at the local level are unclear.

It is necessary to promote the survey and assessment of biodiversity values outside protected areas, especially to identify areas of high value in order to build effective conservation models (OECMs), helping Vietnam implement its commitment to the targets of Kunming-Montreal Global Biodiversity Framework. In addition, it should focus on integrating biodiversity conservation into local development policies and plans; encoarge good practices and communication on biodiversity conservation at community level.

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CONSERVATION EFFORT FOR SMALL MAMMAL (NORTHERN PIKA) IN JAPANESE GEOPARKS IN HOKKAIDO ISLAND

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Habitat of Northern Pika (*Ochotona hyperborea yesoensis*) is restricted by topography and climate. Habitat of this small mammal is restricted to rocky sediments such as lava collapses and periglacial blocky slopes in mountain area, where the summer climate is cool. One UGGP and three National Geoparks in Hokkaido Island (Mt. Apoi UGGP, Tokachi-Shikaoi NGP, Tokachidake NGP, and Shirataki NGP) have Pika habitats distributed within their designated areas. This study presents the problem of overuse by photographers in the Pika habitat and the conservation efforts being made in the Geoparks in Hokkaido Island.

As the culture of sharing photos through social networking services expands, the number of people taking animal photos is increasing. As a result, many people began to visit the habitats of Pika, and the uncontrolled expansion of the Trail became evident in some area. The Tokachi-Shikaoi NGP is working to conserve Pika habitat in association with trail management. Through interviews with hikers and GIS analysis of activity data, we identified areas that are frequently used by Pika photographers and set ropes to prevent people from entering other areas. Through communication and information sharing among hikers, the rules for photographing Pika within the ropes are well followed.

On the other hand, the Tokachidake NGP has been struggling to cope with many photographers who enter Pika habitats located far from the trail. Ropes have been installed along the trail since 2023, but there is no end to the number of people who ignore the ropes and enter the area. This may be because the Pika habitat is not visible to trail users, and we are struggling to take measures to ensure that photographers follow the rules.

Keywords: Pika, Conservation, Trail, Hokkaido
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GEOSCIENTIFIC COLLABORATION WITH CAVE EXPLORATION TEAMS TO INVESTIGATE THE INFLUENCE OF TECTONIC STRUCTURES ON KARST DEVELOPMENT IN THE LEFKA ORI MASSIF, HELLENIC SUBDUCTION ZONE, CRETE, GREECE

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The study presents the results of the fieldwork conducted in the western part of Crete (Lefka Ori Massif and the areas of Sternes and Trocharis peaks). The fieldtrips were funded under the IUGS IGCP-715 project and were under the auspices of UNESCO. The Gourgouthakas Exploration Team 2022 and the Sternes Expedition Team 2022-2023 contributed in samples collection and measurements inside the kilometer deep caves.

South-west of Sternes Cave, the Pachnes Thrust has been mapped from the area of Pachnes mountain peak (2453 m) to Katsiveli Hut (1975 m). The Pachnes Thrust has transported the Triassic-Jurassic white limestones and the older black dolostones (hanging wall) over Cretaceous-Oligocene metamorphic thin-bedded limestones (footwall). In the Sternes Cave, the Pachnes Trust has been identified by the tectonic contact of the underlying thin bedded limestones with the overlying black dolostones. Along this contact the Sternes Cave Expedition has explored 5-6 km of underground karst tunnels in a depth of 400-600 m below the surface at 2095 m elevation. A similar tectonic contact is extended 5 km northward to Gourgouthakas Cave. The samples thin section analysis from Gourgouthakas Cave revealed similar tectonostratigraphy with the non-metamorphosed limestones and dolostones (Triassic-Jurassic) to overlay the metamorphosed thin bedded limestones (Cretaceous-Oligocene). These observations explain that some of the caves' geomorphology is related to the Pachnes Thrust. Two major morphological features, the horizontal tunnels in Sternes Cave and the transition from large chaotic vertical chambers to cascading smaller chambers in Gourgouthakas Cave, are associated with the Pachnes Thrust. These observations revealed that the Pachnes Thrust is dipping 8-10° to north-east and it has influenced the karst development in Lefka Ori Massif. In addition, many outcrops can be regarded as potential geosites too, some of international value.

Keywords: Subduction zone, thrust, caves, geosites, Lefka Ori, Crete

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MOBILE GIS SOFTWARE OF TABAS UNESCO GLOBAL GEOPARK (IRAN): FEATURES AND CAPABILITIES FOR GEOTOURISM DESTINATIONS

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Tabas UNESCO Global Geopark (UGGp), the third UGGp in Iran, joined the GGN in 2023. This geopark boasts a diverse and stunning collection of geological, cultural-historical, and natural attractions. It features the most complete sedimentary succession of the Paleozoic era in Iran and West Asia, the oldest, tallest, and thinnest arch dam in the world (Korit Dam), and the largest wildlife refuge in Iran. The unique geological diversity of this geopark has earned it the titles of "Geological Paradise" and "Fossil Museum of Iran." In line with these attributes, Tabas UGGp developed an Android mobile application. The development of mobile-based applications is an effective way to support the geotourism destinations within the geopark's territory, contribute to regional SDGs, introduce geosites and customs, and promote domestic tourism. Mobile technology has significantly changed the way we communicate and interact with the outside world.

The Android application encourages visitors to explore and appreciate the heritage and beauty of the Tabas UGGp territory. This software, designed using Mobile GIS, was unveiled on May 18, 2022. It supports Google satellite maps, Google Street maps, access to different geopark layers (county borders, geopark borders, roads, geosite locations, etc.), and the ability to toggle these layers on and off. Additionally, it displays all information about geosites in both Persian and English, provides information about partners, routes to geosites, and weather conditions, which are updated online.

Mobile GIS software is a part of GIS technology that brings mobile technology out of the office and into the field. These applications are typically designed to run on cars, cell phones, or other personal digital devices that support Mobile GIS. Mobile GIS software can show the most efficient and easiest route to users. Another feature is the ability to calculate travel time, estimating the time required to reach a destination based on speed and distance.

Keywords: Mobile GIS, Geotourism, Tabas Geopark, tourism, Sustainable Development

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NEW WAYS FOR SUSTAINABLE DEVELOPMENT OF INNOVATIVE KARST GEOPARKS DRIVEN BY AGRICULTURAL GEOLOGICAL SURVEY IN GUANGXI

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China Leye-Fengshan World Geopark is located in the slope zone of the transition from the Yunnan-Guizhou Plateau to the Guangxi basin in the northwest of Guangxi, with a total area of 930 square kilometers.Local karst development leads to uneven distribution of water resources, drought, land rocky desertification, ecological protection restrictions and other problems, which largely limit the local social and economic development. People generally have low income and have been on the edge of poverty for a long time.The people's government of Leye-Fengshan World Geopark area makes full use of the advantages of local natural resources, making use of the "Guangxi Agricultural Geology Serves Agriculture, Countryside and Farmers" project organized and implemented by the people's Government of Guangxi Zhuang Autonomous region,the results of geochemical survey and evaluation of land quality in all counties and cities in Guangxi, and vigorously promotes the industrial development model of "green, ecological, selenium-rich, longevity and tourism":

1.To vigorously promote the development of selenium-rich industry.The planting area of selenium-rich agricultural products is 23.5 square kilometers, and 25 brands of selenium-rich agricultural products have been applied for and certified,which has effectively improved the market influence and competitiveness of local selenium-rich agricultural products.

2.To actively develop the cultivation of Chinese herbal medicines such as Mahonia fortune (Lindl.) Fedde, subprostrate sophora. “Donglan-Bama-Fengshan” planted 200.0 square kilometers of traditional Chinese medicine. Fengshan planting bases of Mahonia fortune (Lindl.) and subprostrate sophora were selected as the "first batch of traditional Chinese Medicine demonstration Base in Guangxi". Huanjiangshan base of subprostrate sophora has passed the evaluation of the first batch of "Fixed Pharmaceutical Park" in Guangxi, and the Bama blessing Changshou Island Scenic spot won the first project of establishing a demonstration base for health tourism of traditional Chinese medicine in Guangxi. It has greatly enhanced the brand publicity and influence of agricultural economy with local characteristics.

3.To implement various poverty alleviation models such as "company + base + poor households", "land equity dividends + poor households", "product income + poor households" and absorbing small credit loans from poor households, and sign selenium-rich rice planting assistance agreement with poor households to provide farmers with materials, seeds, selenium-rich fertilizer and technical assistance free of charge, with an annual investment of more than 500,000 yuan.

Since 2016, Community residences in Guangxi Leye-Fengshan World Geopark have innovated and developed a sustainable development model of combining selenium-rich agricultural economy with tourism.Community cooperation companies have paid a total of 14 million yuan to poor households as the bonus, directly benefiting 1,996 poor households and lifting 1,300 poor households out of poverty. It has successfully achieved the goal of geological relic protection and socio-economic green, ecological and sustainable development, which is integrated with the world Geopark and local residents.

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ENHANCING ENVIRONMENTAL LITERACY: THE EDUCATION PROGRAM OF LANGKAWI GEOPARK

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Langkawi Geopark, Malaysia's first UNESCO Global Geopark, is a leader in promoting environmental education and scientific literacy through its comprehensive education program. Central to this effort is the innovative Geopark School initiative, which integrates geoscience education into school curricula and fosters community engagement. The program encompasses various sub-programs aimed at making geological and environmental sciences accessible and engaging. The Geopark to School program brings geopark experts into classrooms, where they deliver lectures, conduct workshops, and engage students with interactive learning experiences about Langkawi's geological features and the importance of conservation. This direct interaction demystifies complex geological concepts and inspires students to take an interest in earth sciences. Conversely, the School to Geopark program provides students with opportunities to visit the geopark and experience its natural wonders firsthand. Field trips to sites like Machinchang Cambrian Geoforest Park, Kilim Karst Geoforest Park, and Dayang Bunting Marble Geoforest Park allow students to observe geological formations and participate in hands-on activities, bridging theoretical knowledge with practical understanding. The Geopark Corner is a designated area within schools that displays educational materials, rock and mineral samples, and information about the geopark. This permanent exhibit serves as a constant reminder of the significance of the geopark, encouraging ongoing learning. The Geomangrove and Geocoral programs focus on specific ecosystems within the geopark. Geomangrove educates students about the critical role of mangroves in coastal protection and biodiversity, often involving them in mangrove planting and conservation activities. Geocoral emphasizes the importance of coral reefs, teaching students about marine ecosystems and promoting coral conservation through interactive projects and snorkeling trips. Additionally, the Geopark Module for Schools was launched to further integrate geopark education into school curricula, an established geopark guide course train guides to provide informative tours, and a youth program in collaboration with the Langkawi Tourism Academy encourages young people to engage in sustainable tourism practices. These programs collectively enhance scientific literacy and environmental stewardship among young learners. By fostering a deep connection with their natural heritage, Langkawi Geopark's education initiatives cultivate a generation of informed and responsible stewards of the environment. Through its multifaceted approach to education and science popularization, Langkawi Geopark demonstrates a commitment to sustainable development and the empowerment of future generations.

Keywords: geopark module, geopark school program, education, science popularization
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INVENTORY SURVEYS ON MARINE LIFE AROUND URADOME COAST IN SAN'IN KAIGAN UNESCO GLOBAL GEOPARK, WESTERN JAPAN

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Within 10 UNESCO Global Geoparks in Japan, the San'in Kaigan UNESCO Global Geopark has been certified since 2010. This geopark covers an area of about 120 km from east to west and 20 km from north to south along the Sea of Japan coast of Chugoku region. There are 58 geosites within this area. San'in Kaigan Geopark Museum of the Earth and Sea is a geopark base facility operated by Tottori Prefectural Government and is located in the Uradome Coast which is a geosite in the western area of the geopark. This museum is visited by about 20,000 people annually from Japan and abroad. In addition to geological exhibits, the notable field is marine biology is remarkable in the museum, where there are 3 curators of geology and 2 of marine biology out of 13 staff members.

The Uradome Coast is mainly composed of granite and tuffaceous conglomerate, and wave action, uplift and subsidence have formed a complex rias coast. Marine activities are popular, and the number of visitors has increased by more than 11 times in the past 10 years, with a growing interest in marine life. However, there has only been one marine biologist for 18 years and has not accumulated much knowledge about its fauna. Although the fauna of fish, stranded seashells, cephalopods, and crabs had been surveyed, other taxa remained unresolved.

Therefore, taxonomists from various marine taxa in Japan have been invited to conduct marine fauna surveys specific to each taxon since 2017. The survey was conducted by a few taxonomists, mostly snorkeling and scuba diving. At the present time, 93 echinoderm, 52 ascidian, and 134 nudibranch species were found in and around Uradome Coast. Photographs of various marine organisms and some specimens taken during the survey were used for the museum's permanent exhibits and promotional booklets, and some of the organisms were exhibited in museum aquariums.

Keywords: Japan, San'in Kaigan, marine biology
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SCIENCE POPULARIZATION EDUCATION ACTIVITIES IN CHANGSHAN GEOPARK ARE RUNNING ON A REGULAR BASIS

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The Geopark lies in Changshan County, Quzhou City, Zhejiang Province, China, with a total area of 1043.10 km2.

The Geopark system has completely preserved and displayed the evidence of geological evolution from the Neoproterozoic Tonian Period to the Quaternary. The Geopark features a unified and complete cap sedimentation, reflecting the biological succession and environmental changes in the final "roaring 300 Myr" of the Proterozoic Eon. It serves as a natural geology museum for studying the geological history from the Tonian period to the Lower Palaeozoic era, not only within the context of China but on a global scale as well. The strata here are successively exposed, ranging from the folded basement of the Neoproterozoic to the Quaternary cover rocks of the Cenozoic (excluding the Triassic, Paleogene and Neogene). The region boasts world-class stratigraphic sections such as the CHINA'S FIRST GSSP of the Huangnitang Ordovician Darriwilian Stage, and the Xiyangshan Cambrian-Ordovician Boundary Section. It also houses a rich array of ancient biological fossils, represented by the trilobite and graptolite faunas, which clearly depict the evolutionary sequence. Together, these features constitute a global chronostratigraphic scale.

During the neotectonic movement, diverse stratigraphic rocks in this area developed into a variety of landscapes represented by the stone forest of Sanqu Mountain, the water landform of the Changshan River, and the granite landform of Bamian Mountain. As geological evolution shaped these geological features, it also impacted the local soil, vegetation, and human history, creating a cultural heritage termed 3Two Roads and One Riven and the characteristic agricultural industries of "two pomelos and one tea".

Since its establishment, the Geopark has played an active role in the science popularization education. The Global Boundary Stratotype Section and Point (GSSP) at Huangnitang, the Sanqu Mountain, and the Changshan GSSP Museum in China are excellent science popularization education bases, and they receive a large number of tourists and students of various age groups for visit and study every year. In addition, the Geopark organizes geoscience popularization education activities in the schools, during which authoritative experts, scholars, and professional commentators assigned by the Geopark give free explanations and lessons.

The Geopark provides intangible cultural heritage lessons in the science popularization schools with a partnership with the Geopark, organizes science popularization and teaching activities on intangible heritage for the students, and organizes handicraft workshops for bamboo weaving, egg decorating, paper cuttings, etc.

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THE VEGETATION SURVEY ON GIMNYEONG·SEONHEUL GOTJAWAL (DONGBAEK DONGSAN) GEOTRAIL

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The Gimnyeong coastal sand dune area, recognized as geologically significant, is designated as a representative geological site and offers an outstanding vista of agricultural heritage including Batdam and Billewat and natural coastal landscape between Gimnyeong and Woljeong in Gujwa-eup, Jeju-si. The plants in the area are classified into 90 families, 262 genera, 328 species, 22 varieties, 2 cultivars, 9 subspecies, and 361 taxa. Two endemic taxa, Korean flowering cherry(*Prunus* × *yedoensis* Matsum.) and Korean goldenbell tree(*Forsythia koreana* (Rehder) Nakai), have been identified. Also, Swamp shield-fern(*Cyclosorus interruptus* (Willd.) H.Itô), a Class II endangered wild plant designated by the Ministry of Environment, grows wild in large colonies. In addition, 6 taxa included in the IUCN Red List are confirmed.

The Gotjawal area is of interest not only domestically but also internationally, and research on its unique ecosystem is actively being carried out. The plants that appear on the Seonheul Gotjawal Geotrail are classified into 83 families, 147 genera, 186 species, 5 varieties, 2 cultivars, and 193 taxa. Two endemic taxa of Mankyua(*Mankyua chejuensis* B.-Y.Sun, M.H.Kim & C.H.Kim) and Two-leaf oreorchis(*Oreorchis patens* (Lindl.) Lindl. subsp. *coreana* (Finet) Y.N.Lee) have been identified. As for endangered wild plants, Mankyua, a Class I endangered wild plant, and Red-bark oak(*Quercus gilva* Blume), Watershield(*Brasenia schreberi* J.F.Gmel.), Big-root cymbidium(*Cymbidium macrorhizon* Lindl.), and Whisk fern(*Psilotum nudum* (L.) P.Beauv.), a class II designated by the Ministry of Environment, grow naturally. In addition, 14 taxa on the IUCN Red List have been identified.

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VISIBILITY AND INTERPRETATION OF RAJA AMPAT GEOPARK: AN INTEGRATED PUBLIC INFORMATION SYSTEM

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Raja Ampat Geopark is in a wide archipelago area, where geopark sites are often located in locations that are difficult to access directly or have unique characteristics that prevent them from using common visibility, such as on islands or on karstic cliffs so that can only be seen from a boat, or even underwater. In addition, there are also several sites that are not open for tourist visits/public. The Management Body carries out identification regarding this matter at each existing site, then determines the type of panel to be used. There are 3 types of interpretation panels installed in the Raja Ampat Geopark Area. Each panel has basic information, such as: 1) geosite name and code; 2) symbol of value; 3) geopark logo; and 4) QR Code, directly linked to a specific geosite page on the website, which contains more detailed information. The use of conceptual and consistent interpretation panels throughout the Geopark Area will create greater recognition by the local community and general visitors to increase awareness of the important values for sites that are usually located near residential areas, or are often passed by, which often go unnoticed, even by the local community. Thus, it not only indirectly helps to protect or conserve geological sites that are vulnerable to destruction (vandalism) by tourists or local communities, but also improve public access to detailed and advance information and knowledge regarding the features and reasons why the area was made as geopark site, which at once aim to develop the capacity of local communities and awareness of the potential they have in their "homeland".

Keywords: panel interpretation, awareness, geopark visibility, integrated public information
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GUADALUPIAN CORAL ASSEMBLAGE OF IN LOEI FOLD BELT, INDOCHINA TERRANE: A CASE STUDY FROM KHAO KHI NOK, PHETCHABUN GEOPARK, THAILAND

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The Phetchabun Geopark, central Thailand contains an outstanding Paleozoic marine faunas and historical geology. New information on Guadalupian)middle Permian(carbonate sedimentology and coral assemblage were investigated and reported from Khao Khi Nok)KKN(, south of the Phetchabun town. This locality is belonging to Loei fold belt of Indochina Terrane. The KKN section is characterized by coral biostrome facies and bioclast packstone facies, represent moderate to high-energy deposited in a middle ramp. Coral assemblage includes *Multilumurinus* sp., *Ipciphyllum* sp., *Chihsiaphyllum* sp. *Sinopora* sp. and others associated with Wordian fusuline such as *Verbeekina verbeeki*, *Lepidolina* sp. *Sumatrina* sp. *Neorormeria* sp. and others were found in the lower-part of KKN. These fauna assemblages can be correlated with those in the Khao Somphot, south of the Khao Khwang Platform. Most of these Permian faunas were also found in limestone-clast conglomerate at Phu Nam Yod, 30 km south of KKN, which represents a Triassic Indosinian orogeny event. This geological significant and important of fossils in this area will be used for future education and tourism development of the Phetchabun Geopark.

Keywords: Phetchabun Geopark; Guadalupian; Indochina; coral biostrome facies; Indosinian Orogeny
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AN INTRODUCTION TO LEYE-FENGSHAN UNESCO GLOBAL GEOPARK

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Leye Fengshan UNESCO Gobal Geopark, China

Leye-Fengshan UNESCO Global Geopark is situated in Leye County and Fengshan County Guangxi Zhuang Autonomous Region,China which are 350km and 365km from Nanning City, 250km and 366km from Guiyang City, 89km and 140km from Baise City respectively by motorways. The Geopark consists of 2 communities and 59 villages covering an area of 1113 square kilometers and is famous for "the kingdom of tiankengs and the country of caves", featuring international significant geological heritages such as Dashiwei tiankeng cluster, Sanmenhai karst windows caves and very large cave chambers,huge natural bridges and P/T Profileetc. From subterra- nean rivers to cave chambers, from karst windows, to tiankengs dolines and valleys, the area vividly records the evolutionary sequence of karst landforms. It consists of six major categories of geosites, including landformsstrata, paleontological fossils rocks, structures and water. The geopark is a unique high-quality multi-type karst geopark with magnificent karst landscape as the core tourism resource. Due to the natural barrier of the tiankengs'cliffs and the connections with caves and subterra- nean rivers creating special microclimate conditions, it has become a"refuge" for plants and animals providing good ecological environment of the preservation and reproduction of many relict species and rare species. The Geopark has also strong ethnic customs featuring many cultural heritages and intangible heritages such as Chuanlongyan cave stone carvings, the old battlefields of Red Army, the traditional buildings of Zhuang people, the marriage and ritual cultures of Zhuang, Han and Yao people, the copper drum culture, the local ballad culture etc., these giving visitors a wonderful and spectacular as well as educational experience.

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ASPIRING GEOPARKS OF GYEONGSANGBUK-DO PROVINCE, KOREA

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Gyeongsangbuk-do Province, in the southeastern part of the Korean Peninsula, is rich in geodiversity, with various rocks formed over different geological periods. The region's geological structures and topography hold significant landscape and preservation value.

In addition to its natural features, Gyeongsangbuk-do Province also possesses a remarkable historical and cultural heritage, necessitating effective preservation methods. The Geopark, an integrated conservation program encompassing geology, history, culture, archaeology, and ecology, has been introduced to address this need.

As a result, there are five Geoparks in Gyeongsangbuk-do Province. Four of these (Ulleungdo·Dokdo, Cheongsong, Gyeongbuk Donghaean, and Uiseong) have been certified as National Geoparks of Korea, with Cheongsong also being designated a UNESCO Global Geopark in 2017. The remaining geopark, Mungyeong, is currently in the process of certification as the National Geopark of Korea.

We aim to provide a detailed report highlighting significant geosites, geological importance, and an introduction to each geopark.

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

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The Gyeongbuk Donghaean Geopark is located in the eastern part of the Republic of Korea, which is situated in East Asia. It shares boundaries with Pohang City, Gyeongju City, Yeongdeok County, and Uljin County, covering an area of 2,693.69 km² (Land 2430.26 km² + Sea 263.43 km²). Currently, outdoor activities, accommodations, food and beverage establishments, crafts, and tour guiding services are emerging with the development of geotourism.

The Geopark showcases diverse geological periods, including Paleoproterozoic, Paleozoic, Mesozoic, and Cenozoic. The geological diversity is contributed by various rock types, such as igneous, metamorphic, and sedimentary rocks.

Five types of granitoid can be found within the Geopark, varying in age. The Permian granitoid and Triassic adakite within the Geopark hold particular significance as they offer valuable insights into the Permo-Triassic continental collision and the subduction of the Paleo-Asian oceanic plate. These rock formations provide important clues about the region's geological history and tectonic processes during that period.

The Geopark is home to Paleogene and Neogene sedimentary rocks, which are rare in the Korean peninsula but can also be found in western Japan. These rocks hold international importance due to their unique characteristics, including paleomagnetic information, fossils, and complex fault systems. They contribute significantly to understanding the geological event of the opening of the East Sea (Sea of Japan).

The Geopark is home to captivating geological features, including limestone caves, meandering gorges, tuffaceous cliffs, columnar joints, coastal terraces, dunes, and an unconformity with a time gap of 1.8 Ga. These remarkable features have been identified and listed as geological sites, with some of them designated as representative geosites due to their exceptional geological significance.

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THE CHALLENGE OF BECOMING A SUSTAINABLE ISLAND THROUGH IMPROVING POOR ACCESSIBILITY IN THE BAENGNYEONG-DAECHEONG ASPIRING GEOPARK

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The Baengnyeong-Daecheong Geopark, located in Ongjin County, Incheon Metropolitan City, South Korea, was certified as a National Geopark in 2019. This geopark comprises three islands—Baengnyeongdo, Daecheongdo, and Socheongdo—and is situated in the Yellow Sea. These islands are among the most remote in South Korea, approximately 170 km from Incheon in a straight line, with a travel time of about 4 hours by high-speed ferry (with a maximum speed of 40 knots) from Incheon Coastal Passenger Terminal. Although Baengnyeongdo, Daecheongdo, and Socheongdo are highly desired destinations for South Koreans due to their outstanding landscapes, their accessibility issues due to distance and travel time make them challenge to visit.

The Baengnyeong-Daecheong Geopark has a population of around 10,000 people. Baengnyeongdo focused on agriculture while Daecheongdo and Socheongdo are mainly centered around fishing. Despite its relatively small land area of 66.86 km², the geopark is rich in geological heritage and serves as an important migratory route and breeding ground for endangered species such as the Black-faced Spoonbill and the Spoon-billed Sandpiper. It also provides a critical habitat for the endangered spotted seal, a protected species in the Yellow Sea.

The park is facing challenges due to its remoteness from the mainland, limited mobility, and population decline, leading to its designation as a depopulated area with an aging population. Ongjin County and Incheon Metropolitan City have been managing the geopark since 2019 and are now striving for UNESCO Global Geopark status. They submitted a letter of intent for UNESCO Global Geopark designation in June 2024 and plan to submit the official application in November.

Keywords: Baengnyeong-Daecheong Geopark, aspiring UNESCO Global Geopark, Republic of Korea, Accessibility.
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THE FORMATION OF A GEOPARK – MINÉ-AKIYOSHIDAI KARST PLATEAU GEOPARK'S JOURNEY TOWARDS APPLYING TO BECOME A JAPANESE UNESCO GLOBAL GEOPARK

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Miné-Akiyoshidai Karst Plateau Geopark is a project of Mine City Hall in Yamaguchi Prefecture, Japan. Mine City has a population of 21,144 people and has long sustained the lives of its residents as a mining town, due to the existence of limestone, coal, and copper. Coal and copper mining are no longer conducted, and the sustainable use of limestone is currently being explored under national law.

Shuho-do Cave in the limestone conservation area, which is a geological site of the geopark, was one of the most famous tourist attractions in Japan during the 1970s, attracting approximately 2 million visitors per year. Today, however, the number of visitors has declined to 400,000 per year.

In the midst of this decline in mining and tourism, Mine City is trying to create a future for the region through the activities of Miné-Akiyoshidai Karst Plateau Geopark. Mine City's geopark activities began with a politician's idea to apply to be registered as a UNESCO World Heritage Site. However, registering as a UNESCO World Heritage Site turned out to be unfeasible, so the city began to undertake geopark activities in 2012 instead.

In the past, the city has experienced two failed applications- one application for becoming a national Japanese geopark, and another application for being recommended as a UNESCO Global Geopark candidate. As a result, city hall staff, politicians, and local residents have spent a significant amount of time working on understanding the Geopark concept better and on improving the geopark's visibility in terms of its activities. The awareness of city hall staff and local residents has changed through trial and error, and the activities of the geopark have improved in quality.

This presentation will report on the history of Mine City's geopark activities over the last 12 years, and will discuss this from the perspective of 'proactive, interactive and authentic learning', which are keywords of the Japanese educational system.

Keywords: City-hall initiatives, understanding of local residents, 'proactive, interactive and authentic learning'

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