EGN 2024

Aspiring Geoparks

Geo Community

Geo Future and SDG´s

Geo Heritages

Geo Tourism

Geodiversity

Geoscience

The Ocean we know for the aUGGp Algarvensis territory we have

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Located in the southernmost part of mainland Portugal, in the heart of the Algarve region, the aspiring UNESCO Global Geopark (aUGGp) Algarvensis encompasses not only 1,584 km² of continental territory but also 842 km² of marine territory. This marine area extends from the Geopark's 37 km long coastline to a depth of 120 meters below mean sea level, representing the coastline as it was 20,000 years ago.

This coastal and underwater territory presents an ideal opportunity to address the ten challenges of the UNESCO Ocean Decade and to promote the concept of "The Ocean We Need for the Future We Want".

The aUGGp Algarvensis faces several significant threats associated with climate change. Among the most pressing are rising sea levels, concentrated little rainfall, reduced freshwater availability, and the impact of extreme weather events. Other challenges include the overexploitation of marine and coastal resources, particularly in the areas of fishing and beach-and-sun tourism. The natural and cultural heritage assets of the region are plentiful, existing along the coast, and underwater.

In recent decades, several coastal heritage sites have been lost to the sea due to intense coastal erosion. Sedimentological and geological characteristics of the continental shelf, as well as its connection to inland areas through continuous lithology and submarine estuaries, have been documented. It is thus crucial to incorporate existing oceanographic knowledge in order to identify, quantify, and mitigate the risks posed by natural, climatic, anthropogenic, and biological hazards to the various types of natural and cultural heritage.

This study presents the data surveyed and compiled so far within the marine territory of the aUGGp Algarvensis. It offers a comprehensive view of the coastal and underwater region's recent geological and environmental history, examines how climate change threatens the area's geological, cultural, and ecological features, and emphasizes the intricate relationship between environmental changes and heritage preservation within the framework of the aUGGp Algarvensis initiative.

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keywords: Ocean Decade, coastal and Underwater heritage

STEAM science centre activities inspired by the aUGGP Algarvensis: a fruitful collaboration with the Algarve Ciência Viva Centre

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The Algarve Ciência Viva Centre (CCVAlg) is one of the 21 science centres in the Portuguese national Ciência Viva network, whose mission is to promote scientific knowledge by developing and encouraging activities that stimulate interest in scientific and technological culture among the general population, with a particular focus on youth. Although the centre is not located within the aspiring UNESCO Global Geopark Algarvensis territory, it has collaborated with the Geopark for the past five years, organizing various projects and activities not only for students and teachers but also for tourists. During the summer, scientists are invited to lead short field trips for the public, sharing insights into different geological settings within the aUGGp Algarvensis, such as the "Jurassic Tropical Sea" or the "Triassic Giant Salamander." In the evenings, astronomical observations are organized at some of the aUGGp's iconic and somewhat isolated geological or cultural sites. These activities offer the public a way to explore the region in both an engaging and scientifically enriching manner. Throughout the academic year, two of the many school-oriented projects worth highlighting are "From Land to Sea" and the "Barrocal Flora Survey." The first project takes place at the Science Centre, where 4th-grade pupils participate in various STEAM activities designed to help them understand the importance of sustainability, with the aUGGp Algarvensis serving as the starting theme of the program. The second project is a citizen science initiative for teenage students, who are tasked with surveying areas near their schools to identify endemic and invasive plant species across three different seasons, utilizing the Biodiversity4All collaborative app. In parallel, CCVAlg also offers accredited training for teachers, focusing on the geological and biological heritage of the aUGGp Algarvensis. These activities and projects are exemplary in valuing and promoting the heritage of the aUGGp Algarvensis territory (Algarve, Southern Portugal) and should be considered as best practices for the future Algarvensis Geopark.

keywords: aspiring geopark; citizen science ; education; STEAM

The aspiring Algarvensis Geopark: Land, Seas, and People to discover

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Situated in southern Portugal, the Algarvensis Geopark covers 2426 km2, including 1,584 km2 inland and 842 km2 of marine territory. It is located about 250 km from Lisbon and encompasses the municipalities of Loulé, Silves, and Albufeira. The territory boasts a 37 km coastline, offering various tourist attractions and coastal resorts, and extends inland to encompass rural regions, ascending towards the northern hills. The total relief of this region is 255 m. However, the Algarvensis Geopark includes an underground evaporite mine that attains a total depth of 120 m below sea level. The territory can be easily accessed by air, with an international airport in Faro approximately 30 km from Loulé, train with three stations, and by car via well-connected north-south and east-west highways. It hosts a resident population of approximately 155,750 inhabitants, resulting in an average density of 154.5 inhabitants per square kilometre. Coastal areas have a higher population density of 314 inhabitants per square kilometre, which triples during the summer. In contrast, the northern territories have a sparser population, with fewer than 40 inhabitants per square kilometre. Over the past two decades, the population in the territory has gradually increased by 11% to 29%, particularly in coastal areas. The economy is dominated by the tertiary sector, which engages 82% of the active population, followed by the secondary sector at 15% and the primary sector at 3%. The economy is predominantly focused on hosting and tourism, which drives prosperity along the coast, leading to increased economic activity. In contrast, inland areas experience lower economic activity and a gradual depopulation trend. This is the main challenge that the aspiring Algarvensis Geopark has to face: to connect the inland areas with the coastal areas, creating three routes, based in a slow tourism, that can bring a new paradigm to this territory, in terms of territorial sustainable development and local engagement, in such a diversified mosaic of geodiversity and people. Geotourism is a key factor to make a change and the aspiring Geopark Algarvensis is the engine to created a vibrant territory with the involvement not only of the local inhabitants, but also from national and international visitors.

The geological history of the aspiring Geopark Algarvensis spans 350 million years, from the Carboniferous to the Holocene. During this time, it underwent two Wilson cycles, which included three compressional orogenic phases and two extensional oceanic phases, all of which had a profound impact on its landscape. In the northern region, the "Brown Algarve" of the “Serra” (Serra = mountain range), consists of Carboniferous Flysch, including greywackes and shales, which have been carved by abundant ephemeral streams. In the "Red Algarve" region at the foothills of the “Serra”, there is a low-lying area. This area is made up of sandstones and mudstones of the Upper Triassic age, overlaid by volcanic-sedimentary rocks of the Lower Jurassic age, which are part of the Central Atlantic Magmatic Province. The last sequence is capped evaporite deposits, including the Loulé rock salt mine. Moving towards the south, the "Silver Algarve" consists of Jurassic limestone with karst features, such as dolines, poljes, lapiáz fields, caves, and aquifers. The "Golden Algarve" forms a cliff coastline consisting of Miocene biocalcarenite with abundant marine fossils and reddish Pliocene continental sandy cliffs along the littoral. The "Blue Algarve" encompasses the marine area from the palaeocoastline of the Last Glacial Maximum to the tsunami of the 1755 “Lisbon earthquake,” which flooded coastal lagoons and serves as evidence of climate warming and natural hazards.The "Blue Algarve" encompasses the marine area from the palaeocoastline of the Last Glacial Maximum to the tsunami of the 1755 “Lisbon earthquake,” which flooded coastal lagoons and serves as evidence of climate warming and natural hazards. This area includes three globally significant geological features: the Triassic bonebed that yielded the exclusive Metoposaurus algarvensis, the Lower Cretaceous marl-limestone sequences with sauropod footprints, and the rich continental and marine fossils record that characterise a distinctive Lower Cretaceous wetland paleoecosystem, and finally, the sedimentological record of the historic 1755 tsunami.

This project has the institutional support of the UNESCO Chair Geoparks, Regional Sustainable Development, and Healthy Lifestyles, of the University of Trás-os-Montes e Alto Douro (Portugal), and has already a Protocol Cooperation with M'Goun UNESCO Global Geopark (Morocco) and also with Oeste UNESCO Global Geopark (Portugal). These partnerships have been crucial also to the development of this project by sharing knowledge and experiences. Some international experts from the Global Geoparks Network (GGN) have also given their contribution for the sucess of this application to the designation of a UNESCO Global Geopark.

keywords: Aspiring Geopark, Territorial Sustainable Development, Cooperation

The Aspiring Jersey Island Geopark

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The Bailiwick of Jersey is a British Crown Dependency situated in the southern English Channel, 100 km south of England and only 20 km from Normandy, France. The Bailiwick is 2,500 km^2 within which is the Island of Jersey (120 km^2), its adjacent intertidal area (36 km^2) and a network of offshore rocky reefs (300 km^2). Jersey has a population of 103,267 and is notable for its temperate maritime climate, varied geodiversity, high biodiversity and a 12 metre tidal range.

The Anglo-Norman peoples of Jersey were gifted at quarrying and stone masonry, creating a cultural affinity to rocks that goes back centuries and is reflected in Jèrriais, the Island's traditional language. In 1989, the Bailiwick was recognised as a Classic Area of British Geology and since the 1990s the States of Jersey developed a network of protected Geological Sites of Special Interest. In 2020, the aspiring Jersey Island Geopark (aJIG) was launched to ensure that Jersey's world class geology is conserved, celebrated and integrated at a local, national and international level. As a centre for high tech, finance and tourism, Jersey has the ready-made infrastructure to develop the economic, educational and geotourism potential of its geosite network.

Geologically, the aJIG sits within the Amorican Massif (AM), a Precambrian and Palaeozoic geological province predominantly associated with the Cadomian Orogeny (700 and 540 Ma) that is divided into several separate terranes, which occupies much of north-west France. The aJIG sits within the St Brieuc Terrane and has rocks covering the entire Cadomian Orogeny, including the post-tectonic erosional phase. Uniquely within the AM, these rocks were not metamorphosed by later tectonic forces making aJIG an important location for geoscientists to study the early evolution of Europe.

Resting on top of these older rocks are sequences of Middle to Late Pleistocene sediments which capture the climatic variation of glacial and interglacial periods. The completeness of these sediments and Jersey's position on a continental margin, continues to attract Quaternary scientists from across the globe. Palaeolithic archaeology associated with these sediments, including famous habitation sites like La Cotte de St Brelade, continues to produce revelations about our hominin relatives.

The prehistoric archaeology of the aJIG also includes megalithic structures, stone working sites and earthworks. These, with the medieval churches, fortifications, maritime features and traditional buildings, reflect a deep insular affinity to stone and geomorphology. The aJIG actively celebrates Jersey's diverse geoheritage through events, education and outreach.

keywords: aspiring, geoheritage, Island, maritime

The cross-border aspiring Kras-Carso geopark; Joint management and sustainable development of the Classical Karst area

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The cross-border aspiring geopark Kras-Carso is situated in two countries, namely Slovenia and Italy, in the Classical Karst Region. It stands above the Gulf of Triest on the north-eastern edge of Italy and forms as a plateau on the edge of the Dinaric Karst in Slovenia. It includes the contact karst area in its south-eastern part. Its exceptional geodiversity is highlighted by about 80 geosites, many of which are recognized for their international importance and are visited and enjoyed by hundreds of thousands of visitors each year. The geopark Kras-Carso also hosts one of the highest biodiversity in Europe. The World-class importance of this area is also due to the cultural-historical and scientific aspect of the Karst as the "cradle" of karstological science.

The first initiatives to establish a geopark in the Classical Karst area date back more than 10 years. Activities at the transboundary level were carried out by various projects from European programs, but unfortunately, the management structure of the geopark has not yet been finalized. However, in the new ongoing Interreg Italia-Slovenia strategic project KRAS CARSO II, both Slovenian and Italian partners are working on finalizing a stable management structure and on the enhancement of the awareness of local people and visitors, by promoting, in scientific and popular way, the rich geological heritage of the Karst. In addition, this project also includes nature conservation activities. Within the framework of nature conservation, the project fosters the aim of directing the protection and preservation of the geodiversity and biodiversity of the Karst. This will be achieved by gathering data on the carrying capacity of selected areas (geosites, caves, etc.) and by preparing guidelines and mitigation measures for visiting, management and sustainable use of natural values, protected areas and Natura 2000 areas in the geopark's area. The project also includes scientific studies on the geology, karstology, geomorphology, hydrogeology and micro-palaeontology. As an example, 40-metre-deep core drill through shallow water carbonates of the Karst was carried out, to analyze rock and fossil indicators of the K/Pg boundary, one of the greatest mass extinctions that wiped out dinosaurs at the end of the Mesozoic. One of the project tasks is linking the geological heritage with the cultural heritage through natural stone as one of the most characteristic elements of the cultural landscape in the Karst. This will be presented in the form of a digital platform in the visitor center, in a mobile application and through the "karst stone paths". During the year the Geopark Week, which is held each year from the end of May to the beginning of June, and Planet Earth Week, which includes the International Geodiversity Day (6th October) take place in the first weeks of October. They include scientific seminars, geo-hikes & geo-bike rides led by specially qualified guides, educational workshops for schools, traveling geo-exhibitions, games and hunts and events linking the unique culinary features with the geological heritage. Among these, a traveling exhibition named "The fantastic microworld of the Karst", where thin sections used in the scientific research could be presented in an artistic and popular way, will be one major highlight. With the establishment of the final management structure of the cross-border Kras-Carso geopark, all these activities will not end within the final date of the KRAS CARSO II Interreg project, but the geopark will continue to work on the sustainable development of the transboundary Classical Karst area.

keywords: aspiring transboundary geopark, karst area, nature and cultural heritage, sustainable development, scientific studies

Educational activities in the Cimmerian Dobrogea Aspiring Geopark, Romania: awareness raising on the main types of natural and cultural heritage

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A new Geopark initiative, supported by the Romanian Geoparks Forum, was launched in June 2022: the Cimmerian Dobrogea Geopark, with a rich natural and cultural heritage on an area around 2500 km^2 between the Danube and the Black Sea. The geodiversity of this territory derives from a complex geological history, as the Cimmerian (Early Alpine) Orogen of North Dobrogea exposes its Hercynian roots, its Triassic-Jurassic successions, as well as its post-tectonic Late Cretaceous cover, related to the inception of the West Black Sea Basin.

In March 2024, a project submitted to the BRAVoluntar 2024 competition organized by the OMV-Petrom Foundation and the Association for Community Relations – ARC was funded. The goal of this project was to create an information point for the Geopark in the main room of a recently built tourist center, in the small village of Valea Nucarilor, close to the Agighiol geological reserve with Triassic ammonoids. The project was carried on together with a volunteer from OMV-Petrom and volunteers from the local community. The project implementation we used. For the information point, several panels were created: a mural reconstructing the life in the Triassic Sea, four panels on the geology, biodiversity, archaeology and cultural heritage, and a map with the main tourist objectives in the Geopark area. During the refurbishment of the tourist center, four workshops with children were organized with several occasions: the Paeony Day, the European Geoparks Week, the Midsummer and Romanian blouse Day and the Fossil Festival. The participant children, both from kindergarten and primary school, were selected by their teachers based on scores obtained in specific tests. In July, the information point hosted a workshop for training several local volunteers as future guides, and a workshop for working on the ammonite mosaic was held in August, also involving people from the local community.

The new information point is scheduled for inauguration in mid-September, once the mosaic on the access road to the building is finished. During the works for the information point, the venue was used for the official inauguration of the “Treasures of Agighiol” thematic trail, when 18 children from a general school in the neighboring Mahmudia village were invited to join us. Future activities and events at the information point include a visit of Volunteers for Geoparks in August 2024, the organization of the International Geodiversity Day and Earth Science Week in October, several tours of the thematic trail from October 2024 through May 2025 with children brought by a partner NGO and visits during the International ProGEO Symposium in 2025, organized in the Tulcea city from the Geopark area.

Currently the Cimmerian Dobrogea Geopark is managed by a small team of volunteers from the partner institutions supporting this initiative. Our plans are to establish several information points and an information center for the Geopark. We are also working on plans for thematic trails to promote and valorize the geological and archaeological heritage, and stimulate the preservation of built and intangible cultural heritage.

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keywords: information point, volunteers, local community

Inspiring the Next Generation: How geoparks and geoscience museums can promote environmental awareness

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Geoparks and geoscience museums have become powerful platforms for collaboration to promote climate change stewardship and create a deep connection between future generations and the natural world. By harnessing the synergistic potential of these specialized institutions, communities can inspire children and youth to become active stewards of the planet.
The Earth Science Museum of the Geological Survey of Iran has played a crucial role in bringing the hands-on experience of geological exploration and research to the forefront of climate education and environmental conservation. As a partner of the network of geoparks across the country, the museum has seamlessly integrated its extensive geological knowledge and hands-on exhibits into the immersive learning environments that these natural landscapes provide.
The museum invites visitors on an interactive journey through Iran's diverse geological heritage. From the impressive rock formations of Qeshm Island Geopark to the brilliant landscapes of Tabbas Geopark, the museum's exhibits and educational programs provide a tangible link between the theoretical concepts of earth science and the real-life manifestations of geological processes.
The museum's curatorial team, made up of experienced geologists and educators, has carefully designed exhibits that capture the essence of the field research and survey work of the Geological Survey of Iran. Visitors can engage with interactive exhibits that showcase the latest technologies and methods used by the agency's teams to monitor and analyze the country's geological features.
One particularly popular exhibit is the "Geological Timeline of Iran"," which invites visitors to walk through a physical representation of the planet's 4.6 billion year history, with each step representing millions of years of geological evolution. This experiential learning approach not only stimulates the imagination of children and young people, but also provides a deeper understanding of the interconnectedness of the Earth's systems and the crucial role they play in sustaining life.
Beyond the museum walls, the Geological Survey of Iran Museum has established a robust outreach program that extends its educational initiatives to local schools and community centers. Geologists from the agency regularly visit these institutions and lead hands-on workshops and field trips where students can experience the work of the Geological Survey first-hand.
This collaboration has been particularly successful in rural and underserved communities where access to quality science education can be limited. By bringing the hands-on experience of the Geological Survey's work to these communities, the museum has given children and youth the opportunity to develop a personal interest in the conservation of their local geologic and natural heritage.
By integrating the Geological Survey of Iran Museum and the Geoparks network, the country has created a powerful synergy that enhances the transformative potential of hands-on, experiential learning in climate education and environmental conservation. The children and youth who participate in these collaborative initiatives will become advocates of sustainable development and custodians of our planet's precious resources as the next generation of climate stewards and stewards of the earth.

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Costa Quebrada Aspiring UNESCO Global Geopark

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At the beginning of the year 2000, a civil society (Asociación Costa Quebrada, ACQ) was set up to clean-up of a coastal sector in Cantabria (Northern Spain), affected by the Prestige tanker accident. From that moment until today the territory has been transformed into a Geopark thanks to its great natural and cultural heritage and the very close collaboration between all sectors of society.

Costa Quebrada is a coastal sector, and adjacent inland, between the bay of Santander and Santillana del Mar, of about 342 km^2, including eight municipalities. The geological character of this sector is controlled by a syncline of Cretaceous-Eocene sedimentary rocks, with strata ranging from parallel to perpendicular to the coastline. Coastal, gravitational and karst processes acting on the variety of rock types present, have produced a wide range of landforms. The very good accessibility and observation conditions along the whole coastal sector as well as in the interior, together with its outstanding scenic value, make it ideal for explaining and understanding processes in, and geologic and cultural evolution of the landscape. During the last twenty years the ACQ, in collaboration with the Universidad de Cantabria, Government of Cantabria, local authorities and private business in the area, has carried out a growing number and variety of activities.

The central sector of the geopark (the cliffs and dune field of Costa Quebrada) has been included by the Geological Survey of Spain (IGME) as a Global Geosite of Spain (Geologic Framework Nº. 2, "Coasts of the Iberian Peninsula - CB010 - Costa Quebrada and Liencres Dune Field"; Act 33/2015, September, 21 about Natural Heritage and Biodiversity). The main interest of the site is geomorphologic. A spectacular synthesis of coastal landforms is present in a very short coastal stretch.

A new step was taken some five years ago, when it was decided to seek nomination of Costa Quebrada as a UNESCO Global Geopark. Due to lack of a well-structured management body and low visibility of the Geopark, at that time the statement was not obtained. In the following years, work has been done to meet the requirements indicated by UNESCO, achieving a Geopark, a territory in which civil society, institutions, local producers and the ACQ work closely together.

The important and rich Natural and Cultural Heritage of Costa Quebrada aUGGp together with the close cooperation between all the different actors in the territory contributes to create and design a series of geoheritage activities, which help to enhance geotourism in the region. Linking all those sites with other sites of geological interest in neighbouring regions, and neighbouring Geoparks through a networking, would improving geotourism throughout northern fringe of Spain as well as a sustainable socio-economic development.

The objective of this contribution is to explain the main characteristics and values of the area, describe the actions already carried out and the results achieved, as well as the steps which have led to the Geopark.

keywords: Costa Quebrada Geopark, UNESCO Global Geopark, Aspiring Geopark, Spain

Charnwood Forest – Home of our Oldest Animal Ancestors: An Aspiring UNESCO Global Geopark in the United Kingdom

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Charnwood Forest is host to some of the oldest animal fossils in the world, many of which have been key to developing our understanding of the rise of animals during the Ediacaran period. In addition to our internationally significant palaeontology, the area is also host to a number of working and historic quarries whose lithologies have shaped the built environment of the United Kingdom for more than 2000 years.

Charnwood Forest occupies just 10% of the area of Leicestershire, and yet contains more than 50% of the natural protect sites within the county: underlying both the broad geodiversity within the Geopark, and the way this geodiversity has underpinned the extensive biodiversity found here. As such the region provides a natural laboratory for highlighting the often-overlooked pivotal role of geodiversity in nature.

Our Geopark is being developed by 18 partner organisations, led by the National Forest, and financially supported by the National Lottery Heritage Fund. This presentation will outline the internationally significant geoheritage, biodiversity, and cultural heritage of Charnwood Forest, and give examples of projects we have developed as we work towards an application for UNESCO Global Geopark status. We will discuss our Geopartner programme that allows local organisations and businesses to show their support for the Geopark, and receive help and training. Education has been a key priority for Charnwood Forest, and we will detail how we have co-designed more than 15 education resources with local educators, linking into multiple subjects across the national curriculum. A particular success has been our volunteering programme, and we will outline the ways we engage local people in the conservation and management of their community's geoheritage. Lastly, we will provide an update on recent successes in securing new legal designations for sites within the Geopark, further securing the future of our region's heritage for generations to come. Charnwood Forest Aspiring UNESCO Global Geopark looks forward to further engaging with members of the Global Geopark family, as we prepare our application and celebrate our unique region.

keywords: Geoparnters; Education; Volunteering; Geoconservation

Nisyros Aspiring UNESCO Global Geopark: Integrating Geology, Culture, and Community for Sustainable Growth

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Nisyros Geopark is a candidate for the UNESCO Global Geoparks Network due to its exceptional geological, natural, and cultural characteristics. Located in the Southeastern Aegean, it spans an area of 481 km², encompassing the active volcano of Nisyros and surrounding islands. The geopark is intricately tied to its volcanic origins, situated at the southeastern end of the South Aegean Volcanic Arc, one of the world's significant active volcanic arcs. This positioning creates a unique terrestrial and submarine natural landscape.

The geopark features 24 geosites that highlight its geological history. Visitors can observe the impressive collapse caldera, volcanic domes in the western part, and various layers of lava, ash, and pyroclastics, which evidence its long geological past. The active hydrothermal field of the craters and numerous hot springs along the coastline reflect ongoing hydrothermal activity. The submarine area of the geopark is also crucial to its formation and evolution, drawing international scientific research aimed at exploring active volcanic environments. This makes the geopark a distinctive natural geological laboratory in the wider Eastern Mediterranean region.

Beyond its geological attributes, the Geopark boasts a rich cultural heritage. Despite its small size, the area has been continuously inhabited for several millennia. The island is directly associated with the myth of Gigantomachy and has inherited cultural elements from various peoples who have conquered and controlled it over time. Fortresses like Paleokastro and the castle of Mandraki, along with ancient settlements, churches, and monasteries from the Byzantine era, contribute to the region's historical legacy. These cultural landmarks shape the traditions, customs, and tangible and intangible cultural heritage of the local people.

The Nisyros Geopark is currently updating its services to enhance visitor experience and educational outreach. This includes the development of two mobile applications, a comprehensive website (www.nisyrosgeopark.gr), and various informative materials. Additionally, the geopark is actively promoting educational activities such as informative talks, workshops, summer schools, and media engagements. These efforts aim to increase awareness and understanding of the geopark's unique features, engaging both residents and visitors in appreciating its geological and cultural significance.

Nisyros Geopark is a candidate for the UNESCO Global Geoparks Network due to its exceptional geological, natural, and cultural characteristics. Located in the Southeastern Aegean, it spans an area of 481 km², encompassing the active volcano of Nisyros and surrounding islands. The geopark is intricately tied to its volcanic origins, situated at the southeastern end of the South Aegean Volcanic Arc, one of the world's significant active volcanic arcs. This positioning creates a unique terrestrial and submarine natural landscape.

The geopark features 24 geosites that highlight its geological history. Visitors can observe the impressive collapse caldera, volcanic domes in the western part, and various layers of lava, ash, and pyroclastics, which evidence its long geological past. The active hydrothermal field of the craters and numerous hot

springs along the coastline reflect ongoing hydrothermal activity. The submarine area of the geopark is also crucial to its formation and evolution, drawing international scientific research aimed at exploring active volcanic environments. This makes the geopark a distinctive natural geological laboratory in the wider Eastern Mediterranean region.

Beyond its geological attributes, the Geopark boasts a rich cultural heritage. Despite its small size, the area has been continuously inhabited for several millennia. The island is directly associated with the myth of Gigantomachy and has inherited cultural elements from various peoples who have conquered and controlled it over time. Fortresses like Paleokastro and the castle of Mandraki, along with ancient settlements, churches, and monasteries from the Byzantine era, contribute to the region's historical legacy. These cultural landmarks shape the traditions, customs, and tangible and intangible cultural heritage of the local people.

The Nisyros Geopark is currently updating its services to enhance visitor experience and educational outreach. This includes the development of two mobile applications, a comprehensive website (www.nisyrosgeopark.gr), and various informative materials. Additionally, the geopark is actively promoting educational activities such as informative talks, workshops, summer schools, and media engagements. These efforts aim to increase awareness and understanding of the geopark's unique features, engaging both residents and visitors in appreciating its geological and cultural significance.

keywords: Nisyros, volcano, geotourism, geoheritage

Budget-Friendly Geopark Communication

Conny Koob[1].
[1]Mëllerdall Unesco Global Geopark (LU).

Budget-Friendly Geopark Communication

In this presentation, we will explore effective strategies that geoparks can employ to maximize their outreach and impact while operating within limited budget constraints. Geoparks face the challenge of engaging a wide audience with often scarce financial resources. Our discussion will focus on innovative and cost-effective methods to attract both locals and visitors, foster community engagement, and enhance educational outreach.

By leveraging digital tools, forging partnerships, and utilizing social media platforms, geoparks can significantly expand their reach without incurring substantial costs. Additionally, maintaining strong relationships with the press should not be underestimated, as regular media coverage can greatly increase visibility at no extra cost.

Examples from the **Mëllerdall UNESCO Global Geopark** in **Luxembourg** will be presented, showcasing practical applications of these strategies. Through these case studies, we aim to provide Geopark managers and stakeholders with actionable insights and creative solutions to enhance the visibility and impact of their Geoparks in an economically sustainable manner. Join the presentation to discover how your Geopark can thrive and connect with a broader audience without breaking the bank.

About the Presenter:

Conny Koob has been the Communication Manager of the Mëllerdall UNESCO Global Geopark in Luxembourg for over five years. She has played a pivotal role in the Geopark's journey from an aspiring UNESCO Global Geopark to achieving its official UNESCO designation in 2022.

keywords: Communication, Marketing, Reach, Strategies, Audience, creative solutions

Aspiring Geoparc Terres d'Hérault

Loic Ducarme[1], **Gaëlle Leveque**.
[1]Department Council of Herault, Head of Unit Geopark Terres d'Hérault (FR); [2]Departmental Councilor, President of the Tourism - Economy and Mayor of Lodève.

Aspiring Geoparc Terres d'Hérault

The department of Hérault, located on the Mediterranean coast in the south of France, has a particularly rich natural and cultural heritage. The "Aspiring Geoparc Terres d'Hérault" attracts significant tourist activity due to its unique features, including its exceptional geological heritage. The subsoil here contains almost every type of rocks, allowing us to trace 540 million years of our planet's history, with all geological eras illustrated by high-quality outcrops.

This unique geology forms the foundation of the landscapes that make the area so attractive. The variety of rocks, landscapes, and environments provides a rich substratum supporting agricultural activities, particularly vineyards and pastoral practices. Over the past millennia, these activities have helped maintain open "natural" environments, allowing biodiversity to thrive and be equally remarkable.

The "Geoparc Terres d'Hérault" project is based on a deep conviction and awareness that we, as stakeholders of this exceptional territory, are entrusted with an invaluable responsibility towards the Earth and the future generations. It is a living testament to our history, a place where the echoes of the past and the promises of the future come together to form an ecosystem of exceptional beauty and diversity. The "Geoparc Terres d'Hérault" is a geological and cultural gem illustrating the unbreakable links of the shared history between humanity and nature.

Such a vision, write in our chart is consistent within the Departmental Council, which coordinates the project through a dedicated team, utilizing its cross-cutting skills to meet the objectives of the UNESCO Global Geoparks. Moreover, this project is an opportunity to promote the skills and actions that the Department Council and its partners already offer on its territory and to create synergy among all local partners, labels and projects.

Following the visit of the French National Geopark Committee in June 2024, its representatives support the submission of our application to UNESCO in November 2024. This presentation will highlight the activities taking place within the Geopark territory, coordinated by the Department Council and its various partners, through our action plan. We will demonstrate that these activities meet the different criteria of UNESCO's Form A, as outlined in our application folder for the UNESCO Global Geoparks label.

Loïc DUCARME and Gaëlle LEVEQUE

keywords: Geoparks, Hérault, geological heritage, cultural heritage, application folder

The Aspiring Cross-Channel Geopark Transmanche

Hélène Dehouck[1], **Greg Taylor[1]**.
[1]Cross-Channel Geopark Transmanche (FR); [2]Cross-Channel Geopark Transmanche (GB).

The authors are the Geopark Coordinators of the Cross-Channel Geopark, an Aspiring Transnational UNESCO Global Geopark initiated by a partnership between the Kent Downs National Landscape (KDNL) & the Parc Naturel Regional des Caps et Marais d'Opale (PNRCMO).

If successful in being awarded UNESCO Global Geopark status, the Cross-Channel Geopark will be the first transnational geopark to incorporate a marine boundary - the English Channel / La Manche. It will also be the first UNESCO Global Geopark with a significant focus on Chalk.

The marine element of the Geopark is not simply a boundary separating two terrestrial areas of geological importance, but a crucial element of the international geological significance of the area. This is primarily in relation to the traces of the megaflood that created the Channel, which can be found on the sea-floor (including the the Fosses Dangeard) along with other important geological features including traces of paleo-rivers which pre-date the megaflood.

The marine extent of the Cross-Channel Geopark also features important non-geological features, none more outstanding than the Channel Tunnel, one of the modern industrial wonders of the world. The Tunnel owes its very creation to the study of geology, and it has had huge cultural and biological implications in the years since it was first dug. In this way the 'Channel' in the Cross-Channel Geopark is not simply a boundary or a 'gap', but the continuation of a block of Chalk that is the same on one side as it is on the other.

The Chalk exposures of the White Cliffs of Dover and Cap Blanc Nez are among some of the most instantly-recognisable geological features on the planet, and examples of the impact of Chalk upon all aspects of the heritage of the Geopark can be found throughout both terrestrial areas in disused quarries, chalk grasslands, and many other sites. Other geological features are focused around the rock layers which make up the Weald-Artois Anticline, most notably the Jurassic exposures found in the Boulogne-sur-mer region.

The Cross-Channel Geopark reunites two areas that were separated nearly half a million years ago by a catastrophic event which ultimately led to the diverse range of human interaction and conflict which has variously connected and separated the two areas in the last several thousand years.

This project is now into its third year and we have made significant progress as we build towards submitting our application. Since the Global Geoparks Conference in September 2023 we have developed the visibility of the Geopark at important sites, as well as working to further integrate these sites into the Geopark through activities and staff training. We have also held another edition of the SALT+EARTH Festival, an arts-led festival celebrating and promoting the Geopark. The third SALT+EARTH Festival, as well as a second multi-day event at Chateau d'Hardelot, are taking place in the next two weeks. We have also launched a programme of events for the general public across the Geopark called Geoadventures / GeoBalades, alongside an exhibition currently housed at the Maison du Site des Deux Caps and due to travel throughout the Geopark in 2025. Our network of ambassadors continues to grow, and we have educational programmes working with schools, universities and community groups. keywords: chalk, opening of the strait, channel

Isle of Arran, Scotland, United Kingdom

Malcolm Wilkinson[1].
[1]Arran Geopark (GB).

The Isle of Arran is known as 'Scotland in Miniature', sitting astride the Highland Boundary Fault, and showcasing many aspects of the country's highland and lowland geology. The island's rocks record an incredible journey from south of the equator over a 600 million year period.

Arran Geopark has been described by the Geological Society as "one of the best locations for fieldwork in Europe". It is included in their list of 100 Great Geosites for its importance as a location for learning and understanding geology.

Arran is enormously important to the history of the science. The island is home to James Hutton's first unconformity where the 'father of modern geology' changed human understanding of the age of our planet. Our youngest rocks record the opening of the Atlantic Ocean and these account for around half of the island's land area.

The island's mountains and coastline provide a rich collection of textbook glacial features. As the last ice sheets retreated, the presence of man is evident on Arran from around 6,000 years ago. The island is home to some of the most spectacular standing stones in northern Europe and one of the greatest concentrations of Neolithic monuments in the UK,

The island's great geodiversity is also the driver for its unique biotic heritage. There are three tree species endemic to Arran, one of which – the Catacol Whitebeam Sorbus pseudomeinichii – is considered by the IUCN to be one of the rarest trees in the world.

The island's biodiversity doesn't end on dry land, however. The Community of Arran Seabed Trust ('COAST') is a pioneering community-led project whose scientific research and tenacity led to the designation of large parts of our marine environment as a Marine Protected Area ('MPA') and No Take Zone ('NTZ').

Arran's population is only around 4,600 people; however this swells over the summer months, attracting 250-300k visitors per year. The island has been a popular tourist destination since the early 19th century, with outdoor activities such as walking, cycling and wildlife watching being especially popular.

Arran Geopark's vision is that "our environment and heritage are conserved, enhanced, and valued for their contribution to people's well-being and Arran's sustainability". We see UNESCO status as a catalyst to drive diverse benefits to our island's community, environment, and economy – working towards an island in balance.

Global Geoparks Network: 20th anniversary Protecting and managing Earth heritage - Building Sustainable Communities

Nikolaos Zouros[1,2].
[1]University of the Aegean, Department of Geography (GR); [2]Natural History Museum of the Lesvos Petrified Forest (GR).

The Geopark concept was introduced at late 90's aiming to protect and promote Earth heritage sites through the sustainable local development of territories containing abiotic nature of significant value.
The Global Geoparks Network (GGN) was established in 2004, under the umbrella of UNESCO and operates as an international network, providing a platform of cooperation among Geoparks, bringing together government agencies, non-governmental organizations, scientists and experts from all countries around the world in a unique worldwide partnership.
In 2015, the 38th UNESCO General Conference ratified the statutes of the International Geoscience and Geoparks Programme and the UNESCO Global Geoparks Operational Guidelines, introducing the brand UNESCO Global Geopark as a label of excellence for areas that meet certain criteria. Since then the Global Geoparks Network was recognized as the official partner of UNESCO for the operation of the UNESCO Global Geoparks.
In 2024, the GGN includes 213 Geoparks in 48 countries working to protect Geological heritage and promote local sustainable development.
The GGN organizes co-operation and mutual assistance between Global Geoparks and between Global Geopark professionals.
The GGN initiates and co-ordinates Regional Geoparks Networks which will foster international co-operation and promotion of sustainable development.
The GGN represents, advances, and disseminates knowledge in Geodiversity management and other disciplines related to studies in Geo-conservation, Geo-tourism, Geo-education and/or the management and activities of Global Geoparks.
An important component of the Geopark management plan is the support of the local economy. Geoparks create links with local tourist enterprises, restaurants and small hotels in order to provide the necessary infrastructure to meet the needs of the increasing number of park visitors. As a result many new enterprises are connected with the activities of the Geopark.
The Geopark also supports the making of local handicrafts such as the production of fossil casts and souvenirs by local enterprises. These items are on sale in the Geopark shop along with a variety of other locally made products and the Geopark promotes these products to its visitors.
Geoparks also collaborates closely with women's agrotouristic cooperatives and local organic food producers to offer their visitors the opportunity to taste and buy local food products. The catering for all Geopark events (conferences, meetings etc.) is supplied using the local traditional food. The Geoparks organize Agro-touristic festivals, which promotes quality local products, food and drinks. The Women's agrotouristic cooperative found that this festival provided them with an excellent opportunity to promote their products and their success lead to the creation of similar cooperatives in other villages
Geoparks contribute significantly to territorial development by directly and indirectly creating new jobs. But what is even more important for the employment in the area is the number of other job opportunities which are created in tourist enterprises, small hotels, guest houses, restaurants and other activities connected with the increase of tourist flow in the Geopark area.
Several other local artisans, such as makers of handicrafts and ceramic fossil casts, carpenters, and blacksmiths, are permanent collaborators with the Geopark.

keywords: UNESCO Global Geoparks, Global Geoparks Network, Sustainable development

"Penina em Festa" - an initiative developed with artists and local community as part of GeoPalcos - Art.Science.Nature, in the Algarvensis Geopark

Andreia Pintassilgo[1], Marta Caetano[2], João Serrão[3].
[1]Aspiring Algarvensis Geopark (PT); [2]Aspiring Algarvensis Geopark (PT); [3]Municipality of Loulé (PT).

Geopalcos is a biannual event intended to connect art, science and nature in the Geopark territory and with the local communities, through the collaboration and participation of the populations and the challenge to artists and scientists to think the (from the) territory, it is a place of creation, of thought, of restlessness and wonder. Its intention is to take a nature lover to discover art and science, an art enthusiast to stroll through nature and the paths of knowledge, or even take just a curious person to connect the knowledge with the natural and created beauties. Between March 2020 and June 2021, in 10 geosites of the aspiring Algarvensis Geopark, the public was encouraged to participate in dialogues between tradition and creativity/innovation, being invited to wander and to (re)discover our people, gastronomy and territory and, at the same time, to take part in several initiatives: performances in site specific, interactive installations; sensorial pathways-experiences and concerts; exhibitions; disciplinary crossings with manual arts, theatrical creations with the community, debates, workshops with the school community, among many other offers of pure sensorial beauty. "Penina em Festa" was the name chosen to work with the artist Manoli Ortiz de la Torre and the local community of Penina, a village in the Algarve's *barrocal* region whose architecture and physiognomy invites people to visit. Blessed with the natural beauty of the Rocha da Pena classified site, the village community welcomed the challenge with open arms and the changes that have resulted from this initiative have been transformative. GeoPalcos was intended to be a biennial initiative, but in Penina it went so well in previous years given the commitment, pride and sense of belonging generated in the local community, as well as the relevant economic impact, and number of visits to the village, that this has promoted not only the village, but also the local economy, by creating new jobs. In this sense, today, Penina village is reference, an example of good practices, in the framework of the aspiring Algarvensis Geopark. Nowadays, during the "Penina em Festa", there is a very interesting program prepared by the local community, with the support of the aspiring Algarvensis Geopark. The event is prepared rigorously to welcome visitors, who come for walks, workshops with local products, such as “esparto”, learning how to make craft beer, horse riding, insect hotels, exhibitions, street entertainment, concerts and cuisine made by the hands of the village's inhabitants. This year, the entertainment was inclusive, with a dance/performance show featuring a group of users with special needs from the *Existir* Association. The highlight was the unveiling of the Penina Children's March, which recaptured the spirit of the Popular Saints. 50 students from primary school of three schools existing in the Parish Union of Querença, Tôr and Benafim, were engaged in a cheerful and colorful march which filled the streets of the village with joy and pride. The music and lyrics were conceived by the local inhabitants, and also the choreography. With the support of the aspiring Algarvensis effective support, task was distributed among the inhabitants, so that everyone would feel involved and proud of their village and also of the Algarvensis Geopark territory.

keywords: Community, Art, Science, Nature, Engagement

Community driven sustainable development

Rasmus Elmquist Casper[1].
[1]The South Fyn Archipelago UNESCO Global Geopark (DK).

Workshop abstract (also works for an oral presentation)

Geoparks are unique in their focus on bottom-up sustainable development. As expressed on unesco.org: *UNESCO Global Geoparks are established through a bottom-up process involving all relevant local and regional stakeholders and authorities in the area (e.g. landowners, community groups, tourism providers, indigenous people, and local organizations).*

But how does bottom-up sustainable development work in practice? How is a bottom-up approach integrated in the management structure of a Geopark? And how can we square the circle of on one side meeting the many criteria of UNESCO Global Geoparks and ensuring the continuous sustainable development of the Geopark according to the management plan, and on the other side insisting on decentralized decision making and empowerment of local communities?

These questions are at the core of this workshop/presentation.

Rasmus Elmquist Casper, executive manager of The South Fyn Archipelago UGGp, gives a short introduction to bottom-up management theory and the ideas implemented in the management philosophy and practice as well as the strategic communication of The South Fyn Archipelago UGGp.

The Geopark secretariat communicates a manifesto stating that
The South Fyn Archipelago UNESCO Global Geopark aims at creating the best possible environment for community-driven sustainable development.

Rasmus invites listeners/participants to reflect on the practice of The South Fyn Archipelago UGGp and to share their own experiences – good and bad – on the subject of bottom-up sustainable development.

keywords: Sustainable management; bottom-up development; strategic com-munication

GEOPARK
DET SYDFYNSKE ØHAV

The Stone Villages of Grevena-Kozani UGGp: Community-led Conservation Efforts

Dina Ghikas[1], Anna Batsi[1].
[1]Grevena-Kozani UGGp (GR); [2]Grevena-Kozani UGGp (GR).

The *Mastorohoria* (Craftsman Villages) is a region of West Macedonia comprising communities which had stone working as their economic and cultural basis. The rocks of this region are sedimentary, primarily consisting of sandstones with properties ideal for use as building material, and the buildings of the Mastorohoria were famed for their durability and beauty. The craftsmen of this area attained a high level of technical knowledge, and the region was prosperous for many centuries.

The 20th century saw a rapid decline of the Mastorohoria, as industrial building materials flooded the market and economic centers shifted elsewhere. Young males migrated away from the area, and remaining craftsmen did not document their knowledge. Today hardly any skilled workers exist, many of the historic structures of this territory are in a state of decay, and the region is one of the most economically disadvantaged in the country.

In recent years, there has been a renewed interest in reviving the craft of stone building, as the region of West Macedonia has begun to invest in tourism and sustainability. Grevena-Kozani UGGp partly overlaps with the Mastorohoria and participates in the efforts to preserve both the historic structures in its territory, and the cultural traditions of its communities.

In August 2024, the 1st Workshop in Traditional Building, Art and Customs of the Craftsman Villages took place in the village of Kyparissi, the first workshop of its kind in the Township of Grevena. The 4-day event was a collaboration between the Community Association of Kyparissi, the Aristotelian University of Thessaloniki (AUTh), and one of the last remaining stone masters, Athanasios Poravos. Participants numbered about 30, coming from around the country and had various backgrounds relating to architecture, engineering and history. Mr. Poravos guided the group through techniques for building a dry-stone wall, in the courtyard of the old stone schoolhouse of the village (now a museum). In the evenings, the group toured the villages of Kyparissi and Kalloni to examine their traditional building practices and current structural problems, and to learn the history of the area. Dr. Constantinos Katakalos (Dept. of Civil Engineering, AUTh) instructed participants on methods and materials for renovating traditional structures. Geopark staff guided the group through the geologic foundations of the Mastorohoria, with a tour of nearby outcrops and a classroom lesson in the geologic history of the territory.

Cultural practices related to stone working were also on display, as local theater groups staged reenactments of some of the customs which marked both the annual departure of the workers from their villages, and the completion of a project. One of these, the *Bachtsisia*, has been submitted to UNESCO by Mr. Poravos for recognition as Intangible Cultural Heritage.

keywords: intangible heritage, architecture, craftsman, geoheritage

The Importance of Digital Communication in Azores UNESCO Global Geopark: Overcoming Insularity

Carolina Salvador[1], Salomé Meneses[1,2], Tiago Menezes[1,2].
[1]Azores Geopark (PT); [2]Regional Secretariat for Environment and Climate Change (PT).

The Azores UNESCO Global Geopark (Azores UGGp), one of the first archipelagic Geoparks in the world, composed of nine inhabited islands and several islets, faces unique challenges due to insularity. The remote location of the islands and the significant distance to the continent make communication and dissemination of information essential for the promotion and enhancement of this unique territory. In this context, digital communication is an essential tool for connecting, educating and engaging the Azorean community, as well as visitors/tourists, with the renowned geodiversity and important geological heritage present in this territory. The Azores UGGp collaboration with the regional newspaper Açoriano Oriental, the oldest Portuguese newspaper and one of the oldest in Europe, was one of the first and main communication initiatives. This collaboration exists since 2012, and biweekly the Azores Geopark contributes to the elaboration of the (GEO)Diversidades page. The page currently covers various topics, divided into sections, related to the Azores Geopark and networks: Opening Note, (GEO) Partnerships, Biodiversity in the Geopark, (GEO) Culture and Global Geoparks. With this contribution, the Azores UGGp has the opportunity to regularly promote and highlight information that is essential for understanding, valuing and promoting our geological heritage, partnerships and networks. Together with the publication in the physical newspaper, it is shared with a wide Mailing List, as well as published on the Azores UGGp website and social networks, with the aim of communicating with the target audience that does not acquire the purchase of the physical newspaper. By using a widely accessible and respected platform such as "Açoriano Oriental", the Azores UGGp is able to reach a wide audience, promote knowledge and appreciation towards the territory. Alongside this, since 2016, the radio program " Azores Geopark in 5 minutes", produced in collaboration with RDP-Azores (regional Radio Station) and broadcasted every Tuesday and Saturday, complements the communication efforts made, by offering to listeners a more succinct, but equally educational and dynamic, communication of the most diverse topics related to the Geopark. Through brief information segments of around 5 minutes, it is possible to capture the attention of a diverse audience. In addition to these two communication channels (newspaper and radio), the Azores Geopark's presence on its social networks - Facebook, Instagram and Youtube - is a key point for direct contact with the public. Not only it makes possible to share visual content, such as photos and videos, but also allows to share more directly and regularly all the events and activities taking place in the Azores Geopark territory and promote partnerships and projects. The complementation of these multiple communication channels, such as the newspaper, radio and social networks, demonstrates the Azores Geopark's ability to adapt to the needs of an archipelagic reality, which, despite being a geographical barrier, through effective digital communication strategies, manages to overcome this limitation, ensuring that information reaches all interested parties in a clear and accessible way, increasing the existing connection between community and Geopark.

keywords: Comunication; Insularity; Social Media; Environmental Education

(Liquid sounds) Sowing smiles, cultivating conscience

Elena Mateo Mederos [1].
[1]Lanzarote Geoparaque (ES).

SONIDOS LÍQUIDOS (Liquid sounds)

Sowing smiles, cultivating conscience

Sonidos Líquidos is a festival that combinates music, enogastronomy and sustainability.

This “boutique” festival born at 2011 at Lanzarote, and since then, developes various concerts during the spring around the island, specially at La Geria zone and it’s wine cellars.

This volcanic and wine landscape, is one of the most important geosite in Lanzarote Geopark. Also this geosite was recognized as "landscape artwork" by The MoMA in New York back in the seventies, is located next to the Timanfaya National Park and was the result of the volcanic eruptions from 1730-1736.

Different wine cellars are located in the area and are also the “stages” for the Sonidos Líquidos experiences, and while the artists plays its pop-rock music, the audience (around 250 people each event) taste these local wines maridated with local food too. Furthermore, the gastronomic offer present during the festival is organised by renowned local chefs / restaurateurs, who introduce the raw material of the area as the main protagonists of their elaborations. Year after year, the percentage of local product is increased in the gastronomic tastings offered during the festival.

The final event, by the end of the spring season, it takes at Bodega La Geria, one of the oldest wine cellar at Canary Island, and around 3.000 people (more than 60% from ouside the island) enjoy live music for 10 hours. Bands from all around the world, (U.K, France, U.S.A., Iceland, Germany…) and of course spanish bands had played at Sonidos Liquidos. Evidently, local artists are also at the line-up every year.

Another principal ingredient at Sonidos Liquidos is the sustainability. Apart from the respect to the environment and nature, the festival take special care about circular economy, communication, mobility, involvement of organization, noise pollutiosn and much more measures that every year are implemented. **Both, for its philosophy and for bringing music to our places of geological interest, Liquid Sounds has become, for several years, one of the main collaborators of the geopark, helping to promote our values of geoheritage, geo community and geotourism**

Due to this work and sustainability plan since the beginnins, Sonidos Liquidos has been recognized the best festival to contribute to sustainability at Iberian Festival Awards (Spain & Portugal) at 2023 and 2019. And since 2019, Sonidos Liquidos is audited by A Greener Future, an international not-for-profit company helping organisations, events, festivals and venues around the world to be more sustainable and reduce environmental impacts, which gives to the festival the Highly Commended certification last editions And also, Sonidos Liquidos has won in 2022 and 2023 the AGF Community Action Award, what recognises a strong connection with local community and sense of community within the event is celebrated here, demonstrating outstanding social inclusion, action for unity and acceptance between people, and positive projects that provide benefit to others beyond the event itself.

https://sonidosliquidos.com/

keywords: Community, local product, music

The Impact of Geopark Development on Social Justice through Women Empowerment

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The Impact of Geopark Development on Social Justice through Women Empowerment

[*1]Bita Mirzapour, [2]Elahe Tavakoli, [3]Nazanin Badri kolalo

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The development of Geoparks has shown a positive impact on gender equity by empowering women and promoting their involvement in decision-making roles and fostering community.
Studies have shown that women are underrepresented in geosciences and leadership roles within geoparks, highlighting the importance of addressing gender disparities [1], [2]. Geoparks have become platforms for women to pursue new opportunities and contribute to geoconservation efforts, aligning with UNESCO's ideals for women's empowerment in the twenty-first century. Additionally, efforts have been made to promote inclusivity in Geoparks, including initiatives to make geological knowledge more accessible to people with disabilities, [3] further enhancing gender equality and diversity within these spaces. The positive social changes resulting from Geopark development, such as improving welfare,[4] increasing employment opportunities [5], and promoting gender equality [6], demonstrate the broader impact of these initiatives on society. In a culture of gender discrimination, where men dominate the public sphere and hold more decision-making power, there is a recognized need to broaden the diversity and reduce the gender gap in decision-making positions among geoparks' managing teams to enhance gender equality and empower women in geosciences and related fields [1]. Therefore, this research intends to examine the impact of the development of geoparks on the empowerment of women and the establishment of social justice in Iran. In this research, using the thematic analysis method involves systematically identifying, analyzing, and reporting patterns or themes by interviewing experts and local people, a deeper understanding of the underlying meanings and experiences related to the development of geoparks and their impact on gender equality and social justice was found. Through this comprehensive analysis, key insights emerged regarding the specific potential strategies that can be implemented to foster a more inclusive and equitable environment within geoparks.
Some of the most important findings are: Decrease in gender biases and stereotypes that hindered women's advancement, women's empowerment through access to education and training opportunities and breaking free from traditional gender roles, fostering social justice with participation in decision-making processes, engagement in entrepreneurship and economic activities and reach to sustainable development, awareness of environmental issues and foster a culture of environmental stewardship among the younger generation, increase in community engagement and a stronger sense of social responsibility among residents through to involvement of women in geoparks, Furthermore, women unique leadership qualities and their innovative approaches result in a greater diversity of perspectives in addressing environmental challenges.
Keywords: Geopark, Development, Social Justice, Gender Equality, Empowerment,

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keywords: Geopark, Development, Social Justice, Gender Equality, Empowerment,

Danube GeoTour Plus Project - BOOSTING OPPORTUNITIES FOR MORE INCLUSIVE, VALUABLE AND BALANCED GEOPARK COMMUNITIES

Gerald Hartmann[1], Suzana Fajmut Štrucl [2], Darja Komar[3], Lara Piko[4], Danijela Modrej[5].
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Danube GeoTour Plus project, implemented in the frame of INTERREG Danube Region programme expands on the collaboration of nine geopark partners, two research and education partners, and 18 associated strategic partners (ASPs). Previous project results highlight the untapped heritage potential in these geoparks, facing challenges such as rural depopulation, marginalization of resident groups, increased tourism demand, and gaps in management and infrastructure. These geoparks, spanning 416 municipalities across nine countries, have seen a 6% population decline but a 77% visitor increase over the last decade.

The Danube GeoTour Plus project's aim is to enhance sustainable tourism in remote rural communities by capitalizing on the Danube GeoTour product, improving inclusivity, and balancing the management of natural and cultural assets. The UNESCO Global Geoparks development approach will be updated with innovative solutions in product design and visitor management, tested and applied in participating geoparks.

Key outcomes include: Engaging vulnerable groups through a common strategy and nine action plans; Creating value for local SMEs and increasing employment opportunities by piloting nine GeoExperiences; and implementing balanced visitor management with common monitoring solutions and visitor redistribution measures.

This transnational cooperation will enhance the competencies of 29 participating organizations in inclusive territorial development, product innovation, and visitor monitoring. Danube GeoTour Plus aims to establish a sustainable collaborative platform for the Danube GeoTour product, ensuring ongoing networking and achieving more inclusive territorial goals.

Refrences:

Štrucl, S., Bedjanič, M., Hartmann, G., Herlec, U., Poltnig, W., Rojs, L., Vodovnik, P., & Varch, C. (2014). Geopark Karavanke - Secrets written in stone. *International Journal of Geoheritage And Parks*, *2*(1), 82–99. www.igu-cog.org

keywords: Danube GeoTour Plus, UNESCO Global Geopark, Geopark Karawanken/Karavanke

Societal and social engagement and their agency in developing Taiwan's geoparks

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As the global promotion for geoparks have been prominent for more than three decades, its rooted values and various good practices are evident in various parts of the world. However, due to *in situ* specific conditions of each geopark, the ways of their development could be uniquely distinctive to allow exclusive characteristics for resilient place making and community building.

Taiwan's ten validated geoparks (Graphic 1) have been developed under the four core values of geo-conservation, geo-education, geo-tourism, and social engagement for a resilient island state of Taiwan (Graphic 2). The idea of resilience contains not only environmental value, but also societal and economic resilience that is particularly important for all different geoparks with distinctive characteristics, which include provincial, economic, cultural, dietary, traditional believe difference and the earth environments that nurture the above-mentioned aspects. As the people of Taiwan geoparks have faced varied environmental conditions, this paper will illustrate how the people of the varied ten geoparks mobilize and implement their societal power to carry out geopark values to own benefit and in the meantime contribute to resilience building of the island state.

With plenty and flexible national policies allowing numerous ways of implementation and ideas, the people of Taiwan geoparks thrive with distinctive power and identity. National policies such as community-building, small-business innovation research, green corridor, satoyama and satoumi, regional revitalization, community woods, *et al*. are just some examples that could be utilized by geopark people to facilitate their development. All such national policies along with the vitality and geopark community's spirits, each Taiwan geoparks are making their own way distinctively to make Taiwan a splendid island state for show-casing geoparks of people, for the people and by the people.

However, with the limit of particular situation, this paper will also lay out some conflicts of interest that might hinder geopark developments. Community development under geoprks is by no means identical to ordinary community development. Simply because geoparks have particular values that do not share by ordinary communities. For Taiwan gopark communities, periodical networking meetings become means of changes for the better in terms of making use of each geopark's best conditions in proper ways.

keywords: Resilience, Geo-conservation, Geo-education, Geo-tourism, social engagement, community building, and Taiwan geoparks

FOREST FIREFIGHTING IN THE POLLINO UGGP A MODEL TO INVOLVE LOCAL COMMUNITIES

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Themes: 8) Geo Community (Community engagement)
Type of presentation: Oral Presentation

FOREST FIREFIGHTING IN THE POLLINO UGGP
A MODEL TO INVOLVE LOCAL COMMUNITIES

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The area of the Pollino UGGp is located in southern Italy, it covers 192,565 hectares (1925 km2). The geopark basically coincides with the Pollino National Park, set up in 1993 by the Italian government under national legislation. The geopark shows a great variety of landforms and geomorphological features including mountains, rocky outcrops, caves, plains, basins, river valleys, gorges, cliffs, scree slopes, landslides and alluvial fans as well as widespread evidence of glaciation. Furthermore this rich geodiversity is the basis of a even more rich biodiversity. For example the area hosts an important forests heritage. In fact the park have a woody coefficient of about 60%, with a total of 110.516 hectares (1105 km2) covered by forest or by areas with arboreal and shrub vegetation in evolution.
To preserv this important heritage the park made a forest fire prevention plan aimed to forecast, prevent and active fight against forest fires.
The plan is based on the cooperation with local associations of civil protecion. Indeed the park signed different agreements with this associations aimed to put in place some actions to prevent forest fire. For example for strengthening of lookout points, sighting with ultralight aircraft, controlling automatic remote sensing, first intervention. These contracts are a kind of "responsibility contracts": it means the park give an amount of money to pay the activities of the local team in charge to control a specific area during the forest fire season (from June to September). But the contract provides for a bonus based on the results of the activity:

- 100% of amount if during the duration of the agreement the surface area affected by the fires does not exceed 50% of the average annual surface area burned in the previous five-year period in the territory entrusted to the association;
- 50% if during the duration of the agreement the surface area affected by fires does not exceed 70% of the average annual surface area burned in the previous five-year period in the territory entrusted to the association;
- 20% if during the duration of the agreement the surface area affected by fires does not exceed 80% of the average annual surface area burned in the previous five-year period in the territory entrusted to the association,
- 0% if during the duration of the agreement the surface area affected by fires exceeds 80% of the average annual surface area burned in the previous five-year period in the territory entrusted to the association.

With the accountability of the local associations the firefighting plan works excellent, in fact from 2007 to 2023, if we exclude the notable extaordinary events of 2017, forest fires were reduced by approximately 90%.
In our opinion it represents an important example of involvement of local people, with the cooperation of local association of civil protection, to defend the unique woods heritage of the protected area.

keywords: forests, fire, prevention, cooperation, accountability

Identifying Critical Success Factors of UNESCO Global Geopark Governance in Iran

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Identifying Critical Success Factors of UNESCO Global Geopark Governance in Iran

Elahe Tavaloli*[1], Davood Gholamrezaei[2], Mehran Maghsoudi[3]

Geopark governance involves establishing and managing geoparks, focusing on sustainable development through conservation, education, and economic initiatives (Briggs et al., 2022; Lestari & Indrayati, 2022). It is crucial for achieving UNESCO Global Geopark status, requiring effective management structures and engagement with various stakeholders (Briggs et al., 2022; Ristiawan et al., 2023). However, unsettled regulations regarding "geopark" and "geodiversity" (Luneva, 2023), Ineffective policies, and slow government actions affect the collaboration among key actors of geopark and geotourism (Rachaju et al., 2023). Furthermore, this legislative framework is necessary to minimize the negative environmental impact of geotourism growth (Sumanapala & Wolf, 2020). In Iran, although government institutions, private stakeholders, NGO's organizations, etc. involved in the management of geosites individually, no governance model determines and facilitates their relationships. Therefore, designing a coherent governance model is necessary to solve coordination challenges and maximize the potential benefits of geotourism. In this research, through interviews with geopark experts and employing thematic analysis, key issues were identified, leading to the recommendations for a more integrated and effective governance model.

The result indicates that challenges related to geopark governance are: lack of awareness of the principles and the main purpose of geoparks formation, the absence of unique regulation for geopark and geotourism, the conflict of interests between the local community and governments, and low community involvement in the decision-making process. To address these obstacles, comprehensive governance incorporating education, legal frameworks, social engagement, and holistic heritage preservation is essential. By involving local communities in the governance framework, their traditional knowledge and cultural perspectives can be integrated into geotourism planning and management. This inclusive approach can also contribute to sustainable development by empowering local communities to participate in decision-making processes and benefit from the economic opportunities generated by geotourism initiatives. Furthermore, establishing partnerships with educational institutions would help promulgate geopark principles among the local community through educational programs and could provide scientific knowledge for geopark management, facilitating data-driven decision-making and geoconservation actions.

Keywords: Governance, Sustainable Development, UNESCO Global Geopark, Geoutourism

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keywords: Governance, Sustainable Development, UNESCO Global Geopark, Geoutourism

Citizen Science for Geoconservation in Romanian Geoparks

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In Romania there are two international UNESCO Geoparks (Haţeg Country Dinosaurs Geopark and Buzău County Geopark), and three aspiring geoparks (Oltenia Under the Mountains, Carpaterra, and Cimmerian Dobrogea). In a project funded by the Ministry of Research, last year we created a Citizen Science platform that aims towards a holistic approach of the natural and cultural heritage in the UNESCO International Geoparks and UNESCO aspiring Geoparks from Romania with the direct involvement of citizens in geoconservation. In UNESCO Global Geoparks, Citizen Science projects promote the involvement of local communities in scientific projects, stimulating curiosity and more importantly, understanding the science, while providing unprecedented engagement between scientists and the general public. Due to the characteristic and value of their heritage, the UNESCO Global Geoparks are real "laboratories", where scientists, students, teachers and citizens can contribute to deepening the knowledge of the respective territory, by investigating and producing new knowledge in key areas, in fields such as geology, biology, geography, climatology, environment, society, landscape, etc. In this regard, these territories have asserted themselves as territories of *Science*, as a strategy and an essential condition for achieving the main objective that led to their classification - *Sustainable Development*.

With the help of this platform, it was possible to raise the awareness of local communities regarding the values of the geological heritage and simultaneously, gather real-time information that helped us monitor the state of geoconservation and risks. Citizens reported the disappearance of an interpretive panel on the ecotourist trail in the Haţeg Country International Geopark, and the vandalism of two interpretive panels along the “Treasures of Agighiol” trail in the Cimmerian Dobrogea Geopark area.

keywords: Geoconservation, Geoheritage, Community

BOTTOM-UP APPROACH IN VILLUERCAS-IBORES-JARA UGGp

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Villuercas – Ibores – Jara UGGp is involved in the next Management Plan for the coming years following the UNESCO Guidelines; bottom-up approach in our governance strategy. So the active participation of the local population is needed to design the proposals for actions to be carried out in the coming years, to be part of our Management Plan

We have organized different face to face "Focus Groups; (also virtual version) and in these meetings people discuss and do different proposals:1. Mayors and Local Administration. 2. Tourism. 3. Agro-food companies and cooperatives. 4. Youth and Women's Associations. 5. Multidisciplinary technicians and professionals of the territory. 6. Geopark technical commission

As a final result, we want to underline:

- 110 people have participated directly in face to face Focus Groups (6)

- More tan 220 people reached us by social media or google forms.

- Our bottom-up Management Plan 2023 – 2027 was approved by Geopark Council in 2024 and also by Regional Government according to LEADER strategy.

- We have a very complex document with SWOT analysis, about 600 pages, with maps, graphics, pictures, documents, etc.. with public access in our web page.

- 622 actions are gathered in 10 axes of development in which the Geopark is the umbrella all of them are gathered: Training Courses, Agriculture Products, Tourism Enterprises, Public Services, Promotion and Marketing, Equality Gender and Youth policies, Networking and Cooperation, News Infrastructures, Governance, Social Participation, Education, Climate Change, and News Energies

- We have a democratic and participative bottom-up Management Plan for the next future to improve our Geopark, news employment, stop local emigration, and create good conditions for the next future, over all for women and youth, against Demographic Challenge.

keywords: bottom-up Governance Participation

Danube GeoTour Plus Project - BOOSTING OPPORTUNITIES FOR MORE INCLUSIVE, VALUABLE AND BALANCED GEOPARK COMMUNITIES

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Danube GeoTour Plus project, implemented in the frame of INTERREG Danube Region programme expands on the collaboration of nine geopark partners, two research and education partners, and 18 associated strategic partners (ASPs). Previous project results highlight the untapped heritage potential in these geoparks, facing challenges such as rural depopulation, marginalization of resident groups, increased tourism demand, and gaps in management and infrastructure. These geoparks, spanning 416 municipalities across nine countries, have seen a 6% population decline but a 77% visitor increase over the last decade.

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keywords: Danube GeoTour Plus, UNESCO Global Geopark, Geopark Karawanken/Karavanke

Economic Geography of Resilience in Geoparks

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Geoparks face climate change, accelerated by typhoons and winter monsoons with heavy rainfall, and vulnerable island ecology, all impacting the economies of rural geopark communities. Additionally, tectonic movements, such as earthquakes, uplifting, and thermal energy, contribute to the turbulence in local economic development. This study explores how communities can adapt and remain robust in the face of such challenges by presenting an emerging experience from geoparks.

For instance, after experiencing a severe earthquake with a magnitude of 7.3, Caoling Geopark introduced landscape tourism. This transition from mass tourism to niche tourism involved developing small buses that take visitors to various geological sites while providing detailed interpretations. Beyond the revenue from tours, these interpretations emphasize the local significance of geological products, encouraging visitors to purchase local goods. In recent years, the introduction of forest therapy has helped the community learn how to utilize landscape and the core values of the geopark to enhance economic resilience in the face of challenges.

Kenting Park, on the other hand, has fostered a collective learning governance involving the government, community colleges, experts, and farmers. This collaboration aims to establish more environmentally friendly agricultural practices, responding to Schumacher's (1973) advocacy for a relationship with natural resources under the principle that "Small is Beautiful."

keywords: Economic Resilience, Rural Community Development, Small is Beautiful

An Inclusive Approach to Tourism Product Development in Langkawi UNESCO Global Geopark: Its Impact on Women's Empowerment

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An Inclusive Approach to Tourism Product Development in Langkawi UNESCO Global Geopark: Its Impact on Women's Empowerment

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Abstract

Langkawi UNESCO Global Geopark exemplifies the transformative potential of inclusive tourism product development, particularly in empowering women. This paper examines the impact of integrating local women into the planning, management, and leadership of tourism initiatives. This approach aims to enhance economic opportunities, promote social inclusion, and empower women within the geopark community. Case studies and practical examples demonstrate how these initiatives contribute to sustainable development and foster resilience among women in tourism. The study highlights the pivotal role of women in tourism-driven economies and underscores the importance of gender-sensitive strategies for promoting inclusive growth and equitable development within UNESCO Global Geoparks.

keywords: Langkawi UNESCO Global Geopark, inclusive tourism, women's empowerment, sustainable development, gender equality

Who is missing in Geoparks?

Naomi Foster[1].
[1]North Pennines National Landscape and UNESCO Global Geopark (GB).

We may do our best to make our Geoparks, our events and our projects suitable for a wide range of people. But there are lots of people we find we very rarely interact with. This is could be due to locations, or assumptions we make when we plan an activity, or that people don't feel welcome for example.

In this interactive workshop, participants are given a role or character to represent. The presenter reads out statements and the participants step forward if they think this statement applies to their character (no acting required!). After a number of statements, we see who has moved the furthest forward or who has been left behind. We use this to discuss which groups of people we are failing to involve in our Geopark activities, or who is not represented among our visitors or collaborators.

This workshop requires an open space for participants to move around. Everyone attending will be expected to take part in the activity. Suggested maximum 20-30 people depending on the room size.

keywords: Workshop, active, inclusion, diversity, accessibility

Learning from exchange visits between two geoparks either side of the border in ireland

Benjamin Thebaudeau[1], Michael Hegarty[1], Darren Rice[2], Judith Hassard[2].
[1]Joyce Country and Western Lakes aspiring Geopark (IE); [2]Mourne Gullion Strangford UNESCO Global Geopark (GB).

The island of Ireland has an international border separating Northern Ireland, a part of the United Kingdom, to the republic of Ireland. The Shared Island Civic Society Fund provided by the Irish Department of Foreign Affairs is an initiative that brings communities north and south of the border closer together, to exchange ideas and strengthen collaboration on community, business and learning development. Two Geoparks located either side of the border, Joyce Country and Western Lakes aspiring Geopark and Mourne Gullion Strangford UNESCO Global Geopark, took the opportunity to explore each other's territory and learn from their respective experience on community sustainable development and business network organisation.

This Shared Island project running from August 2023 to June 2024 has brought together communities, businesses and staff in these two geoparks, as the foundation for an enduring relationship. Through four exchange visits (two in each direction), it has brought representatives of our two communities and business interests together to exchange information, share development ideas and models, and has opened up channels for growing and sustaining contacts. These two geoparks share common aspects of geological heritage on this island. In contrast, recent research published in the Irish Times (January 28 2023) indicates quite low engagement between people North and South – in terms of relations, friends, cross-border visits, etc. This Shared Island project has been a great opportunity to strengthen our cultural and personal relationships, to promote each other's geoparks as attractive places to visit and experience, and deepen cross-border relations between civic society organisations. This presentation will describe the features of the 4 exchange visits and give examples of the growing exchanges and learnings brought in from these.

keywords: Ireland, UK, Shared Island, Community development, Network, Business, Tourism, Cross border

Progress Report of Taiwan Geopark Network

JIUN-CHUAN LIN[1].
[1]National Taiwan University (TW).

Abstract

This presentation is trying to explain the progress of geopark network in Taiwan since 2011. According to the management plan, education plan, landscape resource evaluation of potential sites evaluation and local involvement, ten national geoparks was designed until the end of 2023. A series of publications such as books, pamphlets, book marks, posters and web sited were published for publics. Through environmental education, the concept of landscape conservation, geo-tourism, geohazard, geodiversity were introduced depending on different characters of geoparks.

Taiwan Geoparks association was established on 2017, however Since 2011, the national geoparks network program were supported by Ministry of Agriculture in Taiwan I and organized by Taiwan Geoparks Association.

There is some progress on the development as below:

1. Geoparks network conference was held twice a year. So far, 25 national geopark conference were helded sine 2011. The network conference played as a platform, provide opportunities for each geoparks to participate and to present their achievements on there progresses.
2. Ten geoparks has been approved on the list of geopark according to Cultural Heritage Preserve. There are another 5 potential aspiring geopark on the way to join the list..
3. Branding geopark guide: 675 local geopark guides were passed after 40 hours' training and examination as a local geopark guide. There are three level of geopark guide, they will need 240 hour's training and practice to become a national guide.
4. Most geoparks can get funding from local government to organize their annual activities.
5. In Taiwan, there is an Environmental Education Law. According to the law, Geoparks are one of the best places to raise visitor's environmental literacy.

keywords: Taiwan Geoparks Network, progress, Taiwan

Living with Volcanos

Daniel Einarsson[1].
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This abstract outlines the development of an visitors center exhibition focused on the response to earthquakes and volcanic eruptions, with a specific emphasis on the importance of civil protection, search and rescue squads, civil engineering and the community of Reykjanes. The ongoing volcanic activity in Reykjanes creates a new reality for the residents, but it can be said that a new period of volcanic activity has begun in Reykjanes, and it is therefore appropriate to educate and prepare the residents and future generations about their reality in an active volcanic area. The community of Reykjanes Geopark have a varying relationship to the geological activity in the area. There is a sense of unease in some parts of the community and longing for information everytime there is volcanic or seismic activity. The sense of unease emerges from a lack of information about what to do in case of an emergency and what procedures are in place as well as the role of the civil defence and other first responders. This exhibition aims to calm these anxieties meanwhile creating an exhibition that lends itself to revisits for local families. The goal of this exhibition is to make a memorable unique experience of recent and future volcanic activities in Reykjanes Geopark which is embraced and used as a go-to place by the local community. The exhibition aims to educate and engage visitors by providing a comprehensive understanding of the challenges posed by these natural disasters and showcasing the critical role played by communities and responders in mitigating their impact. It will bring geological activity to life for visitors of all ages and provide a feeling of magnitude to the natural forces at work. It was chosen to incorporate the local people in the preparation and concept design of the exhibition in order to better understand the local people's experience with the current eruptive series. Throughout the eruptions, Reykjanes Geopark collected stories, images, and videos for the exhibition and collaborating with a leading exhibition design firm in Iceland to create a rare and significant exhibition for residents and visitors to the region.

keywords: Exhibition, Volcanic, Eruption

The EMME Project - Exchanging Memories, Memory of the Earth

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The EMME - Exchanging Memories, Memory of the Earth project is an innovative initiative that, for the first time, involves geoparks and schools from various territories. This ERASMUS+ project, funded by the European Union, is coordinated by the Romanian school Liceul Teoretic Avram Iancu, located in the city of Brad, Romania. The project's partners include Osnovna Skola Pantovcak (Croatia), SzHutnicka 16, Spisska Nova Ves (Slovakia), Jerónimo Emiliano de Andrade Secondary School (Azores - Portugal), GEOAÇORES - Azores Geopark Association (Portugal), and the University of Bucharest, managing body of the Hateg UNESCO Global Geopark (Romania).
The Memory of the Earth is written in rocks and landscapes, millions of years of history that allow us to better understand and respect our planet. The project concept “Memory of the Earth” will allow the students involved to discover the geological history of these territories and the importance of the geological record. The main goal is to increase knowledge and awareness on geological and environmental conservation, through activities carried out in collaboration with UNESCO Global Geoparks (Azores and Hateg). Additionally, the project promotes sustainable practices, interactive learning, and the development of green skills and competencies for a more harmonious existence and connection with Mother Earth.
The EMME project includes both tangible and intangible outcomes that benefit participants and their communities. Tangible outcomes include the #EMME Curriculum "Memory of the Earth," “#EMME Goes Digital” mobile application, video documentaries on "#EMME Around the World," showcasing the activities and discoveries made throughout the project, and additional materials such as the project logo, articles in the local press, the project website, social media pages, the eTwinning page, eTwinning conferences, and follow-up events. Intangible outcomes encompass strengthened partnerships between schools and geoparks, offering more engaging, relevant, and meaningful educational experiences for students. Furthermore, the project supports Sustainable Development Goals (SDGs) such as Quality Education, Climate Action, Life on Land, and Partnerships for the Goals.

keywords: Education, Partnership, Geodiversity, Memory of the Earth

Synchronous distance learning scenario to introduce primary school students of small remote Greek islands with Nissiopi Marine Petrified Forest Park / Lesvos Island UNESCO Global Geopark (Greece)

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Nissiopi Marine Petrified Forest Park is an area with high environmental, scientific and educational value. It is located in the western part of Lesvos Island UNESCO Global Geopark. The excavations carried out by the Natural History Museum of the Lesvos Petrified Forest have uncovered a total of 250 fossils embedded within three different successive layers of pyroclastic materials mainly of volcanic pebbles-breccia. Many petrified logs are still standing in their natural growth positions along with fossilized root systems.
The Natural History Museum of the Lesvos Petrified Forest taking advantage of the educational value of Nissiopi Marine Petrified Forest implements educational programs for primary and secondary school students. The educational activities at the Nissiopi Marine Park were designed to offer experiences and knowledge through the experiential approach. An innovation of the educational activities is the experiential activity during the sea tour with the special glass-bottom boat around the Nissiopi island, where the school students can discover elements of our geological and natural heritage.
This paper presents a teaching scenario adapted to the context of synchronous distance learning for introducing the Nissiopi Marine Petrified Forest Park to primary school students of small remote Greek islands. Its theme focuses on familiarizing children with the results of the scientific research in the marine part of the Petrified Forest of Lesvos, the protection and promotion of the marine environment and our geological heritage in an Island UNESCO Global Geopark. The distance learning activity was organized by the University of the Aegean in collaboration with Lesvos Island UNESCO Global Geopark and participated 12 primary schools of small remote Greek islands.

keywords: Nissiopi, Petrified Forest, Lesvos, Geopark, education, synchronous distance learning

Engagement of primary school students with geological heritage of Lemnos Island (Greece) using Virtual Reality (VR) and field trip didactic scenarios

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Lemnos Island is located in the Northeastern Aegean Sea (Greece). The largest part of the island is covered by volcanic rocks, approximately 23 million years old while sedimentary formations dating back 33 million years dominate the central and eastern regions. The island's diverse geological history is showcased through a variety of volcanic, tectonic, and coastal geosites. These include the Petrified Forest of Lemnos, a particularly significant monument, which was declared as a protected natural monument in 2013.

To highlight the importance of the geological heritage and geosites on Lemnos, the Natural History Museum of the Lesvos Petrified Forest implemented the project entitled "Creation and operation of digital applications for the promotion of the geomonuments of Lemnos". The project was undertaken as part of the "North Aegean 2014-2020" Program. A promotional event informed the local community and the Directors of Primary and Secondary Schools of Lemnos about the potentials of these new tools and educational activities for Primary and Secondary Schools were organized on the island.

A special educational activity and implementation of a teaching scenario using digital tools of Virtual Reality (VR) was organized by the Natural History Museum of the Lesvos Petrified Forest and the Regional Directorate of Primary and Secondary Education of North Aegean with the participation of the students of the 2nd Primary School of Myrina.

This paper focuses on how virtual reality (VR) technologies and content can be utilized in the classroom to enhance primary school students' understanding of geosites. Additionally, it explores how innovative teaching methods such as virtual reality can be employed alongside outdoor educational activities.

keywords: Geological heritage, virtual reality, primary education, didactic scenarios, Lemnos Island

The educational program of the Percé Geopark: challenges and potential transformative impact

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The Percé UNESCO Global Geopark (Percé UGGp) covers an area of 430 km^2 and records 500 million years of geological history.

The Percé Geopark is located at the tip of the Appalachians, nestled at the eastern end of the Gaspé coast in Quebec, Canada, which is a remote region with a long and harsh winter.

Its unique and inclusive cooperative management encourages community engagement and foster sustainability.

The region of the Percé Geopark is a very close-knit community with only 3,000 permanent residents, but which receives a significant influx of visitors during the high tourist season, numbering in the hundreds of thousands. The region is marked by a very low population density, of just five inhabitants per square kilometres, and an aging population, with an average age of around 52. In addition, Percé is part of one of the poorest municipal regional counties (MRC) in Quebec, which makes access to financial resources and educational infrastructure difficult.

The aim of this communication is to show how the Percé Geopark is adapting to financial obstacles and how it has managed to develop and implement an educational project that promotes both scientific dissemination and geoscience education for different audiences throughout the years.

The Percé Geopark promotes an inclusive, dynamic and transdisciplinary educational program integrating the geological, biological and social characteristics of the place.

We are currently strengthening a partnership with different school boards and educational nonprofits to develop a project that aims to encourage the protection of geodiversity and value geoscience education as an integrating axis for transformative learning, belonging and engagement.

keywords: education, community, climate, challenges

Example of Educational Activities in Geoparks: The Kula-Salihli Geopark Education Program

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The Kula-Salihli UNESCO Global Geopark, located in western Turkey, is the first and only UNESCO-labeled geopark in Turkey and the Turkish-speaking countries of Central Asia. With its diverse geological, geomorphological, archaeological, and cultural heritage sites, the geopark has been actively involved in educational outreach and training programs to promote geotourism and sustainable development.

In this context, an educational program was launched in 2022 targeting primary, secondary, and high schools under the Ministry of National Education. This program spans from 4th grade in primary school to the final year of high school (12th grade). The program includes training on various topics such as the introduction to geoconservation and the Kula-Salihli UNESCO Global Geopark, the importance of recycling, the significance of water, global climate change and drought, earthquakes, and other natural disasters. The content and details of the training vary depending on the educational level of the students.

This presentation aims to share this exemplary educational initiative, which serves as a good model for other geoparks and scientists. Over the course of its third year, the program has conducted 76 separate events, providing face-to-face education on the aforementioned topics to 5,400 students. There has been a noticeable increase in the students' awareness on various issues. However, the impact of these educational activities on the students has not yet been measured. In the near future, the goal is to assess the changes these educational activities have brought about in the students.

keywords: Kula-Salihli Geopark, Education activities, Geoparks, Sustainable Development, Geoconservation

Geo learning environment and upper secondary school cooperation

Kalle Männistö[1].

UNESCO Global Geopark Lauhanvuori-Hämeenkangas is situated in western Finland, in the southern part of Suomenselkä, a region separating Ostrobothnia from the southern and eastern lake regions of Finland. The geological theme of the Geopark is the development from an ancient mountain range to the landscape of vast open mires we see today.

Lauhanvuori-Hämeenkangas UNESCO Global Geopark, the city of Kankaanpää, and Satakunta University of Applied Sciences have jointly founded and developed an environmental education learning environment in the middle of the Geopark area and a special environmental education learning center for its organization. The learning center is intended to serve a wide range of people from kindergarten to university students. The center has effectively utilized recycled materials in its operations. Old structures have received a new soul, e.g. with the help of digital technology or by skilled high school students. The learning center features interactive tasks and collections focusing on various themes. In addition, the learning center offers versatile environmental research tools for visitors to use.

The broader concept Geo-learning environment also includes the contents produced by the physical building itself, as well as other learning material that can be used in the LH Geopark area. The activity is therefore not intended to be limited only to the learning center, but to go everywhere in the Geopark area and do, for example, observation and research of the environment.

Honkajoki High School is located in the immediate vicinity of the Geo-learning environment learning center, whose curriculum includes extensive environmental education content. High school students can complete a large number of freely chosen study courses, the content of which may vary depending on the order and opportunity. We have organized teaching on content such as environmental research, biodiversity, environmental art and environmental education in a virtual environment. The common yard area of the school and the learning center also serves as a research and learning environment. It is therefore obvious and convenient that Honkajoki High School and its students are an important part of the testing and operation of the learning environment.

International partners are welcome to get to know the learning environment and plan student/learning cooperation, especially at the upper secondary school level. The top of our area of expertise is especially issues, activities and research related to biodiversity. Examples of activities include determining microplastic concentrations in fish, as well as landscaping work that increases diversity.

keywords: environmental education, Geopark, Honkajoki Upper Secondary School, cooperation

From Field to Digital: A Pilot Project in Geology Education Using 3D Scans

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UNESCO Global Geopark's activities are linked to three main areas, where one of them is education. We therefore spend much of our time with pupils and students from the local schools and university, offering various educational programs and sessions. In this presentation I will talk about a pilot project we are working on with the University of South-Eastern Norway. We chose two locations for this pilot, one with a focus on Quaternary geology and the other with bedrock geology. Using a mix of 3D scans, 360-degree photos and drone photos, we are currently putting together an educational website.

For this pilot project, the target group is university students taking an introductory course in geology, but the long-term goal is to make it suitable for all age groups. The digital models will be used as a supplement to physical fieldwork the students will participate in. The project was initiated to test the LiDAR sensor of the iPhone 12 Pro, assess how easy 3D scanning has become, and explore its potential for educational purposes.

This talk will focus on some of the preliminary results, share our experiences so far, and discuss how user-friendly this technology is now.

keywords: Education, 3D models, LiDAR, University

The Global Geoparks Family – Ngorongoro Lengai and Azores, together through GeoEducation

Salomé Meneses[1,2], Carolina Salvador[1], Tiago Menezes[1,2], Libânio Silva[3], Salomé Areias[3], Lightness Kyambile[4], Ramadhani Khatibu[4], Frank James[4], Gasper Apolinary[5].
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In a year that we celebrate 20 years of the Global Geoparks Network, the strength of this network and the power of cooperative projects and activities between its members is obvious. A UNESCO mission to support Ngorongoro Lengai UNESCO Global Geopark (NLUGGp) in Tanzânia, carried out by an Azorean (Portuguese) geopark expert, created the link between these two geoparks, that are separated by almost 8000 Km of continent and ocean. Anywhere in the world where there is a UNESCO Global Geopark, ‘’geoparkers’’ will find new projects and ways of promoting this concept and the geological heritage of their territories.

In the scope of geoeducation, the Azores UNESCO Global Geopark (Azores UGGp) and the NLUGGp carried out a virtual exchange between students of primary schools (8-11 years old) in a unique moment of empowerment and awareness of identity. The activity involved Santa Clara School, in the Azores, (coordinated by teacher Libânio Silva) and Tumaini Junior Pre&Primary School, in NLUGGP, (coordinated by teacher Gasper Apolinary). The work started with outdoor and indoor activities with the students and teachers, conducted by the geopark teams in the two territories. Having a greater knowledge on their geoparks and on specific geosites, groups where formed to work one geosite each and presented on PowerPoint. With all the knowledge on the geosites and the work ready to be presented, it was time to face a new challenge, the language challenge. The students at the NLUGGp speak English fluently, but in Portugal, this language is usually taught later in the school journey. To overcome this barrier, the Azorean students had to perform an intense work on preparing the presentations in English. With the crucial support of their English Teacher Salomé Areias, this cooperative work reached a higher dimension of true awareness of the importance of communication and of the need of acknowledging the distinctive characteristics of their own territories. This multidisciplinary work allowed the improvement of English and computer skills, team work, respect and resilience. The two geoparks motivated the exchange that, by initiative of the two schools was repeated with the goal of presenting the different curriculum and facilities of their schools. This activity represents a unique opportunity of mutual enrichment and awareness of the diversity that unites us. Almost 8000 Km and a completely distinct natural and cultural heritage separates the two territories but they were united by this global family of UNESCO Global Geoparks.

keywords: Networking; Global Family; Geoeducation, Project-based learning

The Digital Geopark Guide: a proposal for a digital solution in geoparks

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We propose to establish a project called “The Digital Geopark Guide”. This smartphone-based tool aims to provide a tailored digital solution for geological information offerings that meet the needs and offers of geoparks.

Geosites form an essential interface between knowledge dissemination and sustainable geotourism. Traditionally, information about these sites is presented through panels directly in the field. The motivation for developing digital solutions for information dissemination in geoparks is partly due to the fact that static panels are perceived as suboptimal for various reasons. Firstly, the signage at some locations is considered intrusive, especially when multiple panels from different information providers with different designs are placed side by side. Secondly, panels offer limited space for information, and language barriers can arise. Furthermore, panels are static and can only be updated with significant (financial) effort to reflect new findings or developments. They are susceptible to vandalism and weather conditions such as rain, snow, sun, and wind. Additionally, panels may not be installed at all locations within the geopark, especially in remote or difficult-to-access areas. Moreover, the installation of panels in nature reserves is only possible in exceptional cases. As a result, many geosites in the field can only be inadequately communicated. Panels offer no interactive functions or opportunities for individual learning experiences. Visitors cannot interact with the content or retrieve additional information, as would be possible with digital media.

Therefore, we propose a digital solution as it offers many advantages. Since geosites are usually recorded in a geosite register, public access using digital map applications can be easily enabled. Based on the experience from previous projects (www.outcropwizard.de; www.digitalgeology.de) the Digital Geopark Guide would rely on a well-established software stack used in industry and science. The structure of this stack is layered accordingly to the guides three main goals:

a. Providing a repository for all participating UGGPs’ geolocated data (mainly geosites)
b. Management of the data and flexibility of associated media, i.e. images, videos, 3D-models
c. Public access and interaction with the data and hence, the geoparks

Layer a or the data layer would provide a database for the geotouristic data with triple redundancy. Layer b or the management layer would grant dedicated editors from the geoparks access to the data layer via a modern user interface (UI) and provide them with the tools to create, edit and delete data. Finally, layer c or the public layer would serve the data via a state-of-the-art web application to the general public. Here, multiple means of user engagement could be promoted using techniques from gamification to community-based interaction. Thus, layer c would serve as a central entrypoint to the geopark community.

Other benefits arise from statistical analysis of information on visitor numbers and user evaluation of the individual information offerings. In large geoparks, it is often difficult for management to keep track of the infrastructure within the area. The proposed centralised system would give visitors the opportunity to, e.g. report or document vandalism or comment on the accessibility of specific geosites.

keywords: digitalisation, gamification, outdoor experience, smartphone

A second life for an abandoned quarry: from a deep study to the creation of 3D models to enhance, and make a quarry "virtually accessible": the example of Cava Porcili (Minervino, southern Italy)

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The Apulian territory (southern Italy) is rich in quarries, used since ancient times to extract and produce materials for both modern and traditional construction and architecture (i.e. the famous castle of Castel del Monte, the Cathedral of Trani, etc.)
Some of these quarries represent true windows into the geological past of the area, and especially those that have been abandoned, deserve a second life. Cava Porcili is a limestone quarry located south of the town of Minervino Murge (southern Italy), situated on the western edge of the Apulian Foreland. This quarry remains, to this day, not thoroughly studied in detail, despite being one of the most important quarries in the region, due to the discovery of six well-preserved karst caves, that are included in the list of Apulia geosites. The quarry walls present an about 90 m thick Cretaceous succession of shallow water limestone (detailed sampled), which shows a spectacular Milankovitch cyclicity and some slumps. The quarry is rich in other peculiar geological features such as numerous karst cavities, faults, slumps, slope debris, and more which can be very interesting for scientific, educational, and outreach purposes.
The quarry, which falls within an area of an aspiring UNESCO Geopark (TROPEANO *et al*., 2023), is currently abandoned and inaccessible for geotourism purposes, but given its great educational, scientific and touristic potential, a deep sedimentological and paleontological study is going on and an alternative way to admire the quarry using new technologies is proposed here. The creation of 3D models using drone photogrammetry aims the using of a sort of virtual tour to make accessible this small geological treasure to a wide audience, enhancing it and making it known worldwide, waiting and hoping for full future fruition.

keywords: 3d models, drone, Cretaceous, abandoned limestone quarry, Minervino Murge, photogrammetry.

Walking through the deep time: the Neanderthal Man and dinosaur footprints at Altamura (Puglia, southern Italy)

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The surroundings of Altamura, a fascinating small town in Puglia (southern Italy), are home to two internationally unique paleontological testimonies: the skeletal remains of a Homo neanderthalensis in the Lamalunga Cave (i.e., 'Grotta di Lamalunga') and a surface covered in thousands of dinosaur footprints at the bottom of the Pontrelli Quarry (i.e., 'Cava Pontrelli'). Despite being preserved in the same Cretaceous rocks of the Murge region and being only a few kilometres apart, the two fossil testimonies are extremely distant in time, and even the most recent (that is Homo neanderthalensis) is very distant from our own historical times.

It suffices to say that the dinosaurs which crossed our continent moved over a vast, flat, marshy area, a lush swamp near the sea that bore little resemblance to the present-day geography of Apulia – it occurred some 80 million years ago. Homo neanderthalensis, on the other hand, moved over a densely wooded area whose relief forms roughly resembled those of today – and it occurred between 170,000 and 130,000 years ago.

The distance between dinosaurs and humans, as well as their highly distinct environments, which developed on the same small part of our planet (actually, in proportion, less than a stamp!) can only be fully understood through the concept of deep time. From dinosaurs to humans, the slow but inexorable movement of continents resulted not only in an unimaginable variety of environments on the same strip of land, but also in the last mass extinction event that 'wiped out' dinosaurs (except for those that evolved into birds) and allowed mammals, and thus man, to expand and diversify on our planet.

keywords: Altamura, deep time, dinosaur footprint, Neanderthal Man

The amazing underground world of the Lavreotiki UNESCO Global Geopark

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The Lavreotiki Geopark occupies the area where both hypogene and supergene processes created an amazing underground world, decorated with an exquisite variety of minerals of international recognition and value. Its mineralization is unique and of high geodiversity, as the territory contains 683 naturally occurring mineral species, the most of any other district in the world (*https://www.mindat.org/loc-1942.html*). From about 10 to 7 million years ago, massive tectonic movements along the so-called "Western Cycladic Detachment System", accommodated magma emplacement, and facilitated hydrothermal fluid circulation and ore deposition within permeable lithologies. These processes in combination with subsequent supergene oxidation of the ores, gave birth to one of the most important, historically and economically, polymetallic deposits in the world exploited by the Ancient Greeks and during the modern times (*Voudouris P. et al., 2008*).

The mining and metallurgical industry, developed in antiquity -which triggered the cultural and economic development of the city-state of Athens as well as its hegemonic role in classical times- has gained worldwide scientific interest. Essential questions concerning the mining of ores and their processing remain unresolved (*Conophagos C., 1980*).

Thus, Lavreotiki Geopark's geological heritage contains plenty geosites of international value, most of them representing its amazing underground world. In particular, the geopark hosts ten geosites (ancient and modern mining galleries), where 25 minerals have been identified for the first time worldwide and are included in the International Mineralogical Association's list of Type-locality minerals (IMA list).

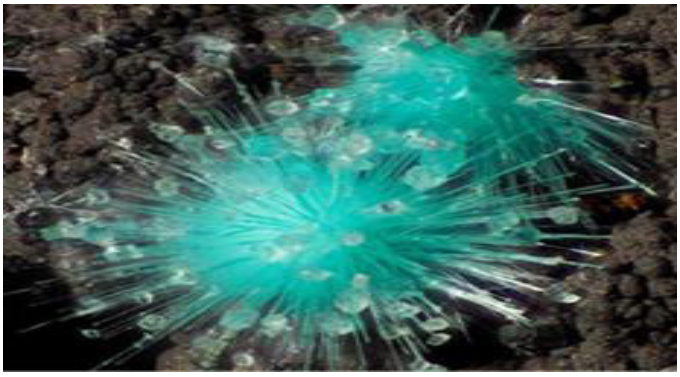

Photo: "Mining gallery '80". " It is the site of the modern mining activity in Lavreotiki area. It hosts the most important vein-type mineralization in the geopark (i.e. "Vein 80"). It also hosts a breccia-style ore, which was formed along a roughly, low – angle, normal fault, the so-called "Western Cycladic detachment fault". The roof of the gallery is the detachment fault itself! Photo credit Ch. Kosmidis.

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keywords: Lavreotiki, geodiversity, minerals, geoparks, geoheritage

What does UNESCO think everyone should learn?

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In this interactive workshop session, join the discussion about what you think is important for everyone to learn. UNESCO has recently released a Recommendation on Education for Peace, Human Rights and Sustainable Development, replacing a previous version from 50 years ago. It includes guiding principles, learning objectives and areas for action. Discuss what you think education priorities should be with colleagues from across Europe, find out about the Recommendation and consider how it could be used in your work.

The suggested session length is 30 minutes to allow for discussion and brainstorming between participants as well as a short presentation. Ideally the room would be set up so that participants can sit around tables to discuss in small groups, but a standard talk setup would also be acceptable.

keywords: workshop, discussion, education, ESD, learning

Rocha da Pena: A unique natural laboratory to promote outdoors GeoEducation in the Algarvensis aspiring UNESCO Global Geopark (Portugal)

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The Rocha da Pena is a Local Protected Area, managed by the Loulé municipality, and constitutes a hotspot of geodiversity, biodiversity and cultural heritage within the Algarvensis aspiring UNESCO Global Geopark (aUGGp) territory in southern Portugal. This contribution aims to demonstrate the educational value of Rocha da Pena's geodiversity and its potential for promoting and conducting outdoor non-formal educational activities.
The distinctive geomorphology of Rocha da Pena stands out from the surrounding landscape, reaching a maximum elevation of 479 m. The length of its plateau extends to 1850 m in a E-W alignment, with a maximum width of 455 m. The basement rocks of this geographical feature include the claystones, sandstones, and volcanic rocks from the "Grés de Silves" Formation. Those rocks were formed by the lithification of sediments deposited at the margins of ancient lakes and rivers during the Upper Triassic (ca. 230 Mya). Within these rocks, a remarkable array of fossils has been documented, including bones of giant, and primitive amphibians assigned to the iconic species Metoposaurus algarvensis. Additionally, fossil remains of phytosaurs, placodonts and fishes have also been discovered. Moreover, the Rocha da Pena plateau comprises carbonate rocks formed along the margins of a branch of the Tethys Ocean during the Lower Jurassic (ca. 190 Mya). The weathering of those rocks has been producing typical karst features, such as sinkholes, karren, and caves.
In the light of the Rocha da Pena's geodiversity elements and the curricula of the Portuguese educational system, a series of outdoor educational activities have been conducted with students and teachers from diverse educational backgrounds (Table 1) at this Algarvensis aUGGp geosite.
Table 1. Framework of the educational activities developed at the Rocha da Pena geosite.

Level of education	Subject area	Domain/Theme
5th grade (Students age: 10 – 11)	Natural sciences	Water, air, rocks and soil – terrestrial materials
7th grade (Students age: 12 – 13)	Natural sciences	Earth in transformation
10th grade (Students age: 15 – 16)	Biology and Geology	Geology and its methods; Structure and dynamics of the geosphere
11th grade (Students age: 16 – 17)	Biology and Geology	Sedimentation and sedimentary rocks; Magmatism and magmatic rocks; Deformation of rocks
12th grade (Students age: 17 – 18)	Geology	From the theory of continental drift to the theory of plate tectonics; The history of the Earth and life; The Earth yesterday, today and tomorrow

keywords: Algarvensis aUGGp, Geoeducation, Outdoor activities, Fossils, Karst landforms

From Gypsum to plaster in Haute-Provence UGGp

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In southern France, Haute-Provence UGGp is a vast 2180,5 km2 territory on the external alpine margin. This location leads to the meeting and the mixing of mediterranean and alpine influences as much for human cultural heritage as for the exceptional biodiversity (butterflies for exemple).

Haute-Provence UGGp is one of the founding members of the Unesco Geoparks, with Lesbos, Vulkaneiffel and Maestrazgo UGGps. It is well-known for spectacular landscapes and numerous fossil witnesses to the last 300 million years of the planet's history.

Strong presence of Artworks in Nature is also a feature of the Haute-Provence Geopark territory.

As I am currently the educational manager in the HP-UGGp, I want to present you an interesting educational project that was conducted last year enhancing gypsum, a major element of our geo-heritage.
Before all, why Gypsum ?

-Geological point of view : a leading role through time

Located in southern Europe, our region underwent episodes of submersion in very hot, even arid climates at the end of Triasic period. This gave rise to thick evaporitic deposits of gypsum. As marine conditions prevailed during the rest of Mesozoic, thousands of meters of sedimentary rocks covered them. In order to escape deep pressure, evaporites often migrate through the sedimentary pile. In doing so, they induced strong «salt tectonics » disturbances before and during alpine tectonics (foldings, diapyrism, thrust sheet sliding…).

-Gypsum and local economic development

From16th to 20th centuries, gypsum exploitation and transformation into plaster was very common all over the geopark territory. Actually, artisanal kilns are still present in several villages as well as semi-industrial abandoned site in Digne city.

-Gypsum use, architectural and cultural local heritage

Rustic plaster was commonly used as mortar to build the houses, as coatings on walls and for home interiors as well : floors, stairs, fireplaces, etc. In noble homes, artist craftsmen created sophisticated decorations and developed « the art of gypseries ».

Educational project for local schoolchildren thanks to European Leader program fundings.

-In order to educate 10 years old children about this rich heritage, we organized classrooms visits and activities about their Geopark and about the use of gypsum by humanity through time.

-They also met a specialized craftsman who taught them basic plaster techniques which they put into practice.

-With the 250 pupils the Geopark also organized field trips to discover old gypsum quarries and plaster kilns. Pupils also had the opportunity to visit private houses still showing gypseries ornamentations in staircase ceiling and ancient buildings still coated with salmon-red colored plaster.

In order to raise general public awareness about this heritage, a traveling exhibition was created using a professional photographer work : from a database of 250 new photographs, 13 large plastic-covered panels are now available to illustrate the gypsum odyssey, indoor or outdoor, in various events and locations in the Geopark.

Tourism geopartners also received informations about the subject with field visits, in order to be able in turn to raise visitors awareness for gypsum to plaster heritage.

Conclusion

Gypsum is a wonderful topic to illustrate the « Geoparks spirit » thanks to the obviousness of intimate links that did exist between geological and cultural heritages in the past, that still do exist at present and are worth pointing out and valorizing for the future.

keywords: Gypsum, geological heritage, cultural heritage, pupils awareness, public awareness

Geo Education program at Jøssingfjord Science Museum

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How to leverage a newly established science museum to enhance geo education in Magma Geopark.

Background
The Jøssingfjord Science Museum officially opened on June 21st, 2024, and represents a significant milestone for the local community and visitors. This long-anticipated science museum, situated in Jøssingfjord in the southwestern part of Norway, is a result of a project that began in 2007 and aims to be a central platform for future learning and exploration, serving as the heart of Magma Geopark.

Educational Programs
Our focus is on establishing the science museum as an important educational center, engaging young learners through tailored educational programs in collaboration with local schools and the five municipalities within Magma Geopark. The educational programs will be based on the relevant curriculum for each educational level, initially targeting 5th and 8th graders, as well as high school students. The interactive lessons will explore geological processes and local rock formations, leveraging the museum's laboratory, auditorium, and exhibitions. Additionally, the museum's bouldering wall will offer cognitive stimulation and creative reflection.

We will present the strategic vision, methodologies, and overall approach to implementing the geo-educational programs. Additionally, we will share our initial experiences, and outline the potential for expanding the scope and impact of these initiatives.

keywords: Geo Education, Educational Program, Interactive Learning, Collaboration

Promoting outdoor education through information sharing and collaboration among european Geoparks

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UNESCO Global Geoparks promotes outdoor education to inspire young and old to protect their landscape by increasing awareness. Geosites are specific places in the geoparks where the interaction of geological, natural and cultural heritage comes into focus. Every Geopark aims to develop and promote outdoor education directly or through local partnerships with schools and universities. And every geopark and local educators face different challenges in this endeavour linked with local curricula and financial or logistical constraints. To tackle these challenges we can use stronger information sharing and partnership at the European Geopark Network's level.

To this end, this Erasmus+ project entitled GeoSite has started in October 2023. The education-focussed project aims to improve the teaching and learning capacity within the partner organisations and the users of geoparks. The six partners include two teacher training universities in Norway (Høgskulen på Vestlandet or HVL in lead and University of Stavanger), and four geoparks; Sunnhordland UNESCO Global Geopark in Norway, Parco delle Colline Metallifere UGG in Italy, Buzău land UGG in Romania and Joyce Country and Western Lakes aspiring Geopark in Ireland. Continuing for 36 months, the project will develop digital resources at a number of geosites in the 4 geoparks and general guidelines for excursions. In a nutshell, it aims to stimulate innovative learning by combining the expertise of the geoparks with experienced teaching.

This presentation will discuss the early findings concerning the current education resources offered by the EGN members and a teacher and student survey in the 4 Geoparks to understand their local challenges, needs and aspiration when it comes to outdoor education. This preliminary work combined with the expertise from the 6 partners has led to the development of a prototype digital forum for education resources across the 4 geoparks that will be presented here.

keywords: Erasmus+, University, Norway, Italy, Romania, Ireland, Geosite, Education, Outdoor, Resources, Lesson plan

Interpretation in Education. Case studies from Buzău Land UNESCO Global Geopark, Romania

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Fostering and promoting education at all levels is one of the main focuses of UNESCO Global Geoparks, especially education related to geosciences, nature and hazards. This can be achieved for both students, using formal and non-formal methods in classroom or outdoors, but also for adults via thematic trails, museums, interpretative materials and videos. In both cases, we believe that the key to effective educational activities, that are both engaging and memorable, is interpretation. Here, we want to present the strategy that we have developed and successfully applied in Buzău Land UNESCO Global Geopark, and also highlight a few case studies and methods. At school level we have developed an educational network with 27 schools and high-schools, where we frequently organize educational activities in classroom, in our visiting points or outdoors. One of our preferred methods is to use the 'Wandering Lab', a mobile science lab equipped with digital microscopes and geological samples, where we can easily run workshops with up to 20 participants at a time. We developed two workshops, one centered around volcanism and one around life in prehistoric seas. The workshops combine observing samples under the microscopes with short presentations and storytelling windows of up to 2-3 minutes each and are developed in a narrative way. For example, we start by looking at volcanic sand and by observing different crystals, and we learn to differentiate them by color, shape or magnetism. We discuss erosion and we switch to thin sections of lavas, where we can see the crystals embedded in glass. Slowly, we build up to the story of magmatism by looking at mantle xenoliths (the sources of magma and magma generation in the mantle), at rocks from lower-crustal and from upper-crustal magma chambers (discussing magma transport, storage and formation of magma reservoirs), we look at samples of volcanic ash (discuss eruptions and the hazards they pose to people, climate and environment), and finally we look at pegmatites (discussing the death of volcanoes and the formation of resources). In addition to this, we will showcase the style of interpretation we use on our thematic paths, often combining geology, culture, history and biology in a narrative way, and linking to digital materials, such as our in-house documentaries. These are documentaries that we use in educational activities with both children and adults, on-site and off-site. We will finish by highlighting our newest and most ambitious Interpretation Center to date, where we combine digital and classical exhibit styles to tell the story of the geological evolution of our territory during 25 million years, and the story of prehistoric life in seas, all of which are relevant to education concerning climate and environmental change.

Parks as Art: Imaging Park Landscapes for STEAM Education Outreach Workshop

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Parks as Art: Imaging Park Landscapes for STEAM Education Outreach

Geoparks, National Parks, and State Parks all conserve landscapes that offer multiple connections to science course curricula, at all educational levels. Developing educational activities that use parks as their geographic anchor highlights the importance of conserving geologic and landscape heritage, and fulfills the United Nations Geoparks goal to enhance awareness of the influence of geology on culture, climate change, natural hazards, and sustainable development. Making the activities easily available for teachers to insert into their curriculum allows them to introduce Geoparks to students and encourages their interest in visiting the Parks with their families. Providing a comprehensive Teachers' Guide ensures that the teachers can introduce the Parks effectively and guide students as they explore the Geoparks virtually and plan in-person visits.

In this workshop you will connect with landforms, landcover, and landcover change in Iceland and in Texas, using Icelandic Geopark imagery and imagery of Texas State Parks. Artistic rendition of Landsat and Sentinal-2 imagery in an art exhibit serves to engage students and teachers with imagery, and provides them with the opportunity to explore park environments and landforms. Regional-scale coverage allows depiction of the surrounding areas and the influence of the "human footprint". Artwork can be effectively linked to educational topics including Earth Science, Environmental Science, Geography, and Climate Change. Activities will include a scavenger hunt, a change detection matching game, and a surface feature matching game.

keywords: landforms, landcover, landcover change, educational activities, human footprint

Soil education in the TERRA.vita UNESCO Global Geopark

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Soils provide numerous essential functions and services for humans and are an important part of the environment. They are habitat for life and store the CO2 we emit. Fertile soil is crucial for growing trees and crops, and we use soil for mining building materials and as building ground. We bury our loved ones in the ground, where soil preserves our cultural heritage in archaeological records for thousands of years. Given that soil is fundamental to our society, we must safeguard it. Education is a key element for raising soil awareness and foster the protection of the soils. The variety and beauty of the different soil types with their numerous functions and services often remain unseen by society. Furthermore, detrimental soil changes (like erosion, compaction or contamination) are often gradual processes and only become visible at a late stage. Thus, education that leads to increased soil awareness and precautionary soil protection measures is fundamental. The TERRA.vita UNESCO Global Geopark educates on the importance of soil in various projects presented here.

Atlas of Soil in the Nature and Geopark TERRA.vita: Due to the high geodiversity, the TERRA.vita UNESCO Global Geopark also exhibits a high variety of soil types. To present the unique characteristics of each soil type within the Geopark and to facilitate an introduction to soil science for aspiring soil scientists, geography teachers, and the interested public, researchers from the Osnabrück University of Applied Sciences created the "Atlas of Soil in the Nature and Geopark TERRA.vita."

TERRA.info brochure on “Soil, soil erosion, and soil protection”: Due to climate change, the length and frequency of drought events and the intensity and frequency of heavy rain events are increasing in the TERRA.vita area. As a result, the number of severe soil erosion events in the County of Osnabrück increased sevenfold within eight years, particularly due to water erosion, but also wind erosion. The TERRA.info brochure raises awareness on the geohazard and informs about measures undertaken to protect soil, especially in agriculture.

TERRA.park Fascination of Soil: Developed in the course of the World Expo in 2000, the two-hectare large TERRA.park exhibits TERRA.vita’s geodiversity, landscapes, and the soil types existing in the landscape forms in a soil pavilion. The information and guided tours are designed especially for school classes and raise awareness on the importance of soil, the human influence on the landscape, and the anthropogenic caused threats for soil.
“Plaggenesch” Information Center: In collaboration with the Lechtingen Miller’s Society, an information center was created to present the rare “Plaggenesch”, an anthropogenic sod soil restricted to Northwestern Europe. The information center is located in the former pigsty of the Lechtingen Mill and exhibits by panels, hands-on objects, videos, and by a “Plaggenesch” soil profile the extinct form of plaggen sod soil agriculture, the transformation to modern agriculture, and the pros and cons of both.

Geo Education

SoilCase: TERRA.vita lends schools and kindergartens the soil case free of charge. This educational material contains a soil book with experiments, craft ideas and songs, a soil animal identification key booklet for small children, labware for soil field experiments, a soil textures collection (containing clay, silt, loam, and sand) to feel the difference and soil and stone social games.

TERRA.guides and TERRA.ranger: The TERRA.guides provide tourists with information on the importance of soil during guided tours, while the TERRA.rangers inform and take action against bikers and hikers causing soil erosion by going off-road in forests.

TERRA.horse Ella: TERRA.vita is increasingly using working horses for landscape conservation measures in nature reserves, as they cause less soil compaction than heavy (forestry) machinery. Ella is TERRA.vita's own logging horse.

Soil is formed through the weathering of rocks, and UNESCO Global Geoparks protect soil by conserving geological heritage. TERRA.vita UNESCO Global Geopark protects its soils by raising awareness and fostering appreciation in educational projects already since 25 years. This extensive experience provides the Geopark with a comprehensive and holistic approach to soil projects.

keywords: soil education, soil erosion, extracurricular educational center, educational material

UNESCO sites as Heritage of Lusatia: achievements and future cooperation in educational work

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The Lusatian region, also known as Lusatia *(German: Lausitz; Upper/Lower Sorbian: Łužica/ Łužyca)* is located in Central Europe and stretches on both sides of the Neisse River across the federal states of Brandenburg and Saxony (Germany) as well as the Lubusz Voivodeship (Poland). The area is well-known for its rich cultural and natural heritage, its diverse landscape and represents one of the main traditional energy centres in Germany, which will face an enormous structural transformation due to the phasing out of coal mining in the upcoming years.

To support this process and contribute to the successful, economic, ecological, climate-friendly and socially sustainable transformation of Lusatia, five partners have come together to form a cross-border cooperation. The so-called “UNESCO 5” cooperation includes one UNESCO World Heritage Site (Muskau Park/ Park Mużakowski, Poland-Germany), two UNESCO Biosphere Reserves (Upper Lusatia Heath and Ponds Landscape, Spreewald), the intangible cultural heritage of the Social Customs and Festivals of the Lusatian Sorbs, represented by the Domowina Association, as well as the Global Geopark Muskauer Faltenbogen / Łuk Mużakowa. As the “Heritage of Lusatia”, our common goals are highlighting the cultural and natural heritage of the region, strengthening the value of tourism provision and supporting the image of Lusatia nationally as well as internationally. To this end, a total of eight sub-projects will be implemented by UNESCO 5 with the participation of regional stakeholders until 2026. These include the development of new themed bicycle tours, digital information services and videos, as well as a wide range of educational activities for schools and informing stakeholders. The activities aim to clearly emphasise the importance of UNESCO and UNESCO sties for the region, to promote the acceptance and implementation of the Sustainable Development Goals (SDG’s) and to further develop the natural and human-shaped landscape of the Lusatian region in a sustainable way. In particular, it is also about ensuring the quality of life and identity for the region's inhabitants and providing orientation for the region in transition.

As part of sub-project “UNESCO sites for young people” a project outline was drafted for the development of challenging educational materials and offers. As one of only 5 projects worldwide, the application of UNESCO 5 was the single German draft selected for funding by a specialist jury of the German UNESCO Commission supported by the Henkel Company and its foundation. The funding will be used to develop and implement an innovative educational program in cooperation with an university partner (BTU Cottbus-Senftenberg) and students of school social work on a German-Romanian course. The four pillars of the project include: (1) Competence development in the planning and implementation of simulation games. (2) Use of the Lusatian UNESCO sites as extracurricular learning locations. (3) Understanding the post-mining landscapes of Lusatia. (4) International exchange and digitality in social work.

The aim of the presentation is to outline the measures successfully implemented to date and to present a further initiative to strengthen the Lusatian UNESCO sites as extracurricular learning locations.

keywords: UNESCO sites, cooperations, education, cultural and natural heritage

Geological and archaeological evolution of an ancient site in Pollino UGGp

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A archaeological campaign (started in 2019) discovered a large settlement (i.e. the Santa Gada site) dated to 6th-3rd centuries B.C. in the Pollino Geopark, southern Italy. The study area is located in a Middle Pleistocene tectonic basin of the axial zone of the southern Apennines, Italy, filled by a thick fluvio-lacustrine succession. The landscape is featured by different orders of SSO-dipping low-angle surfaces that are separated by rectilinear scarp of variable height. Strict relationships among fluvial landforms, active faulting, and settlement evolution have been investigated by the integration of geological, geomorphological, and geophysical data. Archaeological data revealed the sudden abandonment at the end of the 3rd century BC of a vast residential complex. The morpho-genesis of landform elements, the role of major faults as seismogenic sources, and the relationships between landscape and settlement location were discussed in the context of the long-term landscape evolution of the study area. The settlement was built up on the top of a fluvial terrace and is bounded to the north by a morphological scarp. Our investigations suggest a fluvial origin of the morphological scarp of the study area and a possible role of important seismogenic sources of the Pollino area for the sudden abandonment of the site.

The multidisciplinary studies have highlighted a notable archaeological potential, a close influence of the landscape forms on settlement choices and the possible conditioning of seismic events on the settlement dynamics of the site including the abandonment/destruction of the important and extensive settlement, due to a major seismic event. Evidence of how natural risks and the geological evolution of territories have always affected human settlements and activities.

keywords: geoarchaeology, earthquake-induced abandonment, archaeological excavation campaigns,

Outdoor Education case Saimaa Unesco Global Geopark

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Topic: Geoeducation

Title: Outdoor education case Saimaa Unesco Global Geopark

Introduction

Saimaa UNESCO Global Geopark has nine network schools with which we are developing cooperation. We cooperate with comprehensive schools, upper secondary schools, vocational schools and universities of applied sciences. In practice, we implement learning materials, make school visits, and offer geology as part of the curriculum of nature instructors at Saimaa Vocational College. In addition, we carry out projects with universities of applied sciences that focus on the accessibility of our sites and the diverse cultural heritage of our region.

Through our technological innovations, we bring a new addition to the teaching of educational institutions. We generate interest in the topic through videos and virtual visits. In teaching in nature, we utilise so-called nature-built learning environments, where the traces of the Ice Age become concrete in a genuine local environment. For example, we have built information boards along nature trails, where information can be found behind a QR code. The information is in Finnish and English. In addition, we organise so-called nature days in schools, where we tell about the geopark and the living nature in our area. As tools, we use, for example, trace mats, which can be used to identify traces of animals found in our area.

Increasing awareness of living nature increases interest in nature in general and at the same time provides an excellent opportunity to tell about geology and its connection to our living nature and the development of culture in our region. Outdoor training stands out from classroom activities and motivates students to work both in groups and independently. Through our activities, we pass on the story of Saimaa to new generations and increase awareness of the activities of the Geopark. By raising awareness, we implement our values and at the same time promote our SDG 2030 goals. By participating in training programmes, such as nature and environmental training programmes, we produce content for future professionals for their future tasks.

Our latest innovation is the Saimaa Diploma, which serves students to study independently as part of different subjects. In addition to normal teaching, the diploma encourages students to explore our sites in their free time by completing various tasks, for example with the help of a mobile app.

Key words: Outdoor education, co-operation with schools, learning environment, learning tools

Geo-education, twin schools, and the arts in the Cross-Channel Geopark

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The Cross-Channel Geopark is now into its third year as a project and we are making excellent progress towards the development of a fully-functioning Geopark and an application to UNESCO. In the process of developing the Geopark we have created many educational resources for a general audience as part of a wider programme of educational activity engaging schools, universities and various community organisations.

Some of the main resources and activities we have created are:

Animations aimed at the general public, as well as schoolchildren, which focus on specific elements of the geology of the region.

A booklet of drawings, diagrams and other printed pieces which illustrate different aspects of the geological heritage of the geopark, from the paleoenvironment to the Channel Megaflood.

Worksheets and lesson plans allowing teachers and others to lead sessions educating schoolchildren or other groups. These focus on a range of things, including aspects of the natural environment, creating music in nature, and writing your own manifesto based on the UN SDGs.

A geology ‘educational bag’ made available to educators which allows them to deliver geology lessons both inside or outside of the classroom.

A comic book La Balade d’Hardinghen which educates young people about the cultural, biological and geological heritage of a specific town, Hardinghen, in the Geopark.

An exhibition about the Cross-Channel Geopark hosted initially near Cap-Blanc-Nez in France but able to be moved around, with exhibits and recordings from both sides of the Channel.

Geology training sessions for tourism professionals to allow them to lead walks or educate their own customers on specific aspects of the Geopark.

Geopark Training for Ambassadors for them to better understand what a Geopark is and how they can play a part in it

As well as establishing educational resources for schools and others across the entire Geopark, we have launched a ‘twin school’ project between schools in the French and British parts of the Geopark. This builds on the long tradition of ‘twinning’ between the countries, something which is particularly strong in the near-neighbour regions of the Geopark. We have paired a Special Educational Needs (SEN) school from Folkestone with a school in the urban centre of Boulogne-sur-mer, and their first trip is taking place at the Chateau d’Hardelot in October 2024.

Another aspect of our communication of scientific knowledge to the public has been through arts-led activities, including our SALT+EARTH Festival. By engaging with artists and encouraging them to create work in response to the geodiversity of our Geopark, the general public can be engaged in innovative ways. A specific example of this is Alison Neighbour’s The Chalk Path/Le Chemin de Craie. This artwork was developed through Alison’s interaction with the Geopark through SALT+EARTH Festival, amongst other work, and leads participants on a ‘deep time’ walk on both sides of the Channel. **keywords:** twin school, arts, exhibition, educational, training

Letters from the Geopark. The educative activity “There is a letter for you!” in Villuercas-Ibores-Jara UNESCO Global Geopark, Spain

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This activity was designed in order to promote the students of the Geopark Educational Centers to get to know each other. It is about recovering the exchange of letters in the traditional way, offering our students an alternative to so much technology that surrounds us. In this way, bonds of friendship are created between boys and girls from different populations, some of them very remote.

Furthermore, reading and writing are mandatory learning in the educational system. Literacy is the combination of both and represents the appropriate use of written language. Therefore, it is important that the little ones acquire these basic tools from an early age in order to acquire more knowledge and develop more skills. Literacy develops in the little ones the ability to express themselves through written language and at the same time, enrich oral language, since for both skills they must interpret the texts and understand the message that they wish to convey in them. Work has been done through integrated tasks, addressing as far as possible all areas of the official educational curriculum. For example, some schoolchildren were selected to exchange correspondence in English, thus encouraging the use of this language.

This activity also mainly includes the development of Sustainable Development Goals 4-Quality Education and 17-Partnerships for the goals (although almost all the rest are touched on transversally), through knowledge of the different areas and customs within the Geopark, creating that need to take care of our environment and establishing ties for its conservation.

During the 2023-2024 school year, 325 students from 9 geocenters (the educational centers of the geopark educational project) from 17 of our towns participated. The cycles of Early Childhood, Primary and Secondary Education have been included. In addition, 10 of the participants have been from the ASDIVI geocenter (Regional Association of the Disabled of Las Villuercas), making the activity even more integrative.

The high point was when the couples of participants met in person during the *Geoconvivencia*, the day of celebration of the educational project, at the end of the course. After months of sending letters about their local heritage, as well as other issues, they were able to hug each other and spend a morning together. Geoparks are territories of union, sharing and learning.

Even if it is based on paper and pencil!

GeoDocs – a cultural heritage conservation and educational instrument in the Oeste UNESCO Global Geopark (Portugal)

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The Oeste UNESCO Global Geopark (OUGGp) has a rich tangible and intangible cultural heritage, very vivid in the hearts and activities of the local population. Comprising the municipalities of Bombarral, Cadaval, Caldas da Rainha, Lourinhã, Peniche, and Torres Vedras, this geopark totalizes 1154 km2, in the Portuguese central West Region. Incorporating mostly rural areas, its millennial agricultural activity supplies the country's capital, Lisbon, <100 km to the South, with fresh fruits and vegetables. Other distinctive ancient traditions are associated with fishery, with one of the major national fishing ports located in the OUGGp.

In 2021, the OUGGp produced a long documentary, and five mini documentaries, portraying the people and main traditions of its territory. Such documentaries were produced with the objective to promote the cultural diversity of this UNESCO Global Geopark, but also to preserve its cultural identity, because several local traditions may be lost. The five main cultural topics approached were: I) Agriculture; II) Confectionery; III) Wine and Vineyard; IV) Fishery; V) and Intangible Heritage (with ceramics, embroidering, cutlery, and the Good Kings singing traditions).

The large documentary has a length of 1h25, and approaches all five mentioned themes. On the other hand, the mini documentaries are approximately 15 min long, each one dedicated to a single theme. These "short docs" were produced using the same footage as for the long documentary, but they were created by a different team, resulting in smaller films that are quite different from the long one. This implies that seeing the large documentary doesn't exclude the need to see the smaller ones.

Illustrating the cultural heritage diversity of this territory in smaller documentaries is a lighter way to contact with the diversity of this heritage, on the viewer's free time. All documentaries were made available on the OUGGp's Youtube page http://www.youtube.com/@GeoparqueOeste, free of charge, with subtitles in English.

School teachers from the territory and outside have been using these documentaries in classes, to provide information on the local cultural heritage and ancient ways of living, in a more appealing way. The viewing of these documentaries has triggered the student's interest and led to the development of other related projects. As an example, a school class was so enthusiastic that they decided to make interviews with two of the people portrayed in one of the short documentaries. Through these interviews, they had first-hand contact with local traditions, learning and valuing their heritage. The students filmed the interviews and produced two small videos that are also available on our Youtube page. This interaction between the students and the local activities led to the creation of a small school exhibit, advertising to the entire school community what the students had learned about their local heritage, and created awareness of the cultural legacies of the OUGGp's territory.

keywords: cultural heritage, documentary, educational tool, Portugal

An Interpretation Centre for the Oeste Geopark (Portugal) – concept and contents

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The Oeste Geopark (OUGGp) is located in Central West Portugal, 50 km N of Lisbon, encompassing the municipalities of Bombarral, Cadaval, Caldas da Rainha, Lourinhã, Peniche, and Torres Vedras. This has recently become a UNESCO Global Geopark (UGGp) approved in 27 April 2024. Its geological internationally relevant highlights are the presence of the Toarcian GSSP ("Golden Spike") and an abundant and unique fossil record, particularly of Late Jurassic dinossaurs (with a dozen holotypes) and Cretaceous angiosperms. To welcome and inform the visitors about the Geopark, an Interpretation Centre was implemented at the locality of Bombarral, strategically centered in the territory and easily accessible from all the other municipalities (around 30 min by car), just aside from the main regional highway A8.

The Interpretation Center (CIGO - Centro de Interpretação do Geoparque Oeste) uses the facilities of an inactive Primary school, built in the 1980s, with large entrances, different-sized rooms, and excellent natural light. The main objective of CIGO is to introduce all the visitors, before they depart to explore the territory with a guide or by themselves, to: i) the "UGGp concept" and the Portuguese Geoparks; ii) the biological and geological evolution of the planet; iv) the geological evolution of the OUGGp territory; and iv) the different values and highlights of the OUGGp. The overall structure and contents of CIGO are as follows:

A) Front courtyard. With 1800 m2, it will be transformed into a new green area, with autochthonous living trees, environmentally transforming this space; a green path will be created, displaying some regionally relevant heritage items, such as a dinosaur, a small fishing boat, a human-sized pear or a large ceramic sculpture.

B) Entrance and inside courtyard. With 200 m2, this area displays several panels with information, maps and photos about: i) the UGGp concept; ii) the Portuguese UGGps (including the "aspirings"); and iii) the OUGGp territory. This courtyard has a central open-air space, used as a living "Mesozoic Garden".

C) Mesozoic room. The outer wall displays a 14 m long geological timeline showing the different Eras and Periods, with the main geological and biological events, from the Pre-Cambrian to the Quaternary. The inner room (100 m2) will be used for 200º wide video projections and public presentations. The larger open room (200 m2) addresses the geological evolution of the territory within the framework of the N Atlantic opening and alpine collision; large photos and information about the main geosites, as well as attractive rock samples and fossils (including real bones and egg nests), will illustrate it and call the attention of the visitors.

D) Thematic rooms. Smaller rooms, with around 50 m2 each, will cover different components of the Geopark's scope, namely: i) Biodiversity and Protected Areas; ii) Culture and Tradition; iii) Climate Change; and iv) representation of other UNESCO seals in the territory.

A comprehensive circuit will take all visitors (children and adults) along these different spaces, ending in front of a large mirror reflecting the visitors' image, with the sentence "Here's the future of humankind".

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keywords: Geopark, Schools, Outreach, Exhibitions, Displays

GEOPARK SCHOOLS IN SALPAUSSELKÄ UNESCO GLOBAL GEOPARK, FINLAND

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GEOPARK SCHOOLS IN SALPAUSSELKÄ UNESCO GLOBAL GEOPARK, FINLAND

Salpausselkä UNESCO Global Geopark, located in southern Finland, encompasses six municipalities with some 176,000 inhabitants. The key geological features of the area form an integral part of the daily living environment of the local people. The Geopark aims to educate learners on all levels to appreciate the special features of their local environment and to connect a sustainable way of life to their local identity.

Salpausselkä Geopark runs a geopark educational programme, the main components of which are

1. Geopark early childhood education programme, available for all the kindergartens within the geopark.
2. Outdoor education packages for comprehensive schools, designed for central geosites and aimed at different age groups.
3. Geopark guide training and training of Geopark business partners in collaboration with the regional vocational education and training institution Salpaus Further Education.
4. Geopark educational working group with representatives from each municipality.

In addition, geopark themes have been integrated into project courses for university at LAB University of Applied Sciences, several students have chosen geopark themes as the topic of their Master´s thesis, and many vocational and university students have carried out internships within the geopark organization.

The programme is being continuously developed further by developing each individual component and also by bringing new components into the programme. The latest addition is the Geopark school programme, which is being piloted in 2024. With the Geopark schools, we aim to a) increase the learners´ understanding about the Geopark concept and the geological heritage of the area, b) strengthen local identity and the sense of belonging to a place, c) promote sustainable way of living and d) encourage spending more time in natural surroundings, which enhances connection with nature, as well as physical and mental wellbeing.

The criteria for Geopark schools have been developed based on the criteria of the Early childhood education programme and on the long collaboration with the vocational education and training institution Salpaus Further Education, with Geopark themes developed for especially the fields of nature & environment and tourism. The idea now is to create criteria which suits all kinds of educational institutions, from elementary schools to universities. All educational institutions in the area can apply. At the moment three different schools are participating and testing how the programme works for them. The pilot phase has given promising results.

keywords: education for sustainability, outdoor education, geoeducation, geopark, Finland

Valorization of field educational boards in the Holy Cross Mountains UNESCO Global Geopark (central Poland)

Witold Wesołowski[1, 2], Anna Fijałkowska-Mader[1].
[1]Polish Geological Institute - National Research Institute (PL); [2]Holy Cross Mountains UNESCO Global Geopark (PL).

Educational boards are a crucial element of the infrastructure in every geopark. They are the primary component visible to visitors and play a key role in promoting the area. Most importantly, these boards serve as a tool to familiarize tourists with the issues of the geopark.

Unfortunately, in many geoparks, especially those that have been operating for many years and/or established in areas with previous information infrastructure, there is a problem of diversity and lack of consistency in educational boards.

In order to avoid the information chaos a valorization of the boards should be conduct, which will allow for an assessment of their condition in terms of both quality and content. This analysis should consider, whether the content on the boards is appropriate and comprehensible to visitors.

For this purpose a methodology for the valorization of the field panels within the Holy Cross Mountains Geopark was developed, taking into account its specificity.

The Geopark, located in the western part of the Holy Cross Moutains - the highest part of the Polish highlands, is the area of a very rich geological history, featuring rocks from every geological period from the Cambrian to the Quaternary. Evidence of Caledonian, Hercynian, and Alpine orogenic movements is preserved here. The geopark is rich in various mineralizations, including copper, lead, and iron, and features numerous karst formations. These unique geological attributes were the primary reason this area was certified as a UNESCO Global Geopark in 2021.

The geopark area is also unique in terms of its living nature, with over 70% of the geopark consisting of legally protected areas. Consequently, the information on educational boards is varied and presents a holistic approach to the geopark, encompassing geological, biological, and cultural heritage. Therefore, the valorization aimed to serve as a tool for the Geopark Management Board to assess the current state of the field educational boards' infrastructure, identify ways to improve them, and determine trends to follow in the preparation of educational materials.

During field work, almost 100 educational panels located throughout the geopark were valorized. Factors taken into account included location and access to the panel, readability and clarity of the message, including the language in which the panel was developed, graphic design, format, graphic consistency with other panels, visibility of information about the geopark, whether they were summarized in one language or what is the main board topics. As part of the study, a survey was developed in which panel users (tourists, guides, teachers) rated educational boards in the above-mentioned categories. For the purposes of the survey, 12 types of educational boards were assessed by the respondents.

The valorization results were then summarized, identifying the best-prepared panels and designating those of low quality. This evaluation allows the Geopark Management Board and cooperating institutions, such as the Polish Geological Institute - National Research Institute, to develop significantly improved educational boards that meet the needs of visitors to the Holy Cross Mountains Geopark. This type of valorization may serve as an inspiration for other geoparks and contribute to the discussion on establishing elements of a uniform and common visual identification system within UNESCO Global Geoparks. keywords: education boards, valorization, Holy Cross Moutains, geopark,

Call for school projects in the Armorique UNESCO Global Geopark (France)

Shona GRAVAT--HODAN[1], Jérémie BOURDOULOUS[1].
[1]Armorique UNESCO Global Geopark (FR); [2]Armorique UNESCO Global Geopark (FR).

Since March 2024, the **Armorique Regional Natural Park** has been officially labelled UNESCO Global Geopark. This recognition highlights the exceptional character of Armorican geology.

From the vertical cliffs of the Crozon peninsula to the crests of the Monts d'Arrée, via Brest Harbor, the Aulne valley and the chaos of Huelgoat, there are **500 million years of geological history** which can be observed in **the landscapes and cultural heritage** of the Armorique Geopark.

Armorique Geopark participated on the **Interreg « UNESCO sites across the channel » program** from 2020 to 2023. This project helped to develop some educational materials that we distributed to our partners (Geoparks visitors centres and guides). Those pedagogical materials aim to **discover the Armorican rocks** with observation equipment (magnifying glass, microscope) and different rocks samples. It also aims to **understand the geological history** of our territory with a timeline, an educational booklet and 3 comic book board about geological phenomena.

Geopark Armorique mediators and partners have been able to put these educational tools to good use for the 2023 / 2024 school year with a **call for project** to local elementary schools. As a result, 9 class from 6 to 11 years old benefited a technical and financial support from the Geopark to build a project on the theme**: “Let's listen to the stones speak! What secrets do they reveal?”.**

A total of **160 students** took part in workshops to discover local geology during the year, visit geosites and create projects to pass on the knowledge they had acquired at a **feedback day** on June 14. All these schools were able to meet up at the « Domaine de Menez Meur », one of the Geopark centre, to share their learning and present workshops, games and plays based on geoheritage.

This call for school projects has helped to raise awareness and train these 160 budding geologists, who have become real **geoambassadors**. All summer long, they'll be able to take their families to discover the Armorique UGGp through our geosites, our 3 geopark visitor centres and on our animation program.

keywords: education ; school ; geopark ; call for project

Expanding Horizons: A primary schools programme in the North Pennines Geopark

Naomi Foster[1].
[1]North Pennines National Landscape and UNESCO Global Geopark (GB).

This talk describes a programme for schools run by the North Pennines National Landscape and Geopark team between 2021 and 2024. The Expanding Horizons Project was supported by the National Lottery Heritage Fund and provided a free programme for primary school classes from a short distance outside the Geopark. The programme included a series of trips in the Geopark and local area themed around nature and wellbeing. The presentation will include a brief overview of the programme, particular highlights and successes, and what we have learnt for future projects.

keywords: Education, schools, nature, wellbeing, learning

Reducing the Impact of Outdoor Recreation on Marine Species in Mourne Gullion Strangford UNESCO Global Geopark

Judith Hassard[1], Darren Rice[2].
[1]Mourne Gullion Strangford UNESCO Global Geopark (GB); [2]Mourne Gullion Strangford UNESCO Global Geopark (GB).

REDUCING THE IMPACT OF OUTDOOR RECREATION ON MARINE SPECIES IN MOURNE GULLION STRANGFORD UNESCO GLOBAL GEOPARK

POSTER PRESENTATION

Judith Hassard, AONB & Geopark officer, Mourne Gullion Strangford UNESCO Global Geopark, UK
Darren Rice, AONB & Geopark manager, Mourne Gullion Strangford UNESCO Global Geopark, UK

Keywords: **Wildlife Disturbance, Marine Priority Species, Wildlife Protection, Raising Awareness, Outdoor Education, Community Engagement, Education**

Themes 4. c. Outdoor Education
8.b. Community Engagement

The Mourne Gullion Strangford UGGp is located in the south-east of Northern Ireland, adjacent to the border with the Republic of Ireland. The exceptional geology of the Geopark has led to a remarkable range of natural coastal habitats.

With over 160km of coastline, the Geopark boundary encompasses three Marine Protected Areas (MPA): Murlough Bay MPA, Strangford Lough MPA and Carlingford Lough MPA. These designated sites of regional, national, and international importance contain a range of priority habitats and species, which have been identified as being most threatened and needing conservation action. Strangford Lough, on the eastern coast of the Geopark, is one of the highest-ranking marine environment sites in Europe reflected in its many national and international designations. During the Autumn and Winter, the Geopark coast is home to over 70,000 overwintering wildfowl and wading birds. These birds overwinter on the extensive mudflats to feast on eelgrass, green seaweeds and invertebrates. Strangford Lough attracts up to 80% of the Canadian population of pale bellied Brent geese. Tern species arrive in Summer from the Southern Hemisphere to nest and breed here. The coastline of Mourne Gullion Strangford UGGp is also an important breeding site for harbour (common) seals with grey seals, porpoise and otters also present.

The Geopark has an active management role in all three MPAs, interpreting the marine natural environment and managing marine activities.

The landscape and ecosystems of our Geopark form a ‘Living landscape’. The Mourne Gullion Strangford UGGp, with a growing population of 182, 074 (in 2021) has a long history of its landscape and coast being an important attraction for local, national and international visitors, and as a result the region boasts a range of related tourism and recreation facilities. With the UN Sustainable Development Goals at the core of the Geopark management, our target is to sustainably manage and protect these marine and coastal ecosystems to avoid significant adverse impacts.

SDG14 Life below Water – Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

This poster presentation will describe the community engagement and awareness raising tools used by the Geopark management team to sustainably manage the potential for outdoor recreation user conflict with protected marine species around our coast. Raising awareness to reduce incidences of wildlife disturbance and improving visitor knowledge of the possible issues.

keywords: Wildlife Disturbance, Marine Priority Species, Wildlife Protection, Raising Awareness, Outdoor Education, Community Engagement, Education

4GEON – GEOSCIENCE AS PLAYFUL KNOWLEDGE

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The fundamental mission of geoparks is to create, interpret and share knowledge about their territory, geological phenomena and their connection to the local biota and the lives of local people. Starting in 2022, the 4GEON project is dedicated to promoting the transfer of geoscientific knowledge in geoparks of four continents: the Rio Coco UNESCO Global Geopark (UGGp), the Colca y Volcanes de Andagua UGGp, the Ngorongoro Lengai UGGp, the Bohol Island UGGp and the Barrandien National Geopark, defined by their unique (hi)story, geological and geomorphological phenomena and culture of the local communities. The purpose of the project is to increase the interest and knowledge of local and Indigenous people in local geological phenomena and related natural and cultural heritage and in geological sciences in general. In addition to the members of the participating geoparks, Brazilian students also participated in the project and made useful contributions. As an example, a case study *El chuño as a Possible Geotourism Strategy at a Geopark from Peru* is devoted to an ancient Indigenous method of preserving potatoes in the terrain and climate of the Peruvian altiplano in the Colca y Volcanes de Andagua UGGp. At the annual face-to-face meeting of the project, held in September 2023 in the Czech Republic, participants learned about the Czech approach to interpreting the Earth's heritage, the practice of geoschools, paleontological sites and geotourism products, and shared experiences from other geoparks and protected areas.
Among the first key outputs of the project are the launch of the geoportal, several online workshops and the initial phase of introduction of the Toursman mobile application to the participating geoparks. During the first two years of the project implementation, several other diverse activities were implemented, which are briefly described in the article *Fostering Global Citizenship through Geoeducation Impact in Geoparks: the IGCP Project 4GEON* in Episodes magazine. Online workshops, geoscience education courses and geoscience popularization vehicles such as the "geobus" or "geoboat" are underway. A website, Pinterest and Facebook accounts have been created promoting the project and all the geoparks involved. Non-traditional social media such as Pinterest and Night Café are also used to explain and animate geological and landscape phenomena.
The upcoming in-person project team meeting will be held in Ngorongoro Lengai UGGp, Tanzania in the second half of September 2024. At this meeting, participants will be further briefed on the results and plans for joint activities on the project geoportal and website, use of the aforementioned social media platforms, among other things. Paleoart as an effective tool for increasing public and especially youth interest in geoscience will also be discussed. In addition to the agreement on specific activities, a mutual exchange of geoschools between Barrandien National Geopark and UGGp Ngorongoro Lengai will be initiated, which will lead to the further development of the geoschools concept in the other three participating geoparks.

Acknowledgments
We gratefully acknowledge the team of the International Geoscience Program for their support in the implementation of the IGCP project No. 751 (Four Continents Connected through Playful Geoeducation). We would like to thank for the financial support of the project "Information and Knowledge Management and Cognitive Science in Tourism and the student of FIM UHK Milan Kořínek for creating the schemes.

keywords: geosciences popularization; geopark; geoschool concept; IGCP project; social media

Under Øhavet: Enhancing Environmental Awareness through Hands-On Marine Education in the South Funen Archipelago

Line Bruun Nicolaisen[1].
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UNESCO Global Geopark South Funen Archipelago, in collaboration with the Lejrskoleskibet Fylla and Aarhus University's Department of Biology, proudly presents "Under Øhavet" (Under the Archipelago Sea), an educational initiative addressing the critical issue of hypoxia in marine environments. With the project already underway, we have garnered positive experiences and impactful results, aiming to further integrate this program into local school curricula, engaging 40 classes annually over the next three years.

"Under Øhavet" seeks to empower young people by transforming abstract environmental issues into tangible learning experiences. The program combines theoretical classroom instruction with immersive, hands-on fieldwork aboard the historic schooner Fylla. This approach not only raises awareness about the pressing issues of climate change and biodiversity loss but also inspires students to take actionable steps towards environmental stewardship.

Set within the unique and ecologically significant South Funen Archipelago—an area recognized for its outstanding natural heritage—the program offers students a deep dive into marine biodiversity, the fishing industry, and the multifaceted uses of seaweed. The curriculum culminates in a practical, experiential learning day on Fylla, where students collect and analyze data, directly engaging with the hypoxia issue.

Our experience shows that "Under Øhavet" effectively bridges classroom learning with real-world application, fostering a sense of responsibility and proactive engagement among students. By leveraging the authentic and collaborative environment aboard Fylla, we provide a formative and inspiring educational experience that prepares today's youth to address tomorrow's environmental challenges. Through this initiative, UNESCO Global Geopark South Fyn Archipelago continues to lead in innovative environmental education, contributing to the preservation and restoration of our precious marine ecosystems.

keywords: Youth, education, learning, marine environment, empowerment, environmental awereness

Radio amateurs and promotion of IDRIJA UGGp

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Radio amateurs and promotion of IdrijaUGGp

Bojan Režun, Idrija UGGp, Slovenija *(bojan.rezun@gmail.com)*

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Radio amateurism emerged at the end of the 19th century when people started experimenting with radio waves. The way we know it today at the beginning of the 20th century. There are currently around three million radio amateurs in the world.

Since pioneering times, radio amateurs have been using their knowledge and techniques to help save lives and property in the event of various natural and other disasters, in cooperation with the government services. We forget that when the power goes out, there is often no internet, no WI-FI, no telephony! Radio amateurs are assigned a set of frequencies that allow radio communications all over the world and even with space: for example, with astronaut-radio amateurs on the ISS or via radio satellites. Interesting and technically challenging communications are made by bouncing radio waves off the moon, ionised trails from burnt-out meteorites, and clouds. Telephony is used to communicate with each other via radio stations, Morse telegraphy is still very popular, and modern computers have enabled the development of a whole range of digital modes of communication.. The rapid development of integrated circuits and digitalisation has led to the development of portable radios, and this has led to a boom in amateur radio activity in the outdoors.

We have several programmes that encourage radio amateurs to get active in the outdoors. The purpose of amateur radio is not only to get outdoors and connect with the world but also to educate. What they all have in common is that the radios are set up and transmitted at specific points. These can be hilltops, monuments, protected areas, historical sites, parks, etc. Each programme has a unique set of location codes, each with its description on the corresponding website, which also allows you to add your own data, which is something that Geoparks can use to our advantage. In this way, radio amateurs indirectly inform the public about local places of interest, history, geology, natural values, etc. In this way, radio amateurs also raise the profile of Idrija UGGp among them and arouse interest in learning more about our Geopark, and many people decide to visit us.

The most popular programmes are:

SOTA (Summits on the Air) (https://www.sota.org.uk/)There are 10 such sites in Idrija UGGp.

POTA (Parks on the Air)(https://parksontheair.com/), there are16 POTA sites in Idrija UGGp.

WWFF (World Wide Flora&Fauna and Amateur Radio)(https://wwff.co/directory/), there are currently 7 wwff sites in Idrija UGGp.

Do you know how many of your Geopark's attractions are described in these programmes?

On the POTA website, besides the amateur radio data, there is also a link to the Idrija Geopark website, where site SI-0537 is located. (https://pota.app/#/park/SI-0537)

Radio amateurs are another option, besides modern media forms, that can be used by the UGGp network to gain further visibility in the world.

keywords: Radio amateurs, education,promotion, outdoor activities, netting UGGp

Coastal exploration and awareness

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The area of Trollfjell Geopark consists of 70% water, and more than 13 000 islets and skerries. For thousands of years our coast has been the basis of life for the people here, but it has also taken many lives. Trollfjell Geopark and Outdoor council has taken a role towards the local schools, to help them fulfil the new curriculum demanding outdoor swimming classes. As a continuation to this work, we have established activities where youths are learning to cope with the sea, to play along the coast and to build knowledge about our natural heritage through an activity called coasteering. We are climbing and jumping from cliffs, playing in the tide, and exploring the littoral zone. Through this presentation we hope to inspire, show an example of how to reach the youths, build knowledge about risk reduction work, and help to see creative solutions in a rough landscape.

keywords: teacher courses, summer camps, coasteering, risk analyzis, risk reduction, water activities, youths

My village, my fossil ; an operation to reconnect inhabitants and their geoheritage

Quentin Vautrin[1], Vincent Biot[1].
[1]Causses du Quercy UGG (FR).

There can be a real gap between the palaeontological richness of an area and the way local people perceive it. Raw scientific knowledge can easily appear abstract, complex and, ultimately, of little interest to local people. That's why it's vital to promote our geoheritage through scientific outreach. More than 700 fossil species have been found in the Causses of Quercy, an area internationally well-known by paleontologists. However, the region's inhabitants are largely unaware of the importance of their territory and the geoheritage they encounter on a daily basis, especially since many of the discoveries were made decades ago. Some know that fossils have been discovered, but not really to whom they once belonged.

The Causses du Quercy UNESCO Global geopark has therefore launched the "Mon village-Mon fossile" (My village-My fossil) initiative to raise awareness among local residents about some of the region's geoheritage. As part of this project, which combines art and science, seven statues of prehistoric animals were erected in seven villages in the geopark. These statues were not chosen at random, but represent seven animals named in honor of the village where they were discovered. All the statues are accompanied by explanatory panels, describing the animal, its environment and its period, as well as anecdotes.

This work was carried out with the municipal staff. Throughout the project, they were proud to discover the international scientific renown that these fossil species brought to their commune, and to know that their village had witnessed a scientific discovery.

The statues were placed in strategic locations, such as village squares, parking lots and churches. These animals, once completely unknown and abstract to the townspeople, are now familiar and instantly recognizable figures.

« Mon village, Mon fossile » is a growing project. Other statues are in the pipeline, and as part of the Geopark's tourism strategy, events are regularly organized around them to keep this heritage alive.

keywords: Fossils, toponimy, education, artistic aproach, sculpture

What do we mean by 'science communication' within UNESCO Global Geoparks?

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Given their mission to promote geological heritage and sustainable development, UNESCO Global Geoparks serve as unique and privileged platforms to communicate science and geoscience effectively, especially under contemporary environmental challenges. These territories are deeply committed to communicating science, and nowadays, reference institutions at the forefront of geoscience communication worldwide. Nevertheless, the formalization of science communication as a practice and research field still needs to be improved in these contexts. One of the consequences is the current ambiguity and need for clarity surrounding the definition and scope of science communication within Geoparks.

To answer the question of what 'science communication' really means within the scope of UNESCO Global Geoparks, a conceptual analysis was conducted through a comprehensive literature review, focusing on both the terminology and the main strategies.

The detailed analysis revealed a wide range of terms, such as popularization, dissemination, interpretation, or public education, among others, with 'science communication' being a less prevalent term. Despite appearing synonymous, these terms have different meanings and reflect different approaches and communication paradigms. From a conceptual point of view, a significant inconsistency was observed in the adopted terminology, with terms often used interchangeably, characterized by an almost arbitrary usage, and needing more formal and rigorous definitions. The diversity of terms may be seen as simply a matter of semantics, but, in fact, it reflects a need for more formalization and a gap between science communication research and practice in Geoparks.

Regarding the practice analysis, the data were gathered and framed within broader categories representing the central science communication paradigms: dissemination, dialogue, and participation models.

The intersection of these two perspectives resulted in an analytical framework that revealed a diverse landscape of science communication, showcasing a broad spectrum of approaches, even if the theoretical positioning behind it is only sometimes precise or consistent. At the same time, the prevalence of one-way approaches primarily focused on translating and disseminating knowledge is observed despite the aim of mobilizing the public for action.

Geoparks acknowledge the importance of promoting dialogue and participation beyond mere transference of factual information. However, dialogical and participatory strategies still seem to be limited, demonstrating a strong attachment to conventional educational approaches.

The literature has shown that higher levels of scientific literacy are not directly correlated with increased awareness and engagement with science. Geoparks, like other science communication contexts, should rethink their strategies to promote more effective public engagement with science. It should be underscored that Geoparks are territories, by definition, committed to public engagement, participatory approaches, and community empowerment with the unique opportunity to make a difference in tackling Earth's environmental challenges.

This research seeks to enhance the formalization and laying the groundwork of science communication in the context of Geoparks, providing a solid foundation for future research.

keywords: science communication, public engagement, UNESCO Global Geoparks

Bridging Heritage and Sustainability: Collaborative Pathways for Long-Term Development in the Bükk Region UNESCO GlobalGeopark

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In recent decades, geoparks have developed rapidly as tools for promoting geological heritage and education. From their conception, geoparks are intended to be a tool to stimulate cultural heritage preservation of their territories and to strengthen their community's socio-economic state. While natural and cultural value preservation and their possible valorization through geotourism in geoparks have been extensively researched, the question of how the geopark concept can be a valuable tool in sustainable development is less researched. This dissertation explores how stakeholders' perceptions can be incorporated into the sustainable development of geoparks.

This presentation focuses on the Bükk Region UNESCO Global Geopark and investigates long-term sustainable regional development strategies through the integration of local expertise and community perspectives. A focus group study was conducted with key stakeholders, including representatives from the local universities, tourism experts, environmental organizations, and geopark management, to identify potential synergies and collaborative opportunities. Additionally, the strategic plan of the geopark was analysed in conjunction with insights gathered from the focus group discussions. The findings emphasize the importance of aligning the geopark's strategic objectives with local community needs and aspirations, thereby fostering a more resilient and inclusive approach to regional development. By highlighting the connections between local partners and geopark management, this research offers practical recommendations for enhancing the role of geoparks in achieving sustainable development goals at the regional level.

keywords: sustainable regional development, focus groups, stakeholder engagement

Workshop on Geosystem Services Assessment and the DPSIR Framework: Hands-on Insights from European Geoparks

Marco Giardino[1,2], Rasool Bux Khoso [1,2], Sophie Justice[3,4], Michele Guerini[1,5], Arianna Negri[1], Elena Storta[1], Michele Zanelli[2].
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Proposal for EGN2024 Workshop

Workshop on Geosystem Services Assessment and the DPSIR Framework: Hands-on Insights from European Geoparks

Abstract: This hands-on workshop aims to provide participants with practical insights into the application of the Drivers-Pressures-State-Impact-Response (DPSIR) framework for assessing geosystem services within European Geoparks. Drawing from case studies in Chablais UNESCO Global Geopark (France) and Sesia Val Grande UNESCO Global Geopark (Italy), the workshop will offer an interactive experience that includes a project presentation, collaborative activities, and an engaging Q&A session.

Objectives:

1. To demonstrate the application of the DPSIR framework in evaluating geosystem services.
2. To share findings and methodologies from recent studies conducted in European Geoparks.
3. To engage participants in hands-on activities that illustrate the practical aspects of geosystem services assessment.
4. To foster discussions on the challenges and solutions related to managing geodiversity and geosystem services.

Workshop Agenda:

1. Introduction (5 minutes)
   - o Welcome and introduction to the workshop.
   - o Brief overview of the European Geoparks Network and the significance of geosystem services.
2. Project Presentation (10 minutes)
   - o Presentation of the project findings from Chablais and Sesia Val Grande UNESCO Global Geoparks.
   - o Explanation of the DPSIR framework and its relevance to geosystem services assessment.
   - o Discussion of the key human and natural drivers impacting geosystem services in the studied regions.
3. Hands-on Activity (10 minutes)
   - o Interactive session where participants work in small groups to apply the DPSIR framework to a hypothetical geosystem scenario.
   - o Each group will identify drivers, pressures, state changes, impacts, and potential responses related to the scenario.
   - o Groups will present their findings and discuss their approaches with the larger audience.
4. Q&A Session (5 minutes)
   - o Open floor for participants to ask questions, share experiences, and discuss the presented methodologies and findings.
   - o Facilitated discussion on best practices and innovative strategies for managing geosystem services in Geoparks.

Materials Needed:

- Flip charts and markers for group activities.
- Handouts summarizing the DPSIR framework and key concepts.
- Projector and screen for the presentation.

Expected Outcomes:

- Enhanced understanding of the DPSIR framework and its application in geosystem services assessment.

- Practical experience in identifying and analyzing the impacts of human and natural drivers on geodiversity.
- Constructive dialogue on effective management strategies for preserving geosystem services in Geoparks.
- Networking opportunities and knowledge exchange among participants interested in geodiversity and environmental management.

Target Audience: Geopark managers, environmental scientists, policymakers, educators, and other stakeholders interested in geodiversity, geosystem services, and sustainable development within Geoparks.

Workshop Facilitators:

- Lead Researcher: Marco Giardino
- Co-Researcher: Sophie Justice, Rasool Bux Khoso, Arianna Negri, Michele Guerini, Elena Storta
- Moderator: Marco Giardino

We look forward to an engaging and productive workshop that will not only enhance our collective understanding of geosystem services but also empower participants with practical tools and strategies for effective environmental management.

For further information, please contact: rasoolbux.khoso@unito.it; marco.giardino@unito.it;

keywords: Geodiversity, Geosystem Services; DPSIR Framework; European Geoparks; Sustainable Development Goals

The Portuguese Language as a tool for international cooperation among UNESCO Global Geoparks

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UNESCO Global Geoparks (UGGp) are territories of international geological importance that promote conservation, education and sustainable development through a network established around the world (Global Geoparks Network - GGN). Although there is no single official language spoken between all UGGp, English is often used as a *lingua franca* to facilitate communication and international co-operation between members of the network. However, inequality in English proficiency creates some obstacles to this endeavor.

Portuguese is the official language of nine countries around the world, including some in Europe (Portugal), South America (Brazil), Africa (Angola, Cape Verde, Guinea-Bissau, Mozambique, Equatorial Guinea and São Tomé and Príncipe) and Asia (East Timor), being the fifth most spoken language in the world, according to Ethnologue in 2021. These countries are part of the Community of Portuguese Speaking Countries (CPLP), an international organisation dedicated to cooperation and promotion of the Portuguese language.

There are currently 12 UGGp whose native language is Portuguese, six of which are in Portugal (Arouca, Azores, Estrela, Naturtejo, Oeste and Terras de Cavaleiros) and six in Brazil (Araripe, Caçapava, Quarta Colónia, Seridó, Southern Canyons Pathways and Uberaba).

Recognising the ease of communication created by the use of the Portuguese language in these countries, the 1st Forum of Portuguese-Speaking UNESCO Global Geoparks was held from the 25th to 28th June 2024 in the Seridó UNESCO Global Geopark. This event was highly sponsored by the Government of the State of Rio Grande do Norte and was attended by the 12 geoparks mentioned. In this context, it was possible to discuss common strategies in terms of geoconservation, geoeducation and geotourism and the challenges that both face in their territories.

There is a long tradition among the Portuguese-speaking UGGps of supporting with information, and welcoming inspection visits of authorities coming from CPLP. During the event, it was announced that the second edition of the Portuguese-speaking UNESCO Global Geoparks Forum will take place in 2026 in the territory of the Arouca UGGp (Portugal). It is intended that this second meeting will be attended by other territories of the CPLP where there are no UGGp, making the common Portuguese language a stimulus for participation and networking, as well as for the support of aspiring geoparks in CPLP and appearance of new Geopark projects in countries such as Angola, Cape Verde, Guinea-Bissau, Mozambique, Equatorial Guinea, São Tomé and Príncipe and East Timor.

keywords: UNESCO Global Geoparks, Portuguese language, Networking

UNESCO designated territories: dialogue between the Portuguese Geoparks and Biosphere Reserves

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The existence of territories classified by UNESCO, in particular Biosphere Reserves and Geoparks, is an important asset for the implementation of strategies that contribute to the balance between the preservation of heritage values and the sustainable development of their communities. In Portugal, eighteen territories are currently recognized with these designations, recognising their value in terms of natural and cultural heritage. Twelve Biosphere Reserves are currently classified (six of them islands and three cross-border): Boquilobo, Corvo, Graciosa, Flores, Gerês-Xurés, Berlengas-Peniche, Santana, Meseta Ibérica, Fajãs de S. Jorge, Tejo/Tajo Internacional, Castro Verde and Porto Santo. As for the UNESCO Global Geoparks, there are six classified territories, namely: Naturtejo, Arouca, Azores (archipelago), Terras de Cavaleiros, Estrela and Oeste. The Estrela and Arrábida Reserves are in the process of becoming a Biosphere Reserve and the Litoral Viana do Castelo and Algarvensis are aspiring Geoparks working on their application processes, which demonstrates the importance that the territories and their communities give to these classifications.

Sharing common values and, in many cases, a territorial area, Biosphere Reserves and Geoparks have, in recent years, focused their efforts on working more closely together, which is fruitful for both designations, fostering a more constructive dialogue and setting challenges for the future. An example of this is the inclusion of observer members on both the National MAB Committee and the Portuguese Geoparks Committee, since 2022. At the same time, a joint meeting between these organisations has been organised in recent months, has been held in recent months, which took place in June of 2024, in the territory of the Estrela UNESCO Global Geopark. As a result of this meeting, it was agreed to strengthen networking in two key areas: 1 - Joint communication in specific situations that contribute to increase the importance of the territories; 2 - Climate Action, extending the project "Biennium for Climate Action in Portuguese Geoparks" for the period 2025-2030 with specific actions defined together with the Biosphere Reserves.

Through this networking, the Portuguese Global Geoparks and Biosphere Reserves are aligned with the values promoted by UNESCO itself, fostering synergies between these designations aiming for the promotion and sustainable development of their communities.

keywords: UNESCO territories, Geoparks, Biosphere Reserves, Networking

Workshop for existing and aspiring Transnational UNESCO Global Geoparks: connecting countries and sharing stories

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Workshop for existing and aspiring Transnational UNESCO Global Geoparks: connecting countries and sharing stories

The Transnational UNESCO Global Geopark Working Group (TNUGGWG) was established in 2019 by the existing Transnational UNESCO Global Geoparks (TNUGG) within the Global Geoparks Network.

There are currently five TNUGGs:

- Cuilcagh Lakelands UNESCO Global Geoparks (CLUGG) in Ireland and the UK
- Karawanken / Karavanke UNESCO Global Geopark (KKUGG) in Austria and Slovenia
- Muskauer Faltenbogen / Luk Mużakowa UNESCO Global Geopark (MLUGG) in Germany and Poland
- Novohrad-Nógrád UNESCO Global Geopark (NNUGG) in Hungary and Slovakia
- Schelde Delta UNESCO Global Geopark in Belgium and the Netherlands

Each recognises that TNUGGs share a unique set of opportunities and challenges, and that by establishing a Working Group, it has enabled them to exchange information and knowledge on their shared experiences and provide a forum for others who may wish to embark on the journey to become a TNUGG.

The TNUGGWG is therefore hosting a workshop for aspiring TNUGGs and / or areas who are considering becoming a TNUGG, or simply for those that want to find out more about how TNUGGs operate. The workshop will deliver short presentations from all five of the existing TNUGGs where they will share their experiences of becoming and being a TNUGG as well as examples of good (and sometimes bad) practice that they have witnessed. It will also provide information on the TNUGGWG including how it functions and how to get involved. In addition, there will be an active panel discussion to allow participants to engage with the presenters, and others in the audience, who have experience in this area.

The TNUGGWG would particularly encourage those that are considering developing a TNUGG to attend but welcome all participants.

To find out more, please contact the Co-Chairs of the TNUGGWG Nancy Sauer (n.sauer@muskauer-faltenbogen.de) and Kirstin Lemon (klem@bgs.ac.uk).

keywords: Transnational, cross-border, partnership, collaboration

Zero-Emission Boats for UNESCO Landscapes

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Pioneering Sustainable Tourism,

Zero-Emission Boats for UNESCO Landscapes

ABSTRACT

This project aims to transition tourist transportation in Iceland's Vatnajökull National Park and Norway's Sunnhordland Geopark to zero-emission boats, aligning with NORA's (Nordic Atlantic Cooperation) sustainability goals for the North Atlantic.

Traditional fuel-powered boats pose a threat to these fragile ecosystems, and the project seeks to evaluate and implement sustainable alternatives like hydrogen fuel cells and battery-powered electric boats. By fostering collaboration and knowledge exchange between the two UNESCO-certified sites, the project aims to create a unified approach to sustainable tourism.

The project involves a comprehensive assessment of zero-emission technologies, addressing factors such as harsh weather conditions and operational range requirements. Key stakeholders, including boat operators, will be engaged to ensure their needs are met and to facilitate a smooth transition to eco-friendly solutions. Modernizing contracts with boat operators to include sustainability principles is also a critical component.

Expected long-term outcomes include reduced air and water pollution, enhanced ecosystem health, and strengthened reputations for sustainable tourism. The project aims to serve as a global model for collaborative sustainable tourism practices, with knowledge sharing to accelerate adoption worldwide. Additionally, the project will inform investment decisions and technological advancements tailored for cold-water environments.

The project aligns with several UN Sustainable Development Goals (SDGs) and the Nordic Council of Ministers' Vision 2030, contributing to clean water and sanitation, industry innovation, sustainable communities, responsible consumption, climate action, and life below water. It exemplifies successful international collaboration and sets the stage for future sustainable tourism initiatives in the North Atlantic and beyond.

keywords: zero-emission, boats,

"Contribution of the Vikos-Aoos UNESCO Global Geopark to the 2030 Agenda for Sustainable Development"

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17th EUROPEAN GEOPARKS CONFERENCE – REYKJANES GEOPARK OCTOBER 2024

Vikos-Aoos UNESCO Global Geopark, GREECE

Oral Presentation

Title: "*Contribution of the Vikos-Aoos UNESCO Global Geopark to the 2030 Agenda for Sustainable Development*"

Dr Georgia Kitsaki[1]

& Dr Haritakis Papaioannou

Sustainable development addresses a range of social, economic, and environmental challenges that require action from governments, organizations, and citizens. The concept was first defined in 1987 by the Brundtland Report as development that meets current needs without compromising future generations' ability to meet their own needs. This definition has remained central to forming programs and policies globally and is frequently referenced in academic and political discussions.

The United Nations (UN) has been pivotal in promoting sustainable development through key initiatives like the 1992 Rio de Janeiro Earth Summit, which introduced Agenda 21, and the 2000 Millennium Development Goals (MDGs), both of which set significant precedents in organizing global efforts around clear goals and actions. UNESCO has also played a significant role in advancing sustainable development through various programs such as the Man and Biosphere (MaB) Program and the UNESCO Global Geoparks Program (UGGp).

The most recent and comprehensive effort is the 2030 Agenda for Sustainable Development, adopted in 2016, which outlines 17 Sustainable Development Goals (SDGs) and 169 specific targets. These goals aim to promote human and planetary well-being through international cooperation and solidarity, integrating them into governmental policies and other stakeholders' actions.

Greece has committed to sustainable development through the adoption and implementation of the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs). A coordinated national effort involves multiple ministries, social partners, and other stakeholders under the guidance of the General Secretariat of the Government (GSG). Greece has identified eight national priorities to localize the SDGs.

In alignment with these national priorities, the Vikos-Aoos UNESCO Global Geopark exemplifies local efforts to promote sustainability. The geopark integrates numerous SDGs into its operations, reflecting Greece's holistic approach. Key contributions include:

Environmental Conservation and Management: The geopark emphasizes the protection of natural resources and biodiversity.

Educational Initiatives: By offering educational programs and promoting environmental awareness. These initiatives aim to foster a deeper understanding of sustainability among visitors and local communities.

Economic Development: The geopark's activities stimulate local economies through eco-tourism, providing employment opportunities and promoting sustainable economic growth.

Cultural Preservation: The geopark helps preserve cultural heritage, which is integral to the local identity and community well-being.

Community Involvement and Partnerships: By fostering partnerships with local communities, governmental bodies, and international organizations, the geopark strengthens participatory governance and collaboration.

The Vikos-Aoos UNESCO Global Geopark's efforts illustrate how localized actions can effectively contribute to national and global sustainability objectives. By aligning with Greece's national priorities, the geopark not only promotes environmental conservation and economic development but also enhances social cohesion and cultural heritage preservation, embodying the principles of sustainable development.

keywords: sustainable development goals

The Geosystem Services in the piedmont sector of the Sesia Val Grande UGGp: opportunities for a sustainable development

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The UNESCO Global Geoparks (UGGps) are territories rich in geodiversity and geoheritage of international significance, with the crucial role of preserving the geological heritage, promoting education and supporting the local sustainable development. In order to reach these goals, many strategies have been developed, but a pioneering approach is under investigation: the integration of geosystem services (GS) within the management and development of UGGps.

The aim of this presentation is to illustrate a preliminary study on how to map the geosystem services in the piedmountain area of Boca and how these GS can be integrated within the Sesia Val Grande UGGp management policies, leading to the long-term viability and success of the UGGp, offering also a model for the sustainable development and the reaching of the SDGs in other UGGps worldwide.

Geosystem services encompasses the benefits derived from the local geodiversity, and their evaluation implements strategies that promote sustainable tourism, education and safeguard the geological heritage of the territory. This can be translated into development of balanced policies that contribute to the reaching of the SDGs.

The territory of the Sesia Val Grande UGGp (SVUGGp) shows different landscapes and environments, from the highest peaks of the Piemonte region to the Lake Maggiore, including a piedmont sector: the area of Boca. This area is the perfect territory on which apply the approach of geosystem services, due to the high geological heritage and the cultural landscapes that derives from it.

Mapping has been a crucial tool for better identifying the geosystem services provided by SVUGGp. The mapping process has been planned realised through many phases: from remote sensing to field surveys, after a literature review approach. Then, a final graphical representation on a GIS environment is necessary, as it provides a visual representation of the areas where major conservation efforts should be concentrated.

keywords: Sustainability; Geopark; Geoheritage; Geodiversity

HealthyForestRegions: Supporting Heatlhy forest ecosystems for human wel-beeing in forest regions

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Topic: Geo Future and SDG's

Title: HealthyForestRegions: Supporting Heatlhy forest ecosystems for human wel-beeing in forest regions

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Request for an oral presentation

The Interreg project HealtyForestRegions (HFR) aims to address the challenges related to the functionality of forest ecosystems due to climate change, biodiversity loss or unsustainable forest management practices in Central European countries (Austria, Slovakia, Slovenia, Croatia). The project partnership consists of nine partner organizations in six countries including: two universities (University for Sustainable Development Eberswalde and Check University of Life Sciences Prag), two municipalities (Argemuende city administration and municipality of Kocevje), two(national) public authorities in the field of forest management (National Forest Center and and Slovenian Forest Service, one national public authority with focus on nature protection (Public Institutuin Paklenica Naional Park) one local NGO (MASiF), sectoral agency dealing with nature conservation and regional development (NUP).

Forestry as an economic branch on one side and recreational functions of forests on the other play an important role in the regional value chain in many rural areas in Europe. Due to climate change, the resulting calamities and the increasing uncertainty in the economic viability of the forestry sector, forest owners must look for other sources of income from their forests in addition to the sale of timber. Forest managers and owners face high costs for forest management thus the preservation of efficient forests ecosystems is crucial.

This project through the second work package: "Reimbursement systems for forest ecosystem services – exploring and implementing new opportunities" is intended to establish further ecosystem services in the forests and thus create additional sources of income in the regions and continue to ensure the well-being of those seeking recreation.

The main planned activities are:

- Mapping and assessing the current state of forest based ES
- Development of alternative forest management action plans for the target regions
- Exploration of potential markets for forest based ES and development and test implementation of PES schemes.

The overall project's objective is to engage policy makers and key stakeholders in Healthy Forest Regions (HFR) to improve the functionality of the forest ecosystems, secure biodiversity and ecosystem services (ES) for human well-being and strengthen sustainable regional development. Therefore, the project will operationalize the potential of monetizing forest ES for local and regional benefits and develop solutions for a transition to ecosystem-based forest management.

Key words: Austria, healthy forest, ecosystem services, carbon storage, forest management

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keywords: Austria, healthy forest, ecosystem services, carbon storage, forest management

"WE REDUCE EMISSIONS IN THE LAND OF EXTINCT VOLCANOES UNESCO Global Geopark" - ONE PROJECT - DIFFERENT ACTIONS - DIFFERENT SDGs (SDG 13 and 3, 4, 11, 12)

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"WE REDUCE EMISSIONS IN THE LAND OF EXTINCT VOLCANOES UNESCO Global Geopark" - ONE PROJECT - DIFFERENT ACTIONS - DIFFERENT SDGs (SDG 13 and 3, 4, 11, 12).

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Land of Extinct Volcanoes UNESCO Global Geopark

Abstract:

According to The Sustainable Development Report 2024, Poland has achieved a stagnant/lightly increasing result in the achievement of SDG 13 (Climate Action), but is still below 50% of the required level. Per capita in the country, 11 tonnes of greenhouse gases are expelled into the atmosphere by the economy each year (the EU average is 9 tonnes). More than 40 per cent of households are not connected to the district heating network. Most of them use coal. Heating buildings accounts for about 38 per cent of Poland's greenhouse gas emissions. One of the priorities for Poland in the implementation of SDG 11 (Sustainable cities and communities) is ‘Improving air quality by reducing low emissions especially from individual central heating stations and road transport’.

Hence the idea for the project ‘We reduce emissions in the Land of Extinct Volcanoes Geopark’. The problem is serious, which is why all Geopark residents have become beneficiaries of the proposed activities.

For adults, an ‘Open Door Day at the Land of Extinct Volcanoes Geopark’ was organised, i.e. visits to farms that have switched to low-carbon heat and energy production. We wanted everyone to be able to see, ask and see for themselves how green energy sources work. SDG 12 - ‘Responsible consumption and production’.

For school children, the action ‘Students versus smog’ - learning about smog - its causes and health effects in the form of free activities in schools. More than 900 children from 16 schools took part in the whole event. Each school was given a sensor to measure air quality. Today we can read the current measurements at any time. The conclusion of the school activities was a workshop entitled. ‘Climate laboratory’ - what the climate is and how it changes, and ‘Monitoring air quality’. - SDGs 3 and 4: ‘Good Health and Well Being’, ‘ Quality Education’.

A series of lectures, meetings with specialists, during which we tried to address important aspects related to air protection, hydrological and hydrogeological drought and climate change in the broadest sense. SDG 12 - ‘Responsible consumption and production’.

Keywords: sustainable development, climate change, air protection, geopark, local action.

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keywords: sustainable development, climate change, air protection, geopark, local action

Governance models in UNESCO Global Geoparks - inter-municipal networks as good practice

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The Oeste UNESCO Global Geopark (OesteUGGp) was recognised in March 2024 as a UNESCO Global Geopark, integrating the Global Geoparks Network, the European Geoparks Network, the Portuguese Geoparks Network, but also a wide range of networked projects in consortia with one or more other entities, including the UNESCO Forum of Global Geoparks in Portuguese.

In a region of 12 municipalities, 6 are part of the Geopark. Soon there will be the opportunity for this territory to increase to 8. Taking into account the factor of increased territory, it becomes essential to have a broad debate on the management model and methodology, based on this local reality, and that the governance model to be applied could be replicated in other UNESCO Global Geoparks.

Based on this regional reality, we can say that the Oeste UGGp is a Functional Intermunicipal Network, formally constituted with a specific and common thematic objective (Feiock 2007 & McGuire 2006), it would be relevant to propose a model of local governance applied to the relationship in which these municipalities are involved on a daily basis with the sole aim of developing Geoeducation, Geoconservation and Geotourism activities, for the systemic development of this UNESCO territory in a holistic and unique way, maximising the combination of the various resources that each of the municipalities looks after.

Thus, on the basis of the White Paper and the European Constitution, Ramos (2016) develops a proposal for proposed governance principles that combine criteria from both documents, namely :openness and transparency, participatory democracy, accountability, effectiveness and coherence as the pillars.

According to the application of governance principles, this association should prioritise good practices and rules that enable efficient and effective administration. If there is a procedure, it will be easier for technicians and politiciansto be in control, not just officials, but to increase public participation rates, , so that there is a greater distribution of shared responsibility in setting objectives and meeting targets.

It´s considered that Oeste UGGp, as an entity that brings together a strategic and integrated perspective for the Oeste region, needs to be recognised as a formal inter-municipal network and therefore an organic restructuring would be essential to ensure unequivocal recognition by local communities in terms of the efficiency and effectiveness of actions, but also to guarantee the administrative, legal and financial stability that local authorities need to continue supporting and including this UNESCO Global Geopark at the heart of policies to promote, disseminate and enhance their natural and cultural heritage.

keywords: Networking, Accountability, Participatory Democracy

The importance of moth network in a UNESCO Global Geopark - Case study Oeste UNESCO Global Geopark

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The Oeste UNESCO Global Geopark (Oeste UGGp) is located in Central West Portugal, 50 km North of Lisbon, encompassing the municipalities of Bombarral, Cadaval, Caldas da Rainha, Lourinhã, Peniche, and Torres Vedras. Its geological internationally relevant highlights are the presence of the Toarcian GSSP ("Golden Spike") and an abundant and unique fossil record, particularly of Late Jurassic dinosaurs (with a dozen holotypes) and Cretaceous angiosperms. There are 4 protected areas, which represented 7% of all Oeste UGGp territory.

Having the citizen science platform - " Biodiversity4all ", asa source, we can affirm that it's possible to observe in this territory more than 4400 different species, both fauna and flora.

Since 2022, the Oeste UGGp team has worked together with the Portuguese Moth Monitoring Network (REBN), in order to create a regional moth monitoring network. Since then, several sampling stations have been created, and complemented with workshops, aimed at schools and the general public.

Around 2,775 species of Lepidoptera (butterflies and moths) have been confirmed, so far, for mainland Portugal, being 2,616 moths. Their presence and abundance in the ecosystems assures a natural balance, as moths are a crucial food source for many other species. Moths also play an important role in agriculture and forestry, where they can have an important impact both as pests and pollinators,

The creation of a regional moth monitoring network has several benefits : a)raise awarness on this fascinating and diverse group of insects ; b) collect data on moth distribution at a regional level ; C) detecting new species that can potential represent a risk of pests in agriculture and forestry ; d) Collect data to support impacts of climate change at a regional level.

All moth data will be integrated in the Portuguese Moth Monitoring Scheme database which, in turn, is shared with the European Butterfly Monitoring Scheme (eBMS). This approach will allow to compare ecosystems between countries and UNESCO Global Geoparks.

The Oeste UGGp as created the first regional moth monitoring scheme in Portugal, the Geoparque Oeste Regional Moth Monitoring. Currently there are 7 moth sampling stations operating inside the Oeste UGGp area, where more than 100 sessions have been held, since 2022, reaching more than 500 people. These stations are run with the support of a local lepidopterist and volunteer citizens that, inspired by the project, created their own moth stations inside the Oeste UGGp territory. This citizen contribution, is a key point on assuring project sustainability. The project also has the valuable partnership of the municipalities that constitute the Oeste UGGp, the DGAV - National Directorate of Food and Veterinary, the INIAV - National Institute for Agricultural and Veterinary Research, I.P., and the ICNF - Institute for Nature and Forest Conservation.

The creation of a coordinated moth monitoring scheme in a UNESCO Global Geopark holds several benefits, namely by creating awareness on biodiversity, conservation and boosting the sustainable development of the region. The integration of such a network aligns perfectly with the objectives of a geopark, which include the protection of natural and cultural heritage and the promotion of sustainable economic development.

keywords: Moth, Networks, Biodiversity

Youth engagement in the EGN

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Youth Engagement in the European Geopark Network

Geoparks have existed for more than two decades and need to adapt continuously to new generations.

In 2021 the UNESCO Global Geoparks Youth Forum was created, in order to "offer to young people an opportunity to get engaged more concretely in the philosophy, mandate and activities of the UNESCO Global Geoparks" (GGN, 2021). Based on this initiative, the European Geoparks Network (EGN) Coordination Committee (CC), in September 2022, established the Youth Initiative Temporary Working Group, with the task to offer a local, national and European/international perspective, tools and strategies for youth involvement in geoparks.

In September 2024 the EGN CC voted for the Youth Involvement Strategy.

The Youth Involvement Strategy is designed to help geoparks actively engage and empower young individuals in various aspects of community development, decision-making and social initiatives. The strategy focuses on offering concrete information and guidance for geoparks to foster collaboration between youth, staff and key stakeholders, ensuring their voices are heard and valued.

The document was developed inside the Youth Initiative Temporary Working Group between 2022 and 2024, after many discussions, interviews and consultations with the European geoparks representatives and the members of the UNESCO Global Geoparks Youth Forum.

The document refers only to the European Geoparks Network as a regional part of the Global Geoparks Network, but could serve as a model for other regional geoparks networks and also other UNESCO designations.

It is of outstanding importance to emphasise the bottom-up approach that the youth involvement should have, in line with the Geoparks' concept. The focus of all efforts should be primarily on local, community, youth involvement. The representation of local youth in national and regional Youth Forums should be only secondary and dedicated also to the support of local involvement in the geoparks' territories.

The discussion focuses on the

1. Challenges inherent to youth involvement
2. Synergies with other UNESCO designations and initiatives
3. Next steps in youth inclusion in European UNESCO Global Geoparks

keywords: youth, community, strategy

LIFE4FIR: protecting the critically endangered fir Abies nebrodensis endemic to the Madonie Unesco Global Geopark

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Abstract
The “Madonie Unesco Global Geopark” is located in central-northern Sicily and includes 22 municipalities in the province of Palermo with a surface area of approximately 1600 km^2. The Madonie Natural Park which is included inside, extends along a strip between the Tyrrhenian Sea to the north, the Imera river to the west, the Pollina river to the east and the centers of Sclafani Bagni, Caltavuturo, Polizzi Generosa, Castellana Sicula and the Petralie South.
One of the most important item of interest of the Madonie Geopark is *Abies nebrodensis* (Lojac.) Mattei, an endemic fir species. The current population is limited to 30 relic adult trees and few hundreds of juveniles of natural regeneration, living in an 84-ha area on quartz arenite sandstone. The species is included in the IUCN Red List of Threatened Species as “Critically Endangered”. The main threats affecting *A. nebrodensis* are: i) genetic erosion and fragmentation, ii) self-fertilization, iii) habitat degradation, iv) grazing and trampling of seedlings by introduced herbivores; v) the risk of genetic pollution exerted by non-native firs co-occurring in its natural range. Climate change, in terms of extreme events may directly affect the species survival.

The LIFE4FIR (Life18 Nat/It/000164) project has been aimed at countering the main threats affecting *A. nebrodensis* and improving its conservation status through the implementation of *in situ* and *ex situ* protection measures.
Results of the implemented in situ measures are: a) new fence system has been installed to protect the relic population from wild herbivores and anthropic pressure; b) videosurveillance system has been launched as deterrent and supervision; c) biotic and abiotic stress to the trees have been monitored though inspections, samplings and multispectral surveys (by drone); d) plantlets of the natural regeneration have been detected and mapped; f) to increase genetic variability, genetic rescue was carried out and more than 5000 selected seedlings were obtained through controlled crosses and were used to create 10 new plots and support re-diffusion of the species.
The project also implemented ex situ conservation measures through: a) a seedbank and cryobank have been launched in the local Museum of *Abies nebrodensis* for the conservation of seeds, pollen, embryos and embryogenic callus lines; b) a clonal orchard has been established in the local forest nursery.
As a tool of the EU environmental policy, Life4fir implemented actions for dissemination and replication. Social media, open days, guided tours and fairs were aimed at raising awareness on environment and biodiversity among local communities and general public. Workshops, replication and training events were intended for the scientific community, stakeholders, managers of protected areas, institutions, to promote the solutions and the best practices for the safeguard of other endangered tree species.

Keywords: endangered species, Mediterranean fir; cryobank; seed bank; reforestation; Climate change.

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SDGs as tool for strategic planning, management and communication

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In September 2015, the United Nations have implemented the Agenda 2030 for Sustainable Development, defined by 17 Sustainable Development Goals (SDGs). With regard to social, economic and ecological sustainability, the Agenda is aimed at ending poverty, hunger and inequality and opening the way for environmentally-friendly progress within the planetary boundaries. As the United Nations have committed themselves to implement these goals by 2030, the SDGs need to be filled with life from the international level down to the smallest community and its inhabitants.

Considering the SDGs´ content and objectives, it becomes obvious, that UNESCO Global Geoparks have a broad potential to support, communicate and integrate the goals into their holistic and interdisciplinary approach. Furthermore, through the bottom-up approach, they stay in the direct connection to their inhabitants and regional network partners by developing and conducting a wide range of projects, which support the SDGs.

Combining these fortunate conditions, UNESCO Global Geoparks can integrate the SDGs as tool for strategic planning, management and communication. Bergstrasse-Odenwald UNESCO Global Geopark took this potential and continuously developed communication, projects & strategies from 2016 onwards towards the SDGs.

On the strategic level, this includes the integration of the Agenda 2030 into the Management Plan with respect to the core tasks, leading projects and visions of the Geopark. The connection between the SDGs and the Geopark´s projects is highlighted in each General Assembly by presenting the successfully developed projects and their contribution to the respective SDGs.

High visibility is given by integrating the SDGs into the communication tools (e.g. Geopark Magazine, SDG postcards, brochure & map, SDG platform on the website), education tools (e.g. SDG Ranger booth, SDG Happy Wheel) and infrastructure (e.g. thematic Geopark panels referring to the SDGs, SDG panels for member communities).

Since 2018, intense international networking takes place in context to the EGN and GGN SDG Working Groups. Especially in 2024 a series of workshops and tutorials took place in order to creating knowledge regarding the SDGs as well as making the SDG potentials and contributions of the UNESCO Global Geoparks visible. These activities are substantially supported by Bergstrasse-Odenwald UNESCO Global Geopark.

The Agenda 2030 with its 17 SDGs are the overall guideline and umbrella for the interdisciplinary and holistic approach of the UNESCO Global Geoparks, which is underlined by their function as SDG model regions for UNESCO. Each Geopark of the worldwide UNESCO programme can contribute to this global task and challenge directly on the spot. Collecting this information source and quantifying the broad variety of SDG contributions can give evidence of the UNESCO Global Geoparks´ impact on the Agenda 2030. Vice versa, the overall role of the SDGs is also suitable for the GGN and its Regional Networks as tool for strategic planning, management and communication in the sense of creating a sustainable future together, which directly supports the main goals of UNESCO.

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keywords: Agenda 2030, management, strategic planning, communication

Las Loras UGGP. Projects for a transition towards more sustainable agricultural models

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The cluster of geological, landscape and cultural heritage of great importance within Las Loras geographical area in Spain, led both civil society and local entities in the territory to promote its designation as a UNESCO Global Geopark, which occurred in 2017, covering 16 municipalities in Burgos and Palencia.
This Geopark consists of a territory with very favourable conservation status, which includes the Natural Park of Alto Ebro and Rudrón Gorges and the SPAB area of Humada Peña Amaya in Burgos; and the Nature Reserves of Las Tuerces and Covalagua in Palencia.
The main economic pillars in the Geopark are the extensive cattle farming and agriculture (mainly intensive). These are intrinsic resources which must be made compatible and managed as an essential tool to fight depopulation and to generate continuous activity and dignified work in rural areas, as well as making it possible for the rural communities to adapt to the new social-environmental conditions resulting from climate change.
Our programme includes concrete actions aimed at encouraging the change to more sustainable agricultural models and the transformation of the extensive cattle farming and agriculture in the following years, thus allowing the sustainable management to improve by means of more modern farms that may be adapted to the future and that guarantee both their continued existence and attracting new livestock breeders and farmers to the territory.
We have, therefore, started up several projects as a result of the agricultural sector situation in the Geopark. The studies were carried out in 2019 and allowed us to know the reality of this sector, which is strategical for our territory, and which has a great impact regarding socioeconomical and environmental issues.

1.- Trials of potato varieties tailored to organic farming within Las Loras Geopark

A five-year project aimed at highlighting and improving the production of seed potato in our territory and also advising farmers about the characteristics and feasibility of agroecological production models, encouraging the transition from intensive patterns to more sustainable ones.

2.- Composting Project

This project involves generating local circular economy by means of decentralising biowaste management and is aimed at encouraging agricultural composting in Las Loras Geopark, using existing resources and providing an alternative to municipal biowaste management. An agricultural composting pilot project has therefore been developed and a farmer, four great generators of biowaste and two local governments have taken part in it.

3.- "GAD-EX Lab: biodiversity improvement measures by means of extensive cattle farming in Las Loras UNESCO Geopark, Castile and León" Project

This project seeks to promote sustainable forest management and its compatibility with extensive cattle farming. The project includes actions entailing climate change mitigation, since it is committed to bioeconomy and circular management of the territory's resources.
The project focuses on bioeconomy and the circular use of the resources in the territory by developing actions aimed at providing added value to local products and their direct marketing.

4.- Training

At the same time and transversally, several training actions on ecological farming, food processing, sustainable agricultural models, among others, have been carried out, to learn from successful experiences within other territories.

keywords: agroecological, composting, circular economy, bioeconomy

Overtourism as a threat to geoheritage

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Overtourism is understood (mostly as urban) tourism that exceeds the social, ecological and economic carrying capacity limits of a destination and thus triggers extensive negative effects (UNWTO 2018) up to a “tourism phobia” (Milano et al 2019). In principle, overtourism is not a new phenomenon; aspects of carrying capacity have been discussed since the 1970s (Kainthola et al 2021, p. 21).
Until now, overtourism and all its negative effects have mostly been discussed in connection with urban destinations (Dodds and Butler 2019), but it is now increasingly affecting rural areas and geo-landscapes in particular (Sæþórsdóttir et al. 2020). Peeters et al (2018, p. 16) even assume that, contrary to previous assessments, it is not cities but rather rural areas, coasts and islands that are most vulnerable to overtourism.
Geoparks have been recognized as such, because of their outstanding, but often also very sensitive geoheritage. At the same time, destinations with UNESCO or other recognition usually attract significantly higher visitor numbers than other areas. Visitor numbers are often concentrated at the main, but usually also the most vulnerable attractions, particularly in the high season and at certain times of the day (Kainthola et al 2021, p. 26). The UNESCO World Heritage Sites of Plitvice Lakes (Croatia) and Halong Bay (Vietnam), among others, made negative headlines due to overtourism. Iceland is also increasingly affected by this phenomena.
In Germany, overtourism increased dramatically during the Covid-19 pandemic. As vacation trips were prohibited but day trips were possible, we observed extremely high concentrations of visitors in protected areas close to home. This led to considerable damage to the geotopes affected (Megerle 2024), aggravated by the fact, that geotopes, in contrast to flora and fauna, are often perceived as less sensitive to disturbances (Megerle and Pietsch 2019).
The presentation uses selected case studies from German and European Geoparks to illustrate the problems of overtourism for geoheritage. Possible solutions are put up for discussion.

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keywords: Overtourism geoheritage Vulnerability

Partnerships for sustainable development – the case of ‘’Aparas de Madeira”, a partner in the smallest island of the Azores UNESCO Global Geopark

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In an archipelagic geopark as it is the Azores UNESCO Global Geopark (Azores UGGp), partnerships assume an even greater importance, as Geopark partners are ambassadors for sustainability and call for our unifying moto – 9 island – 1 Geopark. In the smallest island of our archipelago (Corvo island, with 17 Km2 and 384 inhabitants) our partner ‘’Aparas de Madeira – Crafting Heritage, Shaping Tomorrow’’ plays an extremely important role in preserving and valuing the cultural heritage of this island volcano. The main objective of this partners is:

- to preserve the traditional craftmanship of Corvo, specifically focusing on the production of the historical ‘’Fechaduras do Corvo’’ (traditional wooden locks), using original molds and sustainable practices.
- To engage in environmentally sustainable practices by using recycled and locally sourced materials, particularly the Juniperus brevifolia, an endemic and protected species in the Azores.
- To educate the public and the student community about the traditional woodworking techniques and cultural heritage of Corvo Island through workshops, events, and collaborative projects.
- To foster community involvement and partnerships by collaborating with local organizations and individuals, promoting cultural awareness and socioeconomic development within the region.
- To maintain and enhance the quality and authenticity of traditional woodworking products, ensuring each piece reflects the rich history and craftsmanship of the island.
- To promote the unique cultural and artisanal heritage of Corvo Island on a global scale, participating in international collaborations and events that highlight the island’s traditions and sustainable practices.

Aparas de Madeira are more than artisans, they are educators, sharing stories of heritage and culture through their work and contributing to a wider variety of experiences in this island that corresponds to one main volcanic edifice with a caldera at the top (the Caldeirão), with an average diameter of 2.1 km, occupied by a lagoon. This polygenetic volcano has several secondary cones on the flanks and intra caldera. Given marine erosion, the nature of its volcanic products, and the fact that the island has no historical volcanism or recent volcanic activity (i.e. within the last 10,000 years), the coast of Corvo island appears very steep. The exception is the lava delta of Vila do Corvo, the only inhabited area of the island. This isolated, oceanic inhabited volcano, was the stage for the development of unique cultural heritage based on local resources and ingenuity of men.
Through this partnership we aim to promote the uniqueness of this site in terms of natural and cultural heritage.

keywords: sustainable development, partnerships, geoheritage

Discovery into Art concept strengthening the visibility of the cultural and intangible heritages of Rokua UGGp, Finland

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Rokua UNESCO Global Geopark, located in the middle of Finland, tells the story of the last Ice Age. Besides of the geological elements, the area is also home to a wealth of nationally and internationally valuable and fascinating cultural heritage, a resource that has yet to be utilized and brought to the fore in the tourism services of the region.

To increase the interest and attractiveness of the Rokua Geopark area, especially among tourists looking for culture-oriented and experiential content, Rokua Geopark innovated and launched a tripartite project called Discovery into Art in 2023. The purpose of the project is also to honour the rich network of art galleries and cultural sites of the region and to treasure the unique cultural heritage with its intangible aspects.

In the first phase of the project in 2023, the stories of the Rokua Geopark area were gathered and compiled into a story database. The database brings the stories to the use of entrepreneurs, associations, schools and other actors in the area in a new way. To gather local stories, several workshops were organised in the region´s villages. The stories have been made visible at information points in the area, along hiking trails and on digital platforms. In addition, the project piloted bringing stories to life using virtual modelling solutions. The stories were also applied in gaming.

In the second phase, which has mainly taken place in 2024, the stories have been made visible by environmental art. Rokua Geopark organised an artist competition to select producers for the art works. Together with the local municipalities, three main themes were determined to inspire the art works: pine tar, legends and the story of the landscape. The locations for the art works were selected from the results of votings in each of the three municipalities. Until autumn 2024, all of the seven art work has been erected.

In the third phase, which will begin mainly in late 2024, the stories will be used to inspire event production in the area. This phase is especially targeted to prepare the area for the year 2026 when a neighbouring city of Oulu celebrates the cultural capital year of the European Union. Rokua Geopark organises a series of events which bring the unique cultural heritage of the area to the fore of the visitors.

keywords: geoheritage, stories, digitality, innovations, communities

A Framework for Enhancing Protected Area Management on Lesvos Island UNESCO Global Geopark

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The construction of a new road and other public works on Lesvos Island UNESCO Global Geopark unexpectedly unearthed a remarkably well-preserved rich treasure of plant fossils belonging to the renowned Lesvos petrified forest. Embedded within the pyroclastic formations were complete tree trunks, delicate branches, and exquisite leaf imprints, offering an unparalleled window into the region's Lower Miocene paleo-ecosystem.

Recognizing the extraordinary scientific and cultural significance of this discovery, coupled with the imminent threats, the Natural History Museum of the Lesvos Petrified Forest initiated a comprehensive conservation and preservation project. The primary objectives were to safeguard these irreplaceable fossils, unlock their scientific potential, and harness their value to drive sustainable economic growth through increased tourism.

A detailed conservation plan was meticulously crafted, encompassing strategies for protecting the fossil site, developing visitor infrastructure, and implementing tourism activities as well as educational programs. This ambitious endeavor secured essential funding from the Operational Programme “North Aegean 2014-2020” (NSRF), enabling the transformation of the fossil-rich area into a premier paleontological destination. By combining scientific research, conservation efforts, and public engagement, the project aims to preserve Lesvos' rich geological heritage for future generations while stimulating local economic development.

This initiative stands as a testament to the delicate balance between human progress and environmental stewardship. It showcases how the protection of invaluable natural assets can be seamlessly integrated with sustainable tourism to create a lasting legacy for both the local community and the global scientific community.

keywords: Lesvos, fossils, paleontology, conservation, sustainable tourism, geological heritage

The Durbuy Anticline: a top geoheritage site in the UNESCO Global Geopark Famenne-Ardenne, Belgium

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In 2023, the Durbuy Anticline was proposed by the National Committee for Geological Sciences of Belgium (in collaboration with de Famenne Ardenne UGGp) as a candidate geosite to feature in the esteemed Second 100 IUGS Geological Heritage Sites (Hilaro, 2022) in the History of geosciences (Verheyden, 2024).

The natural cross section of the Durbuy Anticline represents an archetype anticline and as such it is a classical site used for the education of geology and geoscience students from Belgium and neighboring countries. This geosite is situated in the medieval town of Durbuy within the UNESCO Global Geopark Famenne-Ardenne. It boasts a base of 90 meters and a height of 37 meters and is composed of about 25 layers of Mid-Frasnian (Upper Devonian) marine limestone.

This wonderfully exposed outcrop is commonly referred to as the Anticlinal d'Omalius, in honor of Jean-Baptiste Julien d'Omalius d'Halloy, widely recognized as the Father of Belgian Geology (16 February 1783, Liège, Belgium - 15 January 1875, Brussels, Belgium) who described the Durbuy Anticline as early as in 1807 (d'Omalius d'Halloy, J.B.J.). This description was part of a much larger endeavor: in 1813, d'Omalius completed the first geological map of France and bordering areas, which was published only in 1822 due to the political turmoil in western Europe.

The Durbuy Anticline stands as an easily accessible and captivating geological feature, drawing in a diverse audience. Its significance is deeply ingrained in the local culture and heritage, actively embraced and promoted by the medieval town of Durbuy. The apex of the anticline is the highest point of the medieval town of Durbuy, serving as a popular destination for both residents and tourists seeking leisurely strolls and panoramic views.

The presentation will focus on the ceremony to be held in the town of Durbuy in the presence of political figures, Geopark members and representatives of civil and geological society, a few hours after the official announcement, which will be made at the UIGS congress in Korea.

keywords: Second TOP100, Devonian, d'Omalius d'Halloy; History of Geology; Variscan deformation

Geo Heritage

A Proposal for International Geological Site Categories of IUGS in UNESCO Global Geopark Applications: Geo-archaeological Sites

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According to the Statutes of the International Geoscience and Geoparks Programme and Operational Guidelines for UNESCO Global Geoparks, a UNESCO Global Geopark must contain geological heritage of international significance, which must be independently verified by scientific professionals. In this context, the International Commission on Geoheritage (IUGS) has published guidelines for evaluating the international significance of geological heritage within UNESCO Global Geopark applications, identifying 11 types of geological sites: History of Geosciences; Stratigraphy, sedimentology, and past climate; Palaeontology; Igneous and metamorphic petrology; Volcanology; Tectonic and structural geology; Mineralogy and metallogeny; Geomorphology; Hydrogeology; Geological hazards; and Impact structures and extraterrestrial rocks.

Geo-archaeology is a multidisciplinary field related to geology, geomorphology, archaeology, geography, soil science, history, and similar disciplines. Research in this field not only reveals the impact of geological and geomorphological events and processes on human history but also, in some cases, archaeological remains provide critical evidence and records for understanding the recent geological and geomorphological history and evolution of the Earth. In this context, archaeological sites that shed light on the geological-geomorphological evolution of the Earth and serve as evidence of this evolution should be defined as geosites and, if they meet other criteria, evaluated as geosites of international importance.

Therefore, in this study, a new type of internationally significant geosite, termed "Geo-Archaeological Sites," is proposed in addition to the 11 types of geosites identified by the IUGS. Examples from the Kula-Salihli UNESCO Global Geopark are presented to illustrate this proposal and to explain the rationale behind it. These archaeological-geological sites, which serve as records and evidence of the recent geological and geomorphological evolution of the Earth such as tells, tumuli, traces of paleo-earthquakes, and evidence of erosion and similar processes could be classified within existing categories like geomorphological sites or geological hazards. However, they do not fully fit these categories as they are not entirely natural. These sites resemble paleontological sites, which include paleo-ecological conditions and ancient life remains, but they differ in that they can be considered remnants of humans or hominins from the Holocene epoch. Because these sites are man-made, shed light on the relatively recent geological-geomorphological evolution, and possess other unique characteristics, they differ from paleontological sites. Since these sites do not fully align with the other site types proposed by the IUGS, it is recommended that locations with these characteristics be defined as "Geo-Archaeological Sites."

keywords: IUGS, International Geological Site Categories, Geoarcheology, Geoheritage, Geopark

Geosites between Murge and Premurge (Southern Italy, Puglia): exploring the geotouristic water path

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Geotourism, as defined by Newsome and Dowling (2010), "promotes tourism to geosites and the conservation of geo-diversity and an understanding of earth sciences through appreciation and learning". This approach to tourism can serve as a powerful tool for sustainable development, in line with the Sustainable Development Goals of the 2030 Agenda.
The area between Southwestern Murge and Premurge (Puglia, Southern Italy) offers an exceptional opportunity to explore the link between geology and human settlements, and to appreciate the geodiversity of this large territory through ecotourist discovering of geosites. The area includes towns of great interest such as Laterza, Matera (UNESCO World Heritage Site), Gravina in Puglia, Poggiorsini and Spinazzola. From a geological point of view, Murge and Premurge represent two main structural domains of the southern Apennines Chain: the foreland (Apulia Foreland), where Cretaceous limestones diffusely crop out, and the foredeep (Bradanic Trough), where a Quaternary succession made up of calcarenites at the bottom, clays in the middle, and coarse-grained siliciclasts at the top cover the same Cretaceous rocks of the foreland. The historical link between water, geology, human settlements and local culture is the base for the development of a geotouristic path linking the quoted towns. This path is based on the presence of those springs that allowed the development of local communities, and which we can now find as historical fountains.
The aim of this study is to highlight the main geological features occurring around these fountains, in order to appreciate the physical landscape and to sympathize with the meaning of numerous geosites located in their vicinity. These geosites, of either international, or national and regional importance, are essential for understanding the geodiversity of the area, educate local communities, promote sustainable economies such as slow and seasonal tourism, and raise awareness of the importance of geo-conservation.

keywords: Geoheritage, Geosite, Premurgia, Murgia.

Geological Heritage and Issues at the Fossil Dune of Los Escullos and the Barjan Dune of Mónsul: Conservation Strategies at Cabo de Gata – Níjar UGGp

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Theme: Geoheritage- geoconservation

***Geological Heritage and Issues at the Fossil Dune of Los Escullos and the Barjan Dune of Mónsul: Conservation Strategies at Cabo de Gata – Níjar UGGp**

The Cabo de Gata-Níjar UNESCO Global Geopark, located in the province of Almería, Spain, houses valuable geological formations, notably the fossil dune of Los Escullos and the Barjan dune of Mónsul. These dunes not only represent invaluable geological heritage but also serve as crucial records of the region's climatic and environmental history. However, both formations face serious conservation challenges due to factors such as natural erosion, anthropogenic pressure, and climate change.

The fossil dune of Los Escullos, composed of Pleistocene calcareous sandstones, is undergoing accelerated degradation due to wind action and precipitation, as well as the impact of unregulated tourism. Similarly, the Barjan dune of Mónsul, a mobile dune system influenced by prevailing winds and marine activity, is experiencing disruptions in its delicate balance due to infrastructure construction and intensive human activity.

To address these challenges, several specific conservation actions are proposed. These include the implementation of restrictive access measures to minimize direct human intervention, as well as the creation of controlled pathways and observation areas to protect the most vulnerable zones. Additionally, educational and awareness programs for tourists and locals will be developed, emphasizing the importance of geological heritage and the need for its preservation. Continuous monitoring studies will also be conducted to assess the dunes' evolution and the impact of implemented measures, utilizing advanced technologies such as LIDAR mapping and satellite image analysis.

Together, these actions aim not only to conserve these unique geological formations but also to promote a sustainable tourism model that respects and values the natural heritage of the Cabo de Gata-Níjar Natural Park. Protecting these dunes is not just about preserving scenic beauty but also about maintaining an essential geological record for the study of environmental change over time.

This abstract synthesizes the issues and conservation strategies for the fossil dune of Los Escullos and the Barjan dune of Mónsul, highlighting the importance of geological heritage and the necessary actions for its preservation.

keywords: #cabodegata #geoconservation #fossildunes #dunes #

The cultural heritage of the Folafótur peninsula (Westfjords, Iceland)

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Research on the historical-cultural aspects of the Folafótur peninsula was carried out as part of a study consisting of a 1:10,000 scale geological and geomorphological survey, where all the main geodiversity and cultural sites have been reported. Cultural sites are special places showing clear archaeological, literary, and historical values, characterized by a strong connection to the geology and landscape of this area.
The first evidence of settlement on the Folafótur peninsula can be found in the Landnámabók (Book of Settlements), a medieval Icelandic manuscript describing the settlement of Iceland during the 9th and 10th centuries. There are no significant finds dating back to the period between the end of the Saga age s.l. (1262/1264, loss of independence) and the 18th century.
In the early 20th century, more than 100 people lived in several farms of Folafótur, which were finally abandoned around the 1940s. The remains of ancient settlements of fishermen and farmers now represent archaeological sites characterized by ruins of the ancient walls. The stone-wall ruins clearly show how the builders used the local rocks, i.e., basaltic rocks, easily workable and divisible into tabular blocks thanks to the fluid texture with planar mineral orientation. The several archaeological sites identified during the field work on the Folafótur peninsula have been indicated on the map by Ellero et al. (2023).
A number of sites that symbolize important historical and literary evidence are particularly significant in Folafótur. Many represent places where traditional Icelandic fairy tales are set, displaying connection to geological processes, such as that concerning the “elven fissure”, the current Álfalág valley, consisting of a morphological depression coinciding with a N-S oriented fault.
However, the most important and significant cultural landmarks for Folafótur are those linked to the Icelandic writer Halldór Laxness (1902-1998), Nobel Prize winner for literature in 1955. In his (autobiographic) novel World Light (Heimsljós, 1937-1940), he describes moments of epiphany, in Icelandic “Kraftbirtingarhljómur Almættisins” meaning “The Explosive Sonics of Divinity”. Three such supernatural sites can be located on the Folafótur peninsula (Ljósavík, Sjónarhóll and hills above the farm Fótur) representing as many viewpoints for the spirit.
This study highlights how geodiversity and cultural sites contribute to the overall value of the geological heritage of a territory, illustrating the geodynamics of the Earth and the geomorphological processes linked to climate change and their connections with human history.

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keywords: cultural heritage, Folafótur peninsula, geological heritage, Iceland

The Sassi and the Park of the Rupestrian Churches of Matera: the geological heritage of an outstanding UNESCO World Heritage Site and 2019 European Capital of Culture

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The Sassi and the Park of the Rupestrian Churches of Matera: the geological heritage of an outstanding UNESCO World Heritage Site and 2019 European Capital of Culture

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keywords: Matera, Rupestrian Churches, UNESCO World Heritage Site, European Capital of Culture 2019

The rupestrian old town of Matera (southern Italy) is an urban area included in the UNESCO World Heritage List since 1993 and designated as 2019 European Capital of Culture. Its spectacular landscape features the ancient part of the town excavated into the Quaternary calcarenite (Calcarenite di Gravina Fm). Matera exemplifies the perfect integration of human development and geological context, a link established since prehistoric times, when the first settlements appeared in the nearby Murge area. (Tropeano et al., 2018) From the scientific point of view, the geological features of the area are very attractive, showing unique sedimentological and structural characteristics. Geology has been a primary factor in the town’s development, shaping its millennia-old cultural heritage. While the cultural aspects are well-enhanced in the three criteria approved in 1993 for the UNESCO World Heritage nomination (Criteria iii, iv, v), in this work we argue that the geological framework of the area also fulfills two other criteria:

- **criterion vii**: to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;
- **criterion viii**: to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features

Furthermore, since its election of European Capital of Culture in 2019, Matera experienced an incredible touristic growth, becoming a leading Italian, where tourists from all over the world appreciate its unique landscape and culture. By emphasizing its geological heritage, Matera has the potential to become one of the most important sites of geotouristic attraction (Chiarella et al.,2019), where the deep connection between geology and culture is rooted and palpable in every corner of the old town.

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• Tropeano M., Sabato L., Festa V., Capolongo D., Casciano C.I., Chiarella D., Gallicchio S., Longhitano S.G., Moretti M., Petruzzelli M., Schiuma G., Spalluto L., Boenzi F., Pieri P. (2018). "Sassi", the old town of Matera (southern Italy): first aid for geotourists in the "European Capital of Culture 2019". AMQ 31, 133- 145. doi: 10.26382/AMQ.2018.09

keywords: Matera, Rupestrian Churches, UNESCO World Heritage Site, European Capital of Culture 2019

Urban Geodiversity and Geoheritage of the Algarvensis aspiring UNESCO Global Geopark (Portugal) – unveiling stories hidden in plain sight

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Most cities display a remarkable geological and palaeontological diversity. The building materials used in walls, facades, sidewalks, cobblestones, monuments and churches contain rocks and fossils, each with a fascinating story waiting to be discovered.
Recently recognised as a Global Heritage Stone Resource by the International Union of Geological Sciences, Lioz limestone has been used for centuries as dimension stone in Portugal and Brazil. Both countries have many famous monuments built from this rock, which has long been appreciated for its quality and aesthetics. In the aftermath of the Great Earthquake of 1755, lioz limestone became the main stone used in the reconstruction of Lisbon.
This Upper Cretaceous rock, displaying a variety of colours (beige, bluish, pinkish, reddish, and yellow) and abundant fossils of rudists, an extinct group of bivalve molluscs, offers an excellent opportunity to promote geodiversity and palaeontology in an urban context.
Here we present some examples of the use of lioz limestone in the monuments, buildings and pavements of Loulé, Silves and Albufeira, the main cities in the territory of the Algarvensis aspiring UNESCO Geopark (Algarve, southern Portugal), and show how we can reveal its fascinating fossils and captivating geological stories – both linked to a long-vanished tropical ocean – all hidden in plain sight.

Geo Heritage

Geological Significance and Proposed Protection of the Mala Palagruža Islet, Adriatic Sea

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The islet of Mala Palagruža, covering 26,510 square meters, is the second largest islet in the Palagruža Archipelago, situated in the central Adriatic Sea. This archipelago comprises 14 islets and reefs, marking the southernmost marine territory of Croatia. Mala Palagruža, part of the Vis Archipelago UNESCO Global Geopark, is recognized as a geosite of international importance due to its unique geological composition, featuring thin-layered silicified crystalline dolomites interlayered with chert within the Palagruža Diapiric Complex (Korbar et al., 2012). Based on correlations with the southwestern Apennines, these deposits are suggested to represent a proximal or transitional carbonate platform-to-basin environment, with identified radiolarians indicating a Middle Jurassic age (Kukoč et al., 2019).
In July 2024, further geological research of the Mala Palagruža islet began to establish an expert base and propose its protection as a geological monument of nature, in accordance with the Croatian Law on Nature Protection. Preliminary research revealed that the islet predominantly consists of decimeter-bedded siliceous crystalline dolomites alternating with centimeter-bedded cherts, with sharp contacts and occasional chert nodules within dolomite beds. These distinctive rocks, known as the Mala Palagruža Member (Korbar et al., 2012), exhibit numerous folds and faults and are unique to this islet.
The islet's only beach experiences constant abrasion, particularly from Sirocco waves during the cold season, resulting in beach sediments composed partly of weathered chert nodules, which is uncommon along the eastern Adriatic coast (Pikelj and Juračić, 2013). Due to the significant deformation of the rock beds, the islet exhibits extensive erosion, forming unique coastal landforms such as headlands, cliffs, sea caves, sea arches, sea stacks and sea stumps. Consequently, marine sediments around the islet primarily consist of weathered rock fragments, unlike the typical biogenic carbonates of the eastern Adriatic shelf.
The proposal to designate Mala Palagruža as a geological monument of nature involves developing a detailed expert base and geodetic background for legal inclusion in the cadastre and land register. A 30-day public inspection period will allow for the review of the proposed act and supporting documentation, after which the regional government unit will declare the islet a natural monument, ensuring its preservation and management.

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keywords: Mala Palagruža, geological monument of nature, Adriatic Sea, silicified dolomites, chert, UNESCO Global Geopark, coastal erosion

Development of interpretive resources in Molina Alto Tajo UGGp

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Development of interpretive resources in Molina Alto Tajo UGGp
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Geology and its influence on the ways of life and culture of the human communities of the territories, is a heritage of great importance, but, unlike architecture or other cultural expressions, the population, both native and visitor, don´t have the necessary training to understand the scientific aspects that give it value. For this reason, it requires interpretation work to transmit its value in an adapted way to the formation of the public to which it is directed. It is also necessary to design appropriate supports, physical or virtual, to offer information in an attractive way.
This Geopark has been carrying out intense work to install interpretive elements in its main heritage elements and is currently being transferred to digital media that expands the information and makes it accessible in a more flexible way through digital devices, with the additional advantage of its ease for updating content and reducing the need for maintenance. However, there are elements that do not yet have interpretive resources, either due to their lesser relevance, or because they are due to recent scientific discoveries.
The Molina – Alto Tajo Geopark carries out the design of these elements seeking the maximum involvement of the local community so that it assumes geology as a heritage wealth that adds greater value to its land. To do this, municipality representatives and neighbors interested in participating are contacting an invited to carry out research work on the historical and cultural heritage that will be highlighted in the interpretive supports, incorporating the geological heritage and exploring the relationships between them. Illustrations, photographs and easy language are used to make the speech attractive and accessible to the audience. QR codes are included that link to digital content and other interesting aspects.
The local community is kept informed about the progress of the project and a small inaugural event is organized with explanations in the case of the installation of physical panels.
With all this, the maximum involvement of the population in the use, dissemination and conservation of heritage is pursued, as well as the maintenance of physical interpretive resources.

Example of interpretative display for Molina Alto Tajo UGGp

keywords: Interpretaive resources, displays, digital support, community engagement

Following in the footsteps of Charles Lyell along the Salt Way. A strategic path for the Catalunya Central UGGp

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The publication of Charles Lyell's monumental work, Principles of Geology, in three volumes between 1830 and 1833, was a watershed moment in the study of geology. Lyell, a towering figure in the field, not only pioneered scientific thinking in geology but also laid the groundwork for its evolution into an independent and modern science.

Charles Lyell (1795-1875) visited Catalonia in 1830 to explore the volcanic region of Olot. His passage through Central Catalonia was due to a change in the planned itinerary between Puigcerdà and Olot, forced by the turbulent events in the country arising from the liberals' struggle against the absolutism of Ferdinand VII's reign.

During his journey through the Geopark, he identified some of the main elements of international geological interest, such as Montserrat Mountain and the Salt Mountain of Cardona, while describing and sketching the main rocks and geological structures for the first time.

The Saline Valley and the Salt Mountain of Cardona, a unique geological structure, have been a key part of our history since the Neolithic era. These rocks, the only outcrop from the Catalan potash basin, bear witness to the evaporite succession, with the chloride unit formed by halite at the base and sylvite and carnallite in the upper unit. Its historical significance is further underscored by the various associated heritage elements that have shaped a significant part of Geopark's history, creating a sense of connection and engagement with our past.

The heritage value, together with the relevance of Charles Lyell's contributions, makes it an optimal combination to promote actions related to:

- Education: The reference to this figure should serve to create educational materials on the basic geology concepts.

- Geotourism: Lyell traversed the old Salt Way on his visit to Cardona. This is one of the main paths signalised and interpreted by the Geopark. It is the distribution route muleteers used to transport salt from the Cardona salt diapir to Manresa and then to Barcelona.

Geoconservation: An executive project has already been carried out to recover and value the Salí well in Súria. Potash was discovered there in 1912, breaking the monopoly held by Stassfurt and Alsace, both regions of Germany at the time.

- Networking: A review of his travels reveals that Lyell visited outcrops in at least seven Geoparks. There is also evidence that he visited sites very close to another thirteen Geoparks across Europe and North America. This fact makes it possible to create the Lyell Geopark’s Route.

keywords: Charles Lyell, Salt Way, Cardona, diapir, potash.

NEW GEOSITES OF GLOBAL RELEVANCE IN SIERRA MORENA DE SEVILLA UNESCO GLOBAL GEOPARK: A GLOBAL STRATOTYPE SECTION AND POINT (GSSP) FOR THE TELYCHIEN STAGE (SILURIAN) AND CAMBRIAN FOSSIL JELLYFISH IMPRIMS

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In Sierra Morena de Sevilla Natural Park - UNESCO Global Geopark two new geosites of global relevance has been developed over the past four years: the GSSP for the Telychien Stage (433-438 Ma) from the Silurian period and a geosite of fossil jellyfish impressions from the Lower Cambrian period (521-538 Ma).

1. **Geosite *GSSP TELYCHIEN STAGE (SILURIAN)*:** In January 2024, the IUGS ratified the proposal of the International Commission on Stratigraphy to designate a new Global Stratotype Section and Point (GSSP) for the base of the Telychien stage (Silurian period), located in the municipality of Cazalla de la Sierra (Seville, Spain). The base of the Telychien is defined by the first appearance of the cosmopolitan graptolite *Spirograptus guerichi* within a continuous succession of graptolitic black shales without hiatus. The quality of the stratigraphic succession makes this point the new global reference that replaces the previous GSSP (established in 1985 in southern Wales) given biostratigraphic and correlation problems detected (Gutiérrez et al., 2024).

2. **Geosite *FOSSIL JELLYFISH IMPRIMS*:** located in the municipality of Constantina (Seville, Spain), hosts one of the world's most important records of hydrozoan medusozoan impressions from the Lower Cambrian (Cordubian). The exceptional nature of this site lies in its age, the number, and the size of the preserved impressions (diameters ranging from 10 cm to 120 cm). Recent conservation-restoration efforts have revealed up to 289 impressions of a single species (Cordubia gigantea), preserved as subumbrellar and exumbrellar typologies. The current conditions of the outcrop will allow a more precise reconstruction of the paleobiology of this species, the paleoenvironmental conditions, and the origin and formation of this exceptional accumulation of jellyfish. From a heritage perspective, it constitutes one of the most significant paleontological assets in the world record (Mayoral et al., 2004).

Researchers/references:

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keywords: GEOSITE, GRAPTOLITE, SILURIAN, JELLYFISH, CAMBRIAN

NEW IUGS GUIDELINES FOR THE ASSESSMENT OF THE GEOLOGICAL HERITAGE IN UNESCO GLOBAL GEOPARKS. THE CASE OF THE BASQUE COAST UGGP

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According to the statutes of the International Geoscience and Geoparks Programme (IGGP) a UNESCO Global Geopark must contain geological heritage of international significance. Since 2016, the IUGS International Commission on Geoheritage has been conducting the desktop assessment for aspiring geoparks annually. Following the UGGp Council request in 2020 the IUGS and the GGN created a group of experts to develop a long demanded clear guidelines that would help applicants and evaluators in a more effective and objective evaluations process.

In September 2023 the UGGp Council approved the new guidelines for the assessment of the Geological heritage in UNESCO Global Geoparks. The new guidelines and templates can be downloaded from UNESCO website. https://unesdoc.unesco.org/ark:/48223/pf0000386952

This long demanded document should play a major role in the way geological heritage is organized, presented and evaluated in UGGp in the future. The new document clarifies the meaning of geological heritage of international significance as *"A UNESCO Global Geopark with geological heritage of international significance must contain geological features that can be considered among the best examples of their kind at the country level, at the GGN´s regional network (EGN, APGN, GeoLAC…) and within the frame of their main geological context".*

The new guidelines also provide clear tables and templates that will help cataloging homogeneously our geological heritage according to different geological typologies (tectonics, stratigraphy, geomorphology, paleontology…) and different levels of significance (Global, international, national or regional).

The main goal of this long demanded document is to help applicants to produce a good and well-organized dossier, which will allow IUGS evaluators to make a better desktop assessment based on clear evaluation criteria. A good implementation of this guidelines will help maintaining a high quality of geological heritage in a fast growing network. However, the basics of this document should ideally also be used in already existing geoparks, which have already their inventory of geological sites. A good application of this guidelines in existing geoparks would help geopark geoscientist to catalogue their geological heritage using standardized criteria and thus creating a much homogeneous database of the geological heritage of the Global Geoparks Network.

The Basque Coast UGGp has updated its inventory cataloguing the geological sites according to the new IUGS guidelines. As a result of this work the list of sites is now better organized according to their typology and level of significance, which helps also in the definition of management strategies.

The presentation of the new guidelines and their application in an already existing UGGp aims to inspire and motivate the rest of the European Geoparks to consider this guidelines for their geological heritage and to start creating a standardized database of geological heritage in the Global Geoparks Network.

keywords: Geological heritage, IUGS guidelines, assessment

Enhanced and holistic interpretation of geosites at Psiloritis UGGp (Crete, Greece): the case of Nida plateau

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Nida plateau is one of the most visited geosites of Psiloritis UGGp. It is the highest plateau of its size (~ 2km^2) in Crete with a mean altitude of 1360 meters. It was formed as a result of karstic erosion, by the enlargement of smaller surface depressions (dolines), and now forms a polje. It's located at the area where the "Tripolitsa" limestone comes into contact with the underlying "Plattenkalk" rocks. The occurrence of thin "Plattenkalk" metaflysch and "Phyllite-Quartzite" rocks retained water for a longer time to form these depressions, along with numerous smaller potholes and sinkholes. The large Idaion fault that delimits the eastern slopes of Psiloritis mountain and the plateau itself, played a significant role in the creation of Nida. The fault forced the area of the plateau downwards, in respect to the Psiloritis summits, thus modulating conditions for water concentration and for the intense erosion of the rocks, forming an awe-inspiring landscape even to those that are not fascinated by geology. This same fault revealed the entrance of Idaion Antro cave, which became one of the most important worship places of the island through the millennia.

The scenery in Nida changes depending on the different color strokes and following the seasonal patterns of the trees that are present sparsely all over the plateau. Since the times of antiquity, Nida was the main gathering point of pilgrims from around the Mediterranean, wishing to pay their respects and receive prophecies and blessings through the worship of Zeus at the cave of Idaion Antro. The presence of people there is continuous and intense through history, with the area being a point of reference for partisan activity during World War II. Today, the main human activity that occurs 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, have been condensed to form the very essence of Nida's renown that inspires local and international artists to create poems, songs or even open- air sculptures referring to it.

Sharing into the same awe-inspiring feeling that Nida transmits to the locals and visitors, but also understanding the responsibility of preserving and representing the multiple aspects of its history (natural and cultural), Psiloritis UGGp has created many tools for the promotion and interpretation of this very popular 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. In addition, a new view and interpretation point has been installed at a scenic area at the entrance of the plateau. Through the respective informative material and during presentations and field visits for diverse audiences (school and university students, teachers, locals, visitors, researchers etc.), multiple traits of Nida's geo- and bio-diversity are equally presented: Nida's formation and the presence of caves and sinkholes within the plateau, how the geomorphology has affected the different species of flora and fauna through time and how human behavior has affected the plateau's characteristics are only some of the topics that are highlighted concerning communication and education of the natural heritage of the geosite. For the inclusion of information on 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 tools have been employed to increase the outreach potential but also accessibility to Nida. Future efforts include a running race around the plateau and a "hidden-treasure" game- based on a local myth for the area- aiming to increase geotourism activities in the site whilst promoting its heritage.

keywords: Geosites, geointerpretation, geoconservation, Nida, Psiloritis

From a troublesome quarry to a highlight of a geopark – the successful story of a basalt quarry at Mt. Wilkołak, Land of Extinct Volcanoes UNESCO Global Geopark (Poland)

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Volcanic rocks and related landforms, distinctive in the country, are the key geoheritage assets of the Land of Extinct Volcanoes UNESCO Global Geopark (UGGp) in south-west Poland. Many Cenozoic basalt occurrences were quarried in the past and the legacy of stone exploitation can be viewed as both detrimental to the natural values of the region, but also as an opportunity to explore regional volcanic history. The basaltic hill of Mt. Wilkołak in the northern part of the UGGp has been subject to large-scale industrial activities since the early 20th century, which eventually resulted in the considerable modification of its natural shape and the origin of deep quarry pits. However, extensive slope undercutting for quarrying also revealed various geometric patterns of columnar jointing, immediately noted for their scientific and didactic values. Despite conservation efforts initiated in the 1950s, the fate of the hill was long uncertain and at some stage it was not unlikely that the quarry would expand over the entire outcrop, causing its complete demise. The pressure from the local communities to terminate the quarrying, save the hill, and use the quarry as an open-air museum of a volcano, supported by scientists, grew particularly during the timespan, when the region aspired to become a UGGp (since c. 2015). The quarrying was then terminated in 2019, prior to the expected closure date, because of serious quarry wall instability problems, which initiated the rehabilitation phase. Although other options such as conversion into a landfill site and afforestation were also considered, an agreement between the stakeholders was eventually reached to develop the site for tourism and recreation. Rehabilitation works were carried out in 2021–2023 and finished in May 2023, when the site was opened to the public. Apart from dismantling almost all industrial installations, general land restoration, and selection of paths accessible to visitors, the rehabilitation project involved the development of educational infrastructure (interpretation panels). The latter focuses on various, but interrelated themes such as volcanism, history of quarrying, cultural heritage and living nature. In addition, an open-air exhibition of more than 40 quarried stone types from the larger region was built. Coupled with easy access and the proximity of other geosites exposing different aspects of regional geoheritage (sandstone landforms), the former quarry at Mt. Wilkołak has all the potential to become a top-level geosite within the Land of Extinct Volcanoes UGGp. This, however, may soon lead to new management challenges regarding safety, maintenance of infrastructure, conservation of most valuable outcrops, and upgrading of educational facilities.

keywords: geoheritage; volcanism; mining heritage; geotourism

The geodiversity of the Sesia Val Grande UNESCO Global Geopark (NW Alps, Italy) as shown in the Geosites Inventory of the Piemonte Region (Regional Law 23/2023)

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The Regional Law 23/2023 issued by the Piemonte Region government for the provisions for the conservation, management and valorization of the geological heritage recognizes the public interest of geodiversity and geological heritage; it identifies elements of particular scientific, cultural and landscape value within geosites and geoparks; it promotes the conservation, improvement of knowledge and management, scientific, educational, cultural and tourist valorization of geosites in compliance with the principles and state and community provisions on the matter. Thanks to this Law, the territories of the Sesia Val Grande UNESCO Global Geopark (SVUGGp) (NW Alps, Italy) can also be better valued and protected. The Piemonte Regional government, in collaboration with various institutions, including Arpa Piemonte (Environmental Protection Agency), the Regional Museum of Natural Sciences and the Department of Earth Sciences of the University of Turin, has identified some geosites within the SVUGGp for a first geosites inventory in the region. For this reason, six of the most important representative geosites were chosen to witness the SVUGGp's treasure chest of geodiversity.

The Sesia Val Grande UNESCO Global Geopark in the Piemonte Region is recognised for its rich geodiversity, encompassing a variety of geological features that provide significant insights into Earth's history. The six selected geosites within the Geopark, designated by the regional law, highlight their unique contributions to geoscience and their value for education and tourism.

These geosites collectively enhance our understanding of geological processes, from deep mantle dynamics to surface geomorphology, and illustrate the connections between geology, ecology, and human history in the SVUGGp. The designation of these sites emphasises their importance for scientific research, conservation, and sustainable development.

keywords: Geosite; Geoconservation; Alps; Geodiversity; Public Engagement.

HOW CAN A RAW MATERIAL CONNECT GEOPARKS IN THE PAST AND NOW?
Archaeometry of polished stone tools in the Bükk Region UNESCO Global Geopark, Hungary

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An archaeometrical interdisciplinary research initiated in 2014 on the Neolithic polished stone implements of the Herman Ottó Museum in North Hungary focuses on metabasite as their raw material. The museum's archaeological collection includes approximately 500 Neolithic stone implements, out of which 126 originate from archaeological sites within the Bükk Region UGGp. Our research is aiming to explore deeper connections with other geoparks focusing on geodiversity and geoheritage.
Non-destructive analysing methods were prioritized due to the valuable nature of these artifacts. The comprehensive methodology applied included macro- and microscopic petrographic observations, magnetic susceptibility measurements to determine magnetic mineral content, prompt-gamma activation analysis for bulk rock chemistry, X-ray diffraction for mineral phase identification, and electron-microprobe studies for mineral chemistry and textural analysis.
Regarding their raw material the stone artifacts were categorized into main rock groups: 33% metabasites (contact metabasite, blueschist, amphibolite, geenschist), 23% metavolcanic, 31% various volcanic rocks and 13% others. A comparative analysis revealed that the proportion of volcanic rock types in the geopark increases at the expense of metabasites, suggesting that volcanic rocks are of local provenance, while metabasites (blueschist, greenschist, amphibolite, contact metabasite) are regional. Focusing on metabasites, 24 contact metabasite polished implements from 14 archaeological localities within the geopark were identified. The most extensive occurrence of contact metabasites around the Carpathian Basin is in the northern part of the Bohemian Massif, specifically in the Krkonoše-Jizera Crystalline Complex in the Jizerské Mountains (Czech Republic). These rocks were widely used because of their durability, thus becoming widespread throughout the Neolithic Europe.
10 blueschist polished adzes from 7 archaeological sites were investigated. Mineralogical, petrological, and thermobarometric analyses suggest that the blueschist primarily originate from the Meliata Unit in Slovakia, though some may derive from Cretaceous conglomerate pebbles in the Pieniny Klippen Belt.
Additionally, 4 polished amphibolite stone tools across 3 archaeological sites within the geopark were analyzed. Based on mineral assemblages, textural features, and thermobarometric estimations, it is concluded that their provenance fields correlate to the Gemericum, Veporicum, Tatricum, and Zemplinicum (Slovakia), or the riverbeds flowing through these areas to the archaeological sites.
Finally, 4 greenschist polished adzes from 3 archaeological sites were identified. Greenschist is uncommon among Neolithic polished stone tools due to its strong schistosity reducing stability. The small number of samples in the collection is likely due to this property, suggesting that the raw material source was local, potentially from the Gemericum (Slovakia).
As the provenance of contact metabasite is located within the Bohemian Paradise UGGp, serving as a beautiful bridge between the past and present by not only tracing ancient trade routes but showcasing geoheritage. Distribution of the different rock types justifies how early human communities used local geodiversity for economic development, including exchanges. Bükk Region UGGp is an invaluable intangible heritage asset, showcasing an array of polished stone tools of diverse rock types of the Neolithic era.
Acknowledgement: The authors express their gratitude to the archaeologists of the Herman Ottó Museum for providing the stone tools. The research was supported by the NKFIH-OTKA K 131814.

keywords: Archaeology, Archaeometry, Neolithic, Polished stone implements, Geopark connections, Petrology, Mineralogy

Volcanism and Morphology of The Azores Archipelago: a Contribution to the Portuguese Geological Heritage Inventory

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Located in the North Atlantic and composed of nine inhabited islands and several islets, the Azores archipelago is a natural laboratory of international relevance. It comprises features of important value for the understanding of active volcanism and volcanic landforms, global plate tectonics and regional neotectonics, marine fossils and sea level changes, all expressed on a remarkable mosaic of geodiversity. The archipelago displays varied and abundant geological features of scientific, educational, scenic, socio-cultural and economic (tourist) interest, both inland and at sea, whose intrinsic value has been inventoried and evaluated in recent years, namely as the baseline for the creation of the Azores Geopark.

Currently, under the scope of gathering a single Portuguese Geological Heritage Inventory – promoted by the Minho University and the Portuguese National Laboratory of Energy and Geology (LNEG), to be available for public use on the LNEG Geoportal – it was implemented a revision, update and characterization of the Azorean geosites using the common criteria established at a national level.

Among the 121 geosites inventoried in the Azores Islands, a total of 31 geosites were included on the "Volcanism and Morphology of The Azores Archipelago" thematic category of the Portuguese Geological Heritage Inventory, seven of which hold scientific international relevance:

i) The Mid-Atlantic Ridge, located between the islands of Faial and Flores, where the expansion of the Atlantic Ocean occurs;

ii) The caldera of Furnas Volcano (São Miguel Island), the main "hydropolis" in Europe;

iii) Pico Mountain, the highest point in Portugal and the third-largest volcano in the North Atlantic;

iv) The Graciosa Caldera and the Furna do Enxofre volcanic cave (Graciosa Island), the later a unique underground structure in terms of worldwide volcanospeleology;

v) The Capelinhos Volcano (Faial Island), whose eruption marks a milestone in global volcanology;

vi) The Algar do Carvão volcanic pit (Terceira Island), ranking in the top ten of volcanic caves in the world, with its amorphous silica speleothems;

vii) The Ponta do Castelo/Pedra-que-Pica geosite (Santa Maria Island), with unique fossil deposits in terms of the North Atlantic and the islands of Macaronesia paleontological studies.

The selected geosites of this thematic category assure the representativeness of the unique Azorean geodiversity and the Azores islands geological heritage.

keywords: inventory, geoheritage, thematic category, Azores Islands geosites, volcanism

Idrija Lace Festival - Preserving UNESCO Intangible Cultural Heritage of Humanity

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The Idrija Lace Festival is an exemplary model of preserving and promoting the UNESCO-recognized intangible cultural heritage of Idrija lace. This annual festival, held in Idrija, Slovenia, celebrates the intricate craft of lace-making, which has been a significant part of the region's cultural and economic history for over 300 years. The festival not only showcases the exquisite craftsmanship of local lace-makers but also serves as a dynamic platform for cultural exchange and education.

At the core of the festival are numerous workshops, exhibitions, and demonstrations that highlight the traditional techniques of lace-making. These activities are designed to engage both locals and visitors, fostering a deeper understanding and appreciation of this delicate art form. The festival also features a competitive element, encouraging young lace-makers to continue this age-old tradition, thus ensuring its transmission to future generations.

The Idrija Lace Festival's commitment to preserving cultural heritage is further exemplified through its collaborative efforts with educational institutions, local government, and international organizations. These partnerships facilitate the integration of lace-making into broader cultural and tourism initiatives, thereby contributing to the sustainable development of the region.

Moreover, the festival has successfully positioned itself as a significant cultural event, attracting thousands of visitors annually. This influx of tourists not only boosts the local economy but also enhances global awareness of Idrija's cultural landscape. Through strategic marketing and community involvement, the festival has become a beacon of cultural pride and a testament to the enduring legacy of Idrija lace.

In conclusion, the Idrija Lace Festival plays a crucial role in the preservation and promotion of the UNESCO intangible cultural heritage of Idrija lace. By combining traditional craftsmanship with modern cultural practices, the festival ensures the continuous relevance and appreciation of this unique art form. This abstract underscore the importance of cultural festivals in safeguarding intangible heritage and fostering cultural diversity within the framework of global geoparks.

Keywords: Idrija Lace Festival, UNESCO Intangible Cultural Heritage, cultural preservation, traditional craftsmanship, cultural exchange, sustainable development.

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keywords: Idrija Lace Festival, UNESCO Intangible Cultural Heritage, cultural preservation, traditional craftsmanship, cultural exchange, sustainable development.

Boulder ridge as a coastal geoheritage: the case of Valahnúkur, Reykjanes, Iceland

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Coastal boulder accumulations are a type of deposits left by storms and tsunamis. Studies on the geomorphic impact of such high-energy events are of great interest, since their intensity and frequency are key issues for the future evolution of coasts in the framework of the global change. In this presentation, I will describe the diversity of boulder accumulations along the volcanic rock coast of Reykjanes (southwest Iceland), an area facing the powerful storms of the North Atlantic Ocean. They consist of cliff-top boulders, clusters and ridges, beaches, and boulder fields. They represent a very diverse panel of coastal landforms as high-energy signatures. However, Valahnúkur boulder ridge, nearby Reykjanesviti lighthouse, is quite a unique landform and one of the biggest boulder accumulations in the North Atlantic area. As such, it could be highlighted as a geoheritage. We will discuss touristic potential of the area for geomorphology-oriented tour and site-specific constraints, particularly since the onset of a new eruptive phase in the area.

keywords: coastal geomorphology, boulder, geomorphosite, Iceland

Geoheritage as a Source of Cultural Inspiration – Endorsing Local Identity

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The Impact Crater Lake -Lappajärvi Geopark was formed 78 million years ago by the impact of a meteorite. The immense force of the collision destroyed the meteorite itself and significantly reshaped the landscape of the area. Over time, the crater filled with water, and its distinct edges softened. This unique geological history has profoundly influenced the development of both the region and its local culture. The lake formed by the crater, Lappajärvi, has provided sustenance, livelihood, and inspiration to local inhabitants for thousands of years.

In this predominantly agricultural area, residents have entertained and enriched themselves by music, dance, painting and performing arts. The local landscape and spirit have inspired numerous artists across various fields of arts and sciences for decades. The cultural history of the region is preserved and celebrated in local museums such as Väinöntalo, the Provincial Museum Nelimarkka, and several smaller thematic museums. These museums are crucial and central partners for the Impact Crater Lake - Lappajärvi Geopark, and collaboration with them will be developed further in the future.

This year festivities of Alvar Aalto Week were organized as a concrete step and an example of endorsing local culture and identity at the Impact Crater Lake - Lappajärvi Geopark area. World-renowned architect Alvar Aalto is one of the most significant figures whose influence is still evident in the region. Architect Aalto was inspired of the beauty and tranquility of the Impact Crater Lake -Lappajärvi area and he used shapes from the nature in his designs. Alvar Aalto considered the town of Alajärvi his spiritual home, and his early works can be seen in the town center. The cultural event Alvar Aalto Week celebrated the architect's local contributions, lifetime achievements, and significance to the region's cultural life. With this abstract we want to provide a point of view of how geoheritage serves as a source of cultural inspiration, emphasizing the importance of local identity and the profound impact of historical and cultural figures on the region.

keywords: geoheritage, culture, local identity, arts, history, museums

Connecting Geology, Culture, and Community through cooperations between different (and complementing) UNESCO designations promoting the Agenda 2030

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Topic: (6) Geo Heritage

Title: Connecting Geology, Culture, and Community through cooperations between different (and complementing) UNESCO designations promoting the Agenda 2030

Larissa Arras | Bergstrasse-Odenwald UNESCO Global Geopark, Germany

Since the development of the different strands of UNESCO designations, the ambition has always been to use the unique mandate to enhance life for all humanity. This especially counts for the natural areas of significance. There are three different that work towards these goals with specifications for each programme – and hence, each designated site. However, there is a huge opportunity for the programmes to work together, collaborate, cooperate and with this, support the overall message the United Nations stand for – especially the Agenda 2030.

Where some sites bear multiple designation status and maintain protection with a multi-faceted approach, UNESCO also encourages different designations existing in their own right to connect. Particularly fruitful links and cooperations almost offer themselves when UNESCO sites of different designation are relatively closely situated to another in a region and share a number of factors: this extends for example to the geographical and geological context or catchment area for (day) tourists or general recreation for the public in natural or cultural aspects.

UNESCO Global Geopark Bergstrasse-Odenwald includes eight UNESCO designations inside the territory. There are long standing cooperations between the UGGp and WHS Messel Pit, WHS Lorsch Abbey as well as more recently with the UNESCO City of Literature Heidelberg. Connection also exists to the UNECSO Chair in Heidelberg. An intense collaboration with the WHS Limes (Frontiers of the Roman Empire) and a cooperation at hand with WHS Mathildenhöhe Darmstadt broaden the spectrum. Another cooperation is the collaboration with UNESCO Project Scholl Buchen (High School), where a multi-aged Geopark Workshop is active across a number of years. Together with WHS Messel Pit there have been and there are numerous cooperation activities such as elaborate exhibitions, exploring days (UN Day of the Earth e.g.) and the Information Centre serves as Entrance for the Geopark. WHS Lorsch Abbey developed a broad access to experimental education regarding life in mediaeval times. In regard to biodiversity, our Geopark became specifically involved in this supporting a rebreeding project for an old aurochs breed and hence raising awareness for diversity regarding species, genomes and also habitats. A joint project with the UCL Heidelberg currently encourages authors and writers to participate in the “Greenhouse Project”: they are invited to connect to individual outdoor spaces and create pieces of literature around the topic of nature and the Geopark through the seasons. This is only a small number of examples how the cooperation between different UNESCO designations can reach out to a broad audience and people of different interest and ages. It is a way to bring people, nature and culture together over and over again. The network invites many forms of synergies promoting the Agenda 2030 – especially focussing on e.g. resilience, climate change, biodiversity and other aspects. They are all covered by different approaches and activities of education for sustainable development and support the overall goals of UNESCO, which are peace building and mutual understanding between the nations.

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keywords: Cooperation between UNESCO designation, Agenda 2030, EDS

Valuing the Ethnographic Heritage: springs, threshing floors and limekilns

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Topic: Geo Heritage: Culture

Title: Valuing the Ethnographic Heritage: springs, threshing floors and limekilns

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Key words: Ethnographic Heritage, Intangible Cultural Heritage, springs, threshing floor, limekilns

The limestone is the most abundant rock in Sierras Subbéticas UGGp and it is distributed and scattered in all corners of the Geopark. The inhabitants knew how to take advantage of it to make traditional constructions using the dry stone technique. Even today, we can find that rural and mountain architecture, whose base is the stone, and it is possible to distinguish structures, which for several centuries were linked to the economy of the area.

Among the remains, circular threshing floors predominate, where until 50 years ago, wheat was threshed to separate the grain from the spike. Most of the threshing floors are located in high areas of the mountains with a stone wall to support the base on which they sit, given the steep slope of the hillsides.

On the other hand, it is common to find stone walls that served to separate arable land from the pastures or also as boundaries between farms and municipal areas.

In addition, springs and troughs are delimited with carved stones and with stone are also built the limekilns, where the inhabitants of Subbética traditionally prepared the limestone extracted from the mountain until it became quicklime. This quicklime has many uses and was used in construction as mortar, once mixed with soil and water as fertilizer, as disinfectant in diseases, and to whitewash houses or farmhouses. The oldest limekiln in the region dates back to Roman times.

When these generations who dedicated themselves to these traditional tasks disappear, this form of economy and culture will disappear with them. In this way, it is important to value and make known to the citizens this Ethnographic Heritage based on the dry stone technique that has been preserved for centuries in the Sierras Subbéticas mountains, an art which in 2018 was declared an Intangible Cultural Heritage of Humanity by UNESCO.

With this aim, from Sierras Subbéticas, working in touch with the Association of Municipalities of Subbética, several ethnographic elements were selected to be restored, precisely due to their proximity to a trail of public use. Seven springs have already been improved, in which troughs and dry stone walls have been restored, amphibian ramps and wooden dams have been installed, and the surroundings have been reforested. In addition, action has been taken in six threshing floors where the paving of stones of the base has been recovered and the dry stone wall has been reconstructed. Finally, three limekilns have been upgraded.

keywords: Ethnographic Heritage, Intangible Cultural Heritage, springs, threshing floors, limekilns

Geotourism and Geoparks

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The presentation will report on an EEA Grants funded project on the subject of Geoparks and Geotourism, 2022-2024, with a budget of about 129.000 Euros.

The lead partner was AGH University in Krakow, Poland. Other partners were the Holy Cross Mountains UNESCO Global Geopark in Poland and the University Centre of South Iceland in cooperation with Katla UNESCO Global Geopark in Iceland.

The main components of the projects involved the development of a Postgraduate study programme in Geotourism, an online E-book as an academic textbook for the programme, Field guides and Staff training.

keywords: Postgraduate, Geoparks, Geotourism

"Vikos-Aoos UNESCO Global Geopark: Recent Initiatives for the Promotion of Geotourism"

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To promote geotourism and enhance awareness among visitors and the local community, the Vikos-Aoos Geopark implemented the "Enhancement of Geosites and Geological Formations and Evaluation of Visitability of Geosites and Landscapes of High Aesthetic Value in Vikos-Aoos Geopark" project from 2022 to 2024. This project comprised three key initiatives. First, an online application was developed to improve the informational and interpretative services of the Geopark, accessible in visitor centers and on mobile devices. The application integrated comprehensive materials about the geological, natural, and cultural heritage, including texts, photographs, 360-degree photos, and videos, providing a unified and detailed presentation. Additionally, buildings provided by the two municipalities within the Geopark were adapted to serve as Geopark information centers. Second, outdoor viewing platforms were installed at key locations to highlight significant geosites and landscapes of high aesthetic value. Three suitable locations with high visitor traffic were selected, and aerial photographs were used to showcase more geological features than could be seen from the ground level. Third, a visitor counting system was established across eight sites along major hiking trails, which either end or pass through notable geosites and landscapes such as the Dragon Lakes (i.e. alpine lakes) of Smolikas and Tymfi mountains, the Voidomatis springs, and the gorges of Vikos and Aoos. This initiative provided valuable insights into visitor numbers and seasonal trends for the first time, sparking further considerations about the future of geotourism and overall tourism in the Geopark territory. These initiatives have laid a strong foundation for sustainable tourism development within the Vikos-Aoos Geopark. By integrating advanced technology and infrastructure improvements, the project has significantly enhanced the visitor experience and awareness of the region's unique geological and cultural heritage. The insights gained from visitor data provide critical information for future planning and management, ensuring that geotourism growth aligns with conservation goals. This project could serve as a model for other territories aiming to balance tourism development with the preservation of natural and cultural resources.

keywords: Vikos-Aoos, geopark, geotourism, geosites

AROUCA CRAFTS CENTRE – HANDICRAFT INCUBATOR AND ACCELERATOR IN THE AROUCA UNESCO GLOBAL GEOPARK (PORTUGAL)

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The Arouca Crafts Centre serves as an incubation hub for local artisans and was established with the support of the European Structural Funds through the FEDER project 'ROTA Criativa - Traditional Crafts and Creative Art Network'. This initiative was implemented in the Arouca UNESCO Global Geopark (UGGp) through a collaboration between ADRITEM's Local Action Group and the Municipality of Arouca. From 2017 to 2019, the project aimed to: (i) provide personalised support to each artisan to help them to improve and create new products through training; (ii) provide guidance on product design, business management and marketing; (iii) promote and revitalise local arts and crafts; (iv) strengthen the identity of the Arouca UGGp through local crafts; (v) establish a Crafts Centre for training and showcasing artisans' products within two years; (vi) cover the costs of water and electricity for the Crafts Centre; (vii) assist in enhancing ROTA Criativa's activities, focusing on collaboration, promotion, and support for artisans.

Following the training programs and collaborative efforts with artisans, the project culminated in the opening of the Arouca Crafts Centre, located in a quaint shop within the historical centre of Arouca, which is supported and managed by the Arouca Town Council. This exhibition showcases the creations of 20 artisans who utilize a variety of materials, including slate, wood, paper, leather, cork, fur, ceramics, and textiles. Additionally, it features handmade confections, honey, jams, and liqueurs. This centre is very important for the community, especially for those working in crafts. It provides the tools they need to start their own businesses and a special place to sell their goods. At the same time, the projects have led to the creation of new, high-quality products that showcase the identity of Arouca UGGp, holding great artistic and cultural significance.

Recognizing the significance and achievements of this initiative, the Municipality of Arouca has maintained its management of this space for two years, covering all rental expenses. It continues to support both the existing artisans at the Crafts Centre and newcomers, particularly in their registration with the official system for acknowledging artisanal producers in Portugal. This includes assistance in obtaining the Artisan's Charter and the Artisanal Production Unit, as well as fostering the development of new products that draw inspiration from the natural and cultural heritage of the Arouca UGGp. The local artisans are essential for the daily operation of the Crafts Centre, working on a rotating schedule to display the best products of Arouca UGGp to visitors and tourists. Many of the handcrafted items produced are available for purchase at the Birthing Stones - Interpretation Centre (IC), the Trilobites Museum, and the Arouca Tourist Office. Additionally, in collaboration with a designer, a new line of exclusive products inspired by the region's identity has been developed and is sold at the Arouca Municipal Museum and Birthing Stones IC. This initiative exemplifies best practices at Arouca UGGp, merging innovative handicraft production with community involvement, resulting in significant socio-economic advantages. It is aligned with the objectives of the 2030 Agenda for Sustainable Development, particularly SDG8 (Decent work and economic growth) and SDG17 (Partnerships for the goals).

keywords: aroucageopark geotourism handicraft

Wine as an integrated local product in Algarvensis Territory

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Wine as na integrated local product in Algarvensis Territory

The geological characteristics of the Algarvensis territory, along with its climatic conditions, have created a combination of factors beneficial to the production of wines, with very unique, differentiated characteristics and with a seal of quality that makes them increasingly attractive on the national and international markets.

The vineyards grow, mostly in clay-limestone and sandy soils, with several autochthonous varieties such as"Negra Mole", national varieties, such as Aragonês, Arinto, Alvarinho or Verdelho, and also foreign grape varieties, such as Syrah, Sauvignon, Chardonnay among others, which results in this product, of a geographical origin, thus assuming itself as a distinguishing and identity element of the territory. At the same time it allows, in certain geographical contexts, the reduction of the risk of soil desertification.

In addition to this physical dynamic (soil and climate), there is an human activity in the farming, treatment and picking of grapes, as well as wine production. These are, in some cases, ancestral practices, adapted to modernity, with a strong identity bias and local roots.
With this outline, wine production in the Algarvensis territory has become an integrated geotourism initiative, combining the production component with the economic dynamization of territories that tend to experience demographic loss, thus promoting territorial cohesion.

The contribution of this wine production, in a markedly touristic territory, also finds an integrated aspect with other local activities such as gastronomy or culture, developing synergies around events such as, for example, «Jazz nas Adegas».
In short, the commitment to this geoproduct, and all the inherent physical and human dynamics, constitutes a compromise with integrated and participated local sustainable development. For this reason, it is aligned, in particular, with UNESCO's Sustainable Development Goals, specifically with SDG 11.4. protection of cultural and natural heritage, from SDG11 sustainable cities and communities and with SDG 15.3 combat desertification and restore degraded land, from SDG15 protect life on land.

keywords: wine; production; geographical origin; integrated development

A georoute in Grevena – Kozani UGGp combining local traditions in customs and gastronomy

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The significant geodiversity of Grevena - Kozani UNESCO Global Geopark is reflected both in the geomorphology of the area and in its products. The planning and implementation of the geotourist routes is done in such a way as to highlight the geoheritage of the Geopark, combining local traditions in customs and gastronomy. For example, on a geotrail of about 70 km in the central part of the Geopark with easy access from Highway of Egnatia Odos, starting and ending at the two flagship geosites, the visitor can admire the majesty of nature and experience unique experiences.

The georoute begins from the area of Grevena, the village of Spilaio and the gorge of Portitsa. This site is one of the emblematic geosites of the Grevena - Kozani UGGp and was formed by the action of erosion during the melting of the glaciers and tectonics. At its base there is the stone bridge of Portitsa, bridging the two banks of the Venetikos River, creating an outstanding view. Then, heading east, the route passes pastures with herds of organic livestock and scattered fields of aromatic plants. In the mountainous region of Mt. Orliakas, a Cretaceous reef with mixed forest, mushroom picking and cooking in nature takes place. Followed by a visit to a traditional cheese factory in the town of Grevena, learning the process of cheese making and tasting of local cheeses.

Continuing towards Mt Vourinos in the area of Kozani, there is a guided tour of the other flagship geosite of the Geopark, with the two tectonic plates, Europe and Africa, coming together in the Mesio Nero valley, offering the special flora and fauna, with globally recognized geosites with high geological value. After a brief stop at one of our top geoheritage viewpoints, we tour in Magoutes 100-year-old vineyards of Siatista area, to learn about the unique wine traditions of this region and their connection with the geology and Geopark. An example of sustainable development is the Magoutes winery, which maintains the tradition of the new sustainable methods of producing high quality wine.

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keywords: geoheritage, georoute, tourism, Grevena, Kozani, geosite, Greece, Geopark, Geodiversity

Partnership with focus on sustainability and local contribution

Søren Lisby[1].
[1]Geopark Det Sydfynske øhav (DK).

At the EGN 2024 we would like to do a poster presentation of our partnership program, which purpose is to motivate local businesses, organizations and associations to a more sustainable development create an awareness of their contribution to the local society and to establish and develop a strong community that embraces the diversity, strengths and geography of the Geopark – everything to the benefit of the local citizens and guests in the district.

In principle, anyone with a Danish business registration number in Geopark Det Sydfynske Øhav can become a partner, if they can identify with the objectives and criteria of the partnership program.

With sustainability as a fundamental premise of a partnership, partners are required to document sustainability initiatives in their company or organization, and at the same time develop a plan for future sustainability efforts. Furthermore, we want the partners to describe how they create added value in their local area
Finally, partners are expected to participate in the annual Partner Day and to communicate Geopark news and values to local citizens and visitors through their own media and staff.

In return, partners can use the special partner logo of the partnership program and are given a presentation on the Geopark website and access to a special communication package with photos, videos and promotional texts. In addition, the partnership program invites co-creation, in which new networks can be formed across sectors, interests and geographical boundaries.

The partnership program is anchored in the Geopark organization which the board bears the overall responsibility and formally approves all significant changes to the programme. As an objective institution in the program a partner committee has been set consisting of elected partners and appointed representatives.

To this date we have 55 partners in the partnership program.

keywords: Partnership, sustainability, local contribution, network, ownership

The wonderful world of the Nagy-berek marshland: an atypical, yet 'geoparkian' visitor centre in the Bakony–Balaton UNESCO Global Geopark, Hungary

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[1]Bakony–Balaton UNESCO Global Geopark (HU).

Although we always emphasise the holistic concept of geoparks, which means the conservation and presentation of abiotic and biotic assets and cultural heritage of the area, our experience is that a typical visitor centre in a geopark is dominated by geological knowledge and exhibits, illustrations on geological phenomena, etc. We believe that an area without wild gorges, spectacular minerals, rocks and fossils, also deserves geotourism facilities and services.

A small visitor centre opened near Fonyód in 2022, on the southern shore of Lake Balaton. The aim of the facility is to present the unique littoral wetlands (local term for them: 'berek') that once surrounded the lake. The bogs have almost disappeared as a consequence human activities. The fate of these areas is intertwined with Lake Balaton, which is of major importance in Hungary, especially for tourism.

The visitor centre focuses on the Nagy-berek ('Great Berek'), which still shows traces of the once extensive marshland. The main attraction is a multisensory exhibition on the geological history of the area, the evolution of Lake Balaton, the wildlife of the area and how man has shaped this landscape. The staff introduces visitors to the world of the 'berek' through presentations, activities, and guided tours.

Five thousand years ago, our ancestors were already familiar with an image of Lake Balaton which survived until the middle of the 19th century. The shape of the lake was much the same as today. The most striking difference between the lake then and now is the presence of the 'bereks' (marshlands), some of which are still present in patches. The two largest of these are the Kis-Balaton ('Small Balaton') and the Nagy-berek, which once formed an integral whole with Lake Balaton. The 'bereks' of the southern shore of the lake were created by the prevailing north-westerly winds. The waves generated by the winds created barriers (baymouth bars), behind which the 'bereks' were formed.

The restless, landscape-shaping man has not only regulated Lake Balaton and the waters that feed it, but also the 'bereks', in order to make them cultivable and exploitable. The owners of these areas succeeded in regulating the lake by lowering the water level, largely with public money. Their efforts were crowned with success. In 1821 they dismantled one and later several water mills in and around Siófok. Their dams had prevented the waters of Lake Balaton from flowing down the Sió (a largely artificial watercourse capable of draining the water from the lake into River Danube). The removal of the dams lowered the water level of the lake and thus the 'bereks' by about 2.5 metres. This marked the beginning of the regulation of Lake Balaton, which irreversibly sealed the fate of the 'bereks' and the lake. Later, in 1861, a railway was built on the southern shore. The railway company that invested in the project, in order to protect the railway line and in cooperation with the growing and expanding beach associations, succeeded in building the Sió Canal, which could be operated in a regulated manner, and led to a further reduction in the water level of Lake Balaton and the 'bereks'. At the same time, special associations were established, whose work over the decades left only a trace of the former wetlands. Today's Nagy-berek, with its drained landscape, although still enchanting and rich in treasures, are the work of man. The Fehérvíz Bog Nature Conservation Area in the south and small patches of the 'bereks' that remain in places indicate the amazing marshland that once lay here.

keywords: geotourism, holistic approach, wetlands

Challenges and strategies in the visitation management of Caldeira Velha geosite in Azores UNESCO Global Geopark

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[1]Azores UNESCO Global Geopark (PT); [2]Regional Secretariat for Environment and Climate Action (PT).

Caldeira Velha, located on the northern flank of Fogo Volcano, São Miguel island, is an area of secondary volcanism composed of fumaroles and an iron thermal spring that sprouts from a fracture at the base of a trachytic *coulée*. The spring, and the associated stream, feed two waterfalls, the second of which has a dam at its base, which creates a pleasant bathing area surrounded by lush vegetation. Currently, the thermal spring has temperatures of 31°C, while in the dam the water reaches temperatures of 25°C to 27°C. Further downstream, there are three other thermal pools (heated by the fumarole), where it is possible to enjoy a relaxing thermal bath at temperatures of 38°C. This geological site is a Natural Monument and a geosite of the Azores UNESCO Global Geopark (Azores UGGp), with regional relevance and scientific, educational and geotouristic interest and use. The characteristics of this site, known for its thermal waters and lush vegetation transformed it into one of the most visited geosites in the island. Measures to protect and value this site were intensified in 2013, with the construction of the Interpretation Centre of Caldeira Velha with touristic and educational purposes, providing a journey to discover the geodiversity of the island and the natural heritage of the Azores, highlighting the Azores UGGp. The increase of visitants to this site, for visitation and/or thermal baths urged a more effective management of touristic visitation. The carrying capacity was set to a maximum of 250 visitors simultaneously, with no time restrictions, which was still not enough to assure preservation of the natural values of the site and a pleasant and unique experience for visitors. In 2018 several revisions were implemented, including free ticket for residents and the introduction of two types of admission tickets (with or without thermal bath), consequently, the carrying capacity was adjusted in two slots accordingly. The onset of COVID-19 introduced a range of challenges that required a thorough review of the visitation regulations for Caldeira Velha. The timing was contemporary with a new management of the site, with the Regional Secretariat for Environment and Climate Action assuming the responsibility and establishing an effective system of visitation that set a limit of time for the purchased tickets, and implementing an Online Ticket Office that features a unique QR code for both check-in and check-out purposes. This system ensures adherence to designated visiting times while effectively managing visitor's capacity simultaneously. Strategies implemented in the visitation management of geosites, are the result of a joint work of governors, stakeholders and partners, ideally leading to the balance between use and geoconservation.

keywords: Caldeira Velha, geosite management, carrying capacity, geotourism

The European Charter for Sustainable Tourism: the experience in the Apuan Alps UNESCO Global Geopark

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UNESCO Global Geoparks have the purpose of exploring, cultivating and celebrating the links between their geological heritage and all other aspects of the area's natural, cultural and intangible heritages. Together with various forms of transmission and interpretation of the geological heritage, be they education and training of local communities, projects for schools and more, tourism – and most notably geotourism –constitutes one of the main pillars of a UNESCO Global Geopark when it comes to promoting the sustainable economic development of their territory.
Geoparks are naturally committed in heritage interpretation and actively promote their territories as sustainable tourism destinations. Thus, they need a local tourism strategy that honors the principles of sustainable tourism and also builds synergies and collaboration in the form of formal agreements with local players that share the same goals and intents.
For the Apuan Alps, a versatile and participatory approach to achieve this was also offered by the European Charter for Sustainable Tourism in Protected Areas (ECST), a certification awarded by the Europarc Federation for the commitment of Protected Areas to promoting responsible and sustainable tourism. Through long-term environmental and social management practices, the ECST ensures that the high-quality experiences offered to tourists and visitors respect the environment, contribute to local development and promote the culture and traditions of the host community.
Collaboration and partnerships are at the core of every step and phase of the ECST: from the development of a sustainable tourism strategy and program up to its implementation, this tool encourages all stakeholders of the Protected Area, both public and private, that are involved in tourism to share responsibilities and engage with each other.
With this contribution, we highlight the merits of adopting the ECST as a means to improve stakeholder relationships and sustainable development in our Geopark through tourism best practices, as well as the results achieved for the Geopark.

keywords: ECST, Geotourism, sustainable development, community participation, stakeholder involvement

Nature- and culture history in Gea Norvegica UGGp - Guided tours with focus on nature history and landscape art

Kristin Rangnes[1].
[1]Gea Norvegica UNESCO Global Geopark (NO).

Gea Norvegica UGGp in Norway has an interesting cultural history – from 9000 years old Stone Age settlements and bronze age rock carvings, followed by Viking heritage, mediaeval churches and other buildings, to modern art and architecture. Attractive landscapes have inspired artist and playwrights, interesting rocks are used by sculptors and the coastal areas have been important for development of a vivid coastal culture with long traditions. The connections between the geological landscape and cultural heritage are many and often used in our visitor programs and guided tours.

Among the famous artist that were working or born in the geopark area are the painter Edward Munch and the playwright Henrik Ibsen. Less known internationally is Theodor Kittelsen, born in 1857 in Kragerø, one of the Geopark towns. Kittelsen, mainly known as the artist giving trolls and other imaginary creatures their look, was also a very skilled landscape painter and his works are at the moment among the most valuable among Norwegian art works.

Gea Norvegica UGGp is conducting two different concepts regarding the life and art of Theodor Kittelsen in Kragerø – in cooperation with small enterprises from the tourism segment. One is an art curator specialized in Kittelsen and Munch.

This presentation focus on the guided Geopark tour on our outermost island Jomfruland (“Virgin Island”). This popular guided tour includes life and art of Kittelsen, art history, the histories of the landscape that rose from the sea after last Ice Age, the rocks found in the large morain and their histories. But also the daily life and history of the local population, born, raised and living on this rather small island, are parts of the tour.

Jomfruland is also one of the youngest National Parks in Norway and the visitor center of the National Park is connected to this guided tour – based upon a well-established and well-functioning cooperation.

keywords: communication art geoscience education

Strengthening geotourism and geoeducation through a common calendar of activities within the Portuguese Network of UNESCO Global Geoparks

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The Portuguese Network of UNESCO Global Geoparks asserts itself through networking, empowerment of the teams and stakeholders, creation (or encouragement to the creation) of new products and services that consolidate the concept of ‘’UNESCO Global Geopark’’ (UGGp) in the designated territories. The different activities are framed in an Annual Plan of the Network and are promoted through a common calendar, released in the common social media, thus strengthening the image of the Network and ensuring that topics of special relevance to geoparks are operated in a balanced way across all. We choose to highlight two sets of common activities occurring during 2024: ‘’Birdwatching in Portuguese Geoparks’’ and ‘’Routes of Flavors and Senses’’. These activities where encouraged by the Tourism of Portugal and serve a dual purpose: promote awareness among the community and visitors on the natural and cultural identity of the territories; stimulate the development of new touristic products and services that are in tune with the UGGp concept. Birdwatching is one of the most popular ways of exploring nature and to be in contact with the different values associated to it. The activities promoted during 2024 in the different Portuguese UGGp are part of an intense work under development that includes the identification of the diversity of species, definition of hotspots for its observation and mechanisms of promotion within the network, with the support of Tourism of Portugal. The ‘’Routes of Flavors and Senses’’ have a wider scope and aim to engage communities, visitors, producers, restaurants and stakeholders in creating a link between food and geological heritage in using a storytelling that promotes sustainable agriculture, circular economy, identity of the territories, local traditions and know-how. This set of activities promoted through a common calendar and released in the social media, where developed with the participation of strategic partners, bringing them closer to geoparks and stimulating the development of a wider geotouristic offer through a holistic approach (in the DNA of Geoparks) as well as the awareness of the values involved.

keywords: Networking; Geotourism; Birdwatching; Geoproducts

From basic research to the public: the example of the project “BROMACKER”

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The "BROMACKER" project started in 2020 with the participation of four cooperation partners in Germany to tackle the difficult task of interlinking basic research and knowledge transfer for the public audience. The research activities are mostly located on the Bromacker Lagerstätte (Lower Permian) in the UGGp Thuringia Inselsberg-Drei Gleichen (Central Germany) that has represented for more than 100 years one of the most significant and productive fossil deposits for terrestrial tetrapods. Beside articulated skeleton findings, desiccation cracks, plant remains, invertebrate trace fossils, jellyfish impressions, the vertebrate tracks for which the Bromacker locality is famous, as well as evaporation and raindrop marks, are commonly preserved on the lower surface of sandstone slabs. The site is unique in the world in terms of fossils conservation and large biodiversity. Alongside several digital and physical exhibitions such the Bromacker-Lab in Gotha, a further new approach is the activities on social media during the excavation campaigns and guided tour combined with the local infrastructures. Researchers and technical staff are explaining daily their various activities in short and simple terms with the aim of attracting attention of younger groups in scientific research. Year after year the number of visitors on the fossil site and on therelated social media had a relevant increase with a positive economical return for the local area, with an associated expansions of the related events. This integrated approach is providing a rise of visitors also in the other areas of the Geopark and showed to be a valuable tool of promotion of geological research and geotourism.

keywords: Thuringia, Geopark, Bromacker fossil site, knowledge transfer

Much more than a simple walk... visit the Algarvensis aspiring UNESCO Global Geopark and let us guide you and tell you a story!

Hélder J.R. Pereira[1], Francisco M.V. Lopes[1].
[1]GeoWalks & Talks – Geotourism in the Algarve, Loulé (PT).

GeoWalks & Talks® was the first company specialised in geotourism operating in the Algarve region, of southern Portugal. Since 2016, we have been valuing and promoting this region's geodiversity, and geoheritage. To do so, we have been using geoscience communication as a way of promoting public engagement with geoconservation, and protecting the natural environment for future generations. This is particularly relevant, as the sustainable development of geotourism, at the local level, depends on the management and effective protection of the geoheritage.
In this context, we have developed a series of guided walks throughout the region, during which we utilise storytelling techniques to unveil certain aspects of the planet's geological history that are concealed within the landscapes and the geological wonders of the Algarve. The setting of some of those stories is located within the territory of the Algarvensis aspiring UNESCO Global Geopark (aUGGp). Here we present a selection of examples of this territory's geological features and associated narratives.
In the municipality of Loulé, at the Rocha da Pena Local Protected Landscape, we have been engaged in the dissemination of the «*Story of the Algarve's Super Salamander*». The geological narrative of this story is based on the discovery of fossilised remains of the primitive amphibian *Metoposaurus algarvensis*, which has been designated as the mascot and logo of the Algarvensis aUGGp. The guided walk starts and ends at the typical village of Penina, where the inhabitants have been engaged in these activities acting as principal agents in the preservation of local traditions, and both cultural and natural heritage.
In the municipality of Silves, at Vale Fuzeiros, the main protagonists of the «*Stories of Ancient Oceans and Mountains*» are the rocks exposed in the nearby outcrops, which are the evidence of the geological processes that shaped the landscape. The geological narratives embedded within the visible characteristics of the rocks and the surrounding landscape are intimately connected to the Pangean mountains and long-vanished oceans.
In the municipality of Albufeira, at the coastal cliffs near the Arrifes beach, the arrangement of the geological strata resembles a series of books on a shelf. This led to the development of the «*Arrifes Beach Library Stories*», which are based on the geodiversity of the area. These geological narratives enable us to embark on a temporal journey, not only to a period when dinosaurs still roamed the Earth, but also to a more recent tropical Algarve, whose palaeontological record indicates that its nearshore waters were warmer than they are today.
Join us on a visit to the territory of Algarvensis aspiring UNESCO Global Geopark, and let us guide you and tell you a story!

keywords: Geotourism, guided walks, storytelling, Algarvensis aUGGp, Algarve, Portugal

Cooperation project: "STRENGTHENING, PROMOTION AND NETWORKING OF UNESCO GEOPARKS" – of CLLD/LEADER RDP 2014 – 2020, Greece

ARGYRO TSIMPRI[1].
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17th European Geoparks Network Conference
Oral Presentation
Theme: 3. Geotourism (Geopark areas cooperation project)

Cooperation project: "STRENGTHENING, PROMOTION AND NETWORKING OF UNESCO GEOPARKS" – of CLLD/LEADER RDP 2014 – 2020, Greece.
The Cooperation project: "STRENGTHENING, PROMOTION AND NETWORKING OF UNESCO GEOPARKS" relates to: the promotion and enhancement of nature and landscape, of the cooperating Geoparks (recognized by UNESCO), as natural heritages of national and global importance, the implementation of actions for the protection of the environment (in the areas of the geoparks and in the zones close to them), as well as their further networking with similar networks - local bodies through: electronic interconnection (web pages, websites, databases, etc.), participation in exhibitions, conferences, etc.
The main objectives of the project are:

- The promotion and enhancement of the cooperating areas' nature and landscape, as natural heritage of national and global importance
- The upgrading of ecotourism in the cooperating areas - through the joined promotion of the biodiversity and geodiversity of the areas - as well as their sites of archaeological, religious, historical and cultural interest
- The development and strengthening of the local economy - reinforcement of existing tourism infrastructure
- The design and promotion of a special label for local agri-tourism products and services in the cooperating regions, based on quality standards that meet the requirements of the global market
- Strengthening networking between the Geoparks

The project cooperation has 4 partners (CLLD/LEADER Local Action Groups - LAGs) from different regions in Greece (Achaia, Epirus and 2 of Crete)
1. LAG ACHAIA – DEVELOPMENT AGENCY S.A. - Coordinator
2. LAG DEVELOPMENT AGENCY OF EPIRUS
3. LAG DEVELOPMENT AGENCY OF AKOMM - PSILORITIS
4. LAG DEVELOPMENT AGENCY OF LASITHI

The project is implemented within the framework of the CLLD/LEADER Programme, Submeasure: 19.3: "Support for the preparation and implementation of inter-local and transnational collaborations" of Greece's Rural Development Programme (RDP) 2014-2020.

EUROPEAN AGRICULTURAL FUND FOR RURAL DEVELOPMENT
Europe investing in rural areas

keywords: COOPERATION, CLLD/LEADER, GEOTOURISM, ECOTOURISM, RURAL AREAS, NETWORKING

MagmaUNESCO2030 – a tourism project to unify the region

Ulf Tjåland[1].
[1]MAGMA GEOPARK AS (NO).

How to unify the Magma Geopark region and create one common sustainable tourism strategy based on a focused geological storytelling and a bottom-up approach involving municipalities, private companies and other partners.

Background
Magma Geopark - situated on the south-western coast of Norway - covers 5 municipalities in 2 counties. All 5 municipalities have their own tourism budget and strategy. There is no common focused strategy, and the region does not perform well as a tourist destination. Historically there has been many initiatives to cooperate across the municipalities´ borders, but with no long-term success.

The project MagmaUNESCO2030 started early 2021 as a 3 yearly project to unify the municipalities, the private companies and different partners behind one common strategy to develop a sustainable and more year-around tourism in the Magma Geopark. The goals were more efficient use of financial and human resources in the region, more visitors and a clearer local understanding of the Geopark. The project was based on our UNESCO designation, and we wanted a very strong involvement and dedication from municipalities, counties, private companies and other partners. We wanted to base the strategy on understandable and engaging geological storytelling.
The project was finished April 2024 and has been successful. We present the project with goals, finance, methods and tools used and show some of the results.

Presenter/Author: Ulf Tjåland, General Manager Magma Geopark

keywords: GEO Tourism, Sustainability, Cooperation, Storytelling, Local Engagement

The Granada Geopark as a new territorial framework for a sustainable tourist destination

Teresa Ortega-Egea[1], Francisco Juan García-Tortosa[2-3], Myriam Prieto-Labra[3], Silvia Marcos-Expósito[3], Natalia Guidoni[3], María Esperanza García-Badillo[3].
[1]Granada University (ES); [2]Jaén University/Granada Geopark (ES); [3]Granada Geopark (ES); [4]Granada Geopark (ES); [5]Granada Geopark (ES); [6]Granada Geopark (ES).

ABSTRACT

The Granada Geopark is located in the southeast of the Iberian Peninsula (Spain), in the north of the province of Granada. The Geopark is composed of 47 municipalities, which belongs to four districts: Huéscar, Baza, Los Montes and Guadix, most of which have a population of less than 1,000 inhabitants. The territorial unit for this Geopark, one of the largest in Europe with more than 4,700 km², is the Guadix-Baza Geological Basin. Its main uniqueness consists on housing one of the best continental geological and paleontological records of the Quaternary Period worldwide. Among the 73 geosites of interest currently inventoried within the Geopark of Granada, many of them are paleontological sites that have been promoted as tourist resources for decades. Another important set of geosites is related to the badlands landscape, which extends throughout the Geopark's territory and is being highlighted thanks to the creation of the Granada Geopark. Additionally, together with the paleontological and geomorphological sites of interest, other geological aspects are being brought to the fore by marked and interpreted routes, to show the Geological History of the Granada Geopark.

Prior to the creation of the Granada Geopark, this territory was known for its rural accommodations dug into the ground (cave houses). It was also known for some significant archaeological sites. However, there was no a territorial framework that unified its most relevant tourist resources. Thus, each of the four districts, used to work as independent touristic destination, disconnected with the rest, despite of sharing all the most important heritage aspects, not only geological and archaeological but also historical and cultural.

The geotourism is a sustainable type of tourism involving various nature sports, scientific arrangements and educational activities having an audience consisting on tourist groups, supporting environmental and cultural protection (Çiftçi and Güngör 2016). In addition, geotourism also aims the local and regional development by encouraging local community participation to the processes of protection, planning and decision making and to organize training events in order to raise awareness about geological heritage. Such kind of tourism creates certainly major opportunities for the geoparks (Özgeriş and Karahan, 2021).

The geotourism contributes to the creation of business in local communities by offering tourist experiences for visitors. In this study, we analyze the current situation of the Granada Geopark territory in relation to tourism in general and geotourism in particular. With this aim, we have gathered data on visitors from the tourist information service of the Granada Geopark since the territory joined the UNESCO Global Geoparks Network in 2020. Additionally, we have made an inventory of the new tourist companies and accommodations created in the territory since we are an Unesco Geopark.

Within all this information and data, we have analyzed the influence of the new territorial framework represented by the Granada Geopark on the creation of new businesses related to tourism and how these new companies are situated according to the location of the most demanded resources by visitors. We also examine and study how the interest in geological tourist resources has increased compared to other heritage resources demanded before the creation of the Geopark, such as some significant archaeological sites.

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keywords: Granada Geopark; tourist resources; local business

CROSS-BORDER SUSTAINABLE DEVELOPMENT OF RESILIENT, GREEN TOURISM PRODUCTS AND MANAGEMENT OF PUBLIC TOURISM INFRASTRUCTURE AND VISITOR FLOWS IN THE KARAWANKEN/KARAVANKE UNESCO GLOBAL GEOPARK

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The Karawanken/Karavanke mountains face increasing recreational use, leading to environmental and cultural degradation. Issues include individual car travel, littering, erosion from cyclists, forest damage from skiing, and disturbances to wildlife. These threats undermine the area's natural beauty and appeal.

The GreenTour project, which is implemented in the frame of INTERREG Slovenia – Austria programme aims to establish resilient and responsible tourism management, leveraging Geopark Karawanken/Karavanke's natural and cultural assets through bilateral cooperation. Geopark will link regions, with tourism organizations managing marketing, guest services, and infrastructure, and the Institute for Nature Conservation protecting sensitive areas.

Management is based on three pillars: Conscious infrastructure management through a "green care" system, including a comprehensive inventory and climate-neutral vehicles; innovative experience development via the Geo.Hub network, connecting service points and exhibitions for services, education, and communication; visitor management based on flow analysis, spatial planning, and guidance systems.

The project's goal is to foster responsible actions among tourism stakeholders and visitors, making Geopark Karawanken/Karavanke a resilient tourist destination. This involves monitoring and minimizing impacts on sensitive areas while improving robust recreational sites.

Cross-border collaboration is essential, as pressures on the area come from both sides. A structured partnership with international expertise will provide sustainable solutions. The project’s innovation lies in its management tools—green care, Geo.Hub, and visitor flow analysis—enabling precise and effective management, ensuring the Karawanken/Karavanke mountains' protection and enhancement.

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keywords: UNESCO Global Geopark, Geopark Karawanken/Karavanke, GreenTour, GeoTourism, Green Destination

Tales and Trails: Enhancing geodiversity and vernacular knowledge in the Sesia Val Grande UNESCO Global Geopark

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Geoparks are employing geotourism initiatives as a means of fostering sustainable regional development, with geotrails representing a particularly popular type of initiative. In this context, this presentation highlights the final step of a PhD research titled "The path of alpine sustainability. Participatory tools for taking care of the cultural and environmental heritage of the Monte Rosa Massif (NW-Alps, Italy)". In particular, the research was focused on the creation of a participatory geotrail in Alagna Valsesia, within the Sesia Val Grande Geopark. The project has already achieved important findings, including the geodiversity and geoheritage maps, the geosites inventory, the analysis of questionnaires submitted to the visitors, and the evaluation of the development of participatory tools and the integration of vernacular knowledge in existing interpreted landscapes within the Northern French Alps. The last phase of the research aimed to develop a communication strategy to enhance and popularize the interpretation of carefully selected geosites and viewpoints along the geotrail.

In particular, the selected geosites correspond to the geostops along the geotrail, each chosen for its potential to both illustrate a geological phenomenon and add elements to the interpretation of the landscape, but also for being connected to the local culture. Specifically, the local Walser population played an active role in the development process, providing insights through traditional narratives, legends, and wisdom. These contributions have been translated into new narratives that highlight the dynamic relationship of the Walser people with the natural environment, so that they can be included in the new geotrail storytelling. In order to popularize both the geological value and the vernacular knowledge, we designed a booklet that offers an insight into the interpretation of the landscape at each geostop. It comprises three principal elements: 1) a geotouristic map, and for each geostops 2) a Walser tale, that has been adapted to reflect contemporary sensibilities and link cultural narratives with geodiversity, and 3) a detailed scientific description of the geological features and processes visible in the landscape. This interdisciplinary approach fosters a stronger emotional and educational connection to the landscape by combining traditional knowledge with scientific interpretation.

Consequently, the geotrail may offer an immersive experience that integrates cultural heritage with geological education. Through its participatory approach, the trail has the potential to engage and raise awareness among both residents and tourists, fostering a shared understanding and appreciation of the region's natural and cultural riches and promoting sustainable development.

keywords: Participatory Geotrail, Geoheritage, Vernacular knowledge, Alps, Geotourism, Informal Education

Promoting sustainable tourism with an action plan in Salpausselkä UNESCO Global Geopark, Finland

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Located in southern Finland, Salpausselkä UNESCO Global Geopark extends from the unique terrains of the first Salpausselkä ridge to the southern parts of the vast Lake Päijänne. Designated as a UNESCO Global Geopark in 2022, it is an internationally significant, continually developing destination especially for tourists interested in nature and cultural heritage. Thanks to its varying terrain, scenery, traditions, services and location, the region is also particularly well suited for sports tourism, especially when it comes to outdoor sports.

Promotion of sustainable tourism is one of the key tasks of the Geopark organizations. Equally important is to foster the natural and cultural heritage of the region, to increase awareness of the valuable geological heritage and its significance, to strengthen local identity and to develop Geopark-themed education and training. The travel trade can take part in fulfilling these tasks by adopting sustainable ways of operation.

In order to advance and strengthen sustainability within the tourism sector in our region, a sustainable tourism action plan was compiled for the Geopark as part of an EU funded development project, in cooperation with LAB University of Applied Sciences, the regional tourism organization Visit Lahti and other stakeholders, including local entrepreneurs and tourism companies. The process included workshops and a seminar. The sustainable tourism action plan for the Salpausselkä Geopark was published in August 2023. At the same time, the Geopark management achieved the Sustainable Travel Finland (STF) label as the first Geopark organization, following the national travel industry sustainability programme.

With the sustainable tourism action plan, covering the period until 2030, we aim to put international and national principles and goals, such as the UN Agenda 2030 goals and Visit Finland's national principles of sustainable travel, into practice in the regional level. The plan defines the principles, the desirable future state of different aspects of tourism, the required actions and actors responsible for their implementation, as well as indicators for the follow-up. Unlike our internationally valuable geological heritage, our plan is not set in stone. We review the goals and actions annually and update them as necessary.

In Salpausselkä Geopark, the work to promote sustainable tourism is well underway, but there is still a lot to do. Success depends on the commitment of the cooperation network in working toward the shared vision. It requires an active approach and continuous learning. Through joint, responsible actions, we can move towards more sustainable tourism.

keywords: sustainable tourism, geotourism, sustainability, Salpausselkä Geopark, Finland

Portugal in the Route of Geoparks: a geotourism program for the national and internacional market

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Partnerships and networking have been one of the pillars of the Portuguese Network of UNESCO Global Geoparks . Among the many common projects that allow to boost our territories, partners and thematic areas of local action, we highlight Geotourism project "Portugal na Rota dos Geoparques" (Portugal in the Route of Geoparks), launched in 2024 at BTL - the Lisbon Tourism Fair, Portugal's largest tourism fair. This project involves the six UNESCO Global Geoparks in Portugal (Arouca, Azores, Estrela, Naturtejo, Oeste and Terras de Cavaleiros), a tour operator partner – OESTETUR- and the Turismo de Portugal, the national tourism entity. Its main objectives are to promote the portuguese territories with the UNESCO Global Geopark designation; to promote the natural and cultural heritage of these six territories; to communicate the tourism values of the territories as a whole; to demonstrate the potential of UNESCO Global Geoparks as a differentiated tourism product and to demonstrate the potential of networking in building a nationwide tourism program.

In light of the above, an integrated tourism program was developed, which in a first phase will take place in the five UNESCO Global Geoparks located in the mainland, and in a second phase in the Azores UNESCO Global Geopark, an archipelagic territory. Considering that a specific partnership has been developed for this project with the tour operator OESTETUR, this program is only available through a reservation with this company. The target audience is the national and international market, focusing both on the general public as well as on more specific niche, such has geotourism and cultural tourism enthusiasts. The program will involves the technical teams and local partners of each Geopark. It is an all-inclusive program that includes 8 days and 7 nights, 8 lunches and 7 dinners in local restaurants, visits to more than 25 geosites and more than 10 museums and interpretation centres. It also includes a dozen of experiences, workshops and boat trips.

The Portuguese UNESCO Global Geoparks believe that projects of this scale and scope contribute to a better promotion of the territories, globally and locally, bringing the concept of UNESCO Global Geoparks to wider audiences, through a networking project that involves the staff, the partners, the local communities and the local and national agents. The goal is to use this pilot project as an encouragement to expand to other touristic agencies, thus increasing the attractiveness of these UNESCO designated territories and sustainable development.

keywords: Geotourism, Networks, Touristic Programs

The role of a tourism promotion platform in a UNESCO Global Geopark - Case study Oeste UNESCO Global Geopark

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The pillar of any UNESCO Global Geopark territory is geotourism. As part of this, there is a need to promote and publicize the territories natural and cultural heritage using different methodologies that meet the respective target audiences.

The Oeste UGGp created the platform visitgeoparqueoeste.com. It is an online platform dedicated to promoting Oeste UGGp territory, and stands out as a differentiating tool compared to other solutions on the market for several reasons. It has a friendly and attractive interface, characterised by its modern and intuitive design, which makes it easy for users to navigate. The interface is visually appealing, with high-quality images that capture the natural beauty of the territory. The site offers a wealth of detailed information about the Oeste UGGp, including its geodiversity, natural and cultural heritage, trails, points of interest, events and available activities. Each section is organized in such a way as to facilitate access to the desired information. It includes interactive maps, tours and digital guides that allow visitors to explore the territory in an immersive way, even before the physical visit. These resources are especially useful for planning trips and discovering specific attractions. One of the site's most ambitious tools is the travel planner, which guarantees the planning and creation of personalized visits and programmes, allowing users to create itineraries tailored to their preferences and interests. It includes options for accommodation, restaurants, transport and recreational activities. To cater for a global audience, the site is available in several languages, facilitating access to information for international tourists.

While many tourist websites cover a wide range of destinations, visitgeoparqueoeste.com specialises exclusively in the Oeste UGGp, offering a depth of information and resources that are difficult to find on more generalist platforms. In this sense, the site is strongly integrated with local initiatives, promoting the region's businesses, crafts, gastronomy and cultural events. This community approach sets the site apart by creating a more authentic and engaging tourist experience. Thus, it can be said that it promotes sustainable tourism practices and environmental awareness, educating visitors about the importance of preserving natural and cultural heritage. This is not only a differentiator, but also a core mission of the platform.

The visitgeoparqueoeste.com website stands out in the UNESCO Global Geoparks network for its specialisation, interactive resources, focus on sustainability and integration with the local community. It provides a rich and diverse platform that not only promotes tourism, but also educates and involves visitors, contributing to the valorisation and preservation of the Oeste UGGp.

keywords: Geotourism, Networks, Touristic Programs, Local Communities

Inclusive interpretive panels, with visual impairment information, at the Oeste UNESCO Global Geopark (Portugal)

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The Oeste UNESCO Global Geopark (OUGGp) is located in the Western Central Portuguese mainland. With 80 geosites, our mission is to provide accessible, simple, and concise information about local heritage, to different audiences, in an inclusive way. One way is to provide it through interpretative panels or tables.

At the OUGGp, it was chosen to use interpretative tables, since it was a more inclusive option for different audiences. These interpretive tables describe the most relevant information about the Natural (Geology and Biology) and Cultural heritages present on the site. Explanatory texts are present and were created to be concise and appealing to all ages. Helpful images, schemes and photographs are also used, illustrating elements mentioned in the text and aiding the explanation of local heritage. More information about the geosite is available via a QRCODE, providing more related texts, images, and videos.

The OUGGp designed its interpretive tables with a special care, in terms of designed, materials, and accessibility. The main structure of this tool is made with recycled and recyclable plastic, whereas the information is printed on an adhesive material, resistant to UV light, easily cleaned, durable and, in the future, removable and replaced. These interpretive tables were conceived thinking in all kinds of visitors and specially in people with different disabilities. At the structural level, both the inclination and the height of the interpretive tables were designed taking in consideration the access and observation by people in wheelchairs, as well as by school children and families. The tables are 1.6 by 0.8 metres, with an angle of 15º.

A feature that stands out in these interpretative tables is a three-dimensional topographic model of the geosite and its surrounding areas, with indications of “where you are" and a few geographic reference points. Occupying about one third of the table’s total area, this model helps visitors to look and understand the local landscape. This model is particularly useful for blind people or with visual impairment, since it makes it possible for them to have a tactile perception of the surrounding landscape. Also, the contrast ratio between the background and the text is 7.23:1, specifically useful for people with visual impairment. Next to the QRCODE, there is a text in Braille inviting these citizens to access all the written information (both on the panel and on the OUGGp webpage) using an audio guide App (e.g. VirtualVison or VoiceOver) on their mobile phone. Implementing such a project decisively contributes to a global and inclusive access to information and science, making the interpretive panels really inclusive.

The accessibility of these interpretive tables was tested by a group of blind or with visual impairment people, living at Lourinhã municipality, in the OUGGp territory. All the participants were able to have access to the relevant information present on the interpretative table, and their feedback was very positive. Nevertheless, there were a few interesting suggestions that are going to be implemented in the near future.

keywords: interpretive tables, disabilities, accessibilities, inclusiveness

GEOLAND EXPERIENCE 360º A COMMITMENT TO ACCESSIBILITY IN THE MAESTRAZGO CULTURAL PARK UGGP, SPAIN

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The Maestrazgo Cultural Park UGGp, launched the Geoland Experience 360º project as a commitment to accessibility, which aims to bring the landscapes and geology of the territory to all visitors, relying on 360º technology and the use of drone images.

The project is available in spanish and english through two web pages: a catalog with geological information on all the reflected spaces presented as a book with explanations and audios available in Spanish and English (https://www.geolandexperience.es) and a second one link that offers bird`s view virtual flights, a video and photos through the Maestrazgo (https://360.geolandexperience.es/).

This first stage of the project offers the possibility of taking virtual tours of a dozen geosites. The spaces that can be flown over are:

1) *Órganos de Montoro* Natural Monument (Ejulve and Villarluengo),
2) Fluvial dynamics of the Bergantes river (Aguaviva and La Ginebrosa),
3) Fluvial canyons of the Guadalope river between Aliaga and Montoro de Mezquita,
4) Limestone pavement of *La Estrella*, in Mosqueruela,
5) Lobes of solifluction of Cuarto Pelado (Cañada de Benatanduz, Cantavieja and Fortanete),
6) Geological setting of Molinos (Molinos),
7) *El Llovedor* spring and syncline of *La Atalaya* (Castellote),
8) Utrillas thrust fault (Castel de Cabra),
9) Karstic landscape of *Tozal de la Catma* (La Ginebrosa),
10) Pitarque river fluviokarstic canyon and spring Natural Monument (Pitarque),
11) Galve Paleontological Park (Galve) and,
12) *La Olla* vertical fold within the “Aliaga Geological Park” (Aliaga).

The main geological interest of these Geosites is Tectonic and structural geology (1,6,7,8&12), Hidrogeology (2,3,7&10), Geomorphology (2,4,5,6,9), Geohazards (9) and Paleontology (11). The level of importance vary from geosites of international relevance (Global Geosites, IGME) (11,12), Spanish Assets of Cultural Interest (11), Natural Monument (Government of Aragon) (1,11), Geosites included in the Aragón Geosites Inventory (Government of Aragon) (1,2,3,5,8,6,7,9,10,11,12) to even recondite new geosites as 4, inventoried by the Maestrazgo Cultural Park UGGp and presented in this project.

keywords: Geotourism, accessibility

Geopark Tour, another proposal to discover the Basque Coast Geopark

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The Basque people's love of the mountains is well known. On weekends and holidays, it is common to find mountaineers enjoying the main peaks and the most popular routes in the Basque Country. Aware of this potential, at the Basque Coast Geopark we have always been committed to georoutes as a tool to show the Geopark to both locals and visitors.

In 2010, at the same time as the Basque Coast Geopark joined the European and Global Geoparks Network, it received the Euskadi Tourism Award from the Basque Government for the “Flysch Route”. This tourism product highlighted the geological outcrop of the coastal cliffs and offered opportunities to explore them by boat or on foot.

The GR 121 runs through the entire province of Gipuzkoa and The Flysch Route, without a doubt, is the most popular and most travelled section of the entire GR. The landscape is spectacular, very photogenic, with the sea on one side and the Atlantic countryside on the other.

The inner area of the Geopark, although also marked by other trails, is less known but equally beautiful. The local population usually walks along these trails, although, they are further away from the choice of visitors so far.

In view of these three fact; the love for the mountains, the success of the Flysch Route and the little knowledge of the inland area, the decision was to design a new tourist product based on hiking, called GEOPARK TOUR, as another proposal to discover the geopark.

After considering various options, it was decided to create a 54 km route divided into three stages, prioritising access by public transport, accommodation and restoration. The Geopark Tour runs mostly along pre-marked trails GR, PR, SL or Santiago Way, and for this reason the signals of the Tour is very light, not very invasive and it is recommended to download the tracks for each stage before starting the route. However, there is own signage using plates, mostly using existing posts with QR codes that provide information on positioning at the stage, distance, profile, etc.

The Tour was presented in June to the media by representatives of the different tourist administrations of the country. Now, is in the promotion phase through a promotional video, a map-brochure and bloggers trip related to mountaineering and nature. The next step will be to finalise the details to offer it as a tourist product through a travel agency that will commercialize the product with the complementary services required, as accommodation reservation, luggage transfer, taxi service, etc.

The Geopark's tourism sector partners support the initiative because it contributes to the de-seasonalisation of demand and to promoting other less developed tourist areas.

keywords: TOURISM, LOCAL DEVELOPMENT

Hiking the perimeter of the meteorite crater on the UGGp Ries Panorama Trail

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Geo Tourism: Hiking the perimeter of the meteorite crater on the UGGp Ries Panorama Trail *By Heike Burkhardt and Günther Zwerger, UGGp Ries (Germany)*

Hike around the entire Ries crater, as much as possible along the outer crater rim, through a unique natural landscape—that is the sustainable-tourism experience on the Ries Panorama Trail. About 128 kilometers long, the loop trail is divided into seven daily stages, each at most 21 kilometers, allowing time to explore, observe, enjoy and stop for a culinary treat. Along the route, info-panels explain important features of the UGGp Ries.

Opening the Ries Panorama Trail was the culmination of years of effort: It was at the top of the Geopark Ries "wish list" but complicated by the sheer number of different landowners and municipalities involved, as well as the overall high development costs. The collaborative partnership with the Ferienland DONAURIES and funding from the Bavarian and Baden-Württemberg state governments made it possible during the pandemic. Important steps included optimizing the route, evaluating alternatives, implementing signposting, strategically placing info-panels and effectively designing the day stages to facilitate and enhance the hiking experience. For example, each day stage ends at a community offering overnight accommodations.

The first stage starts at Harburg Castle and leads over species-rich dry grasslands to the Geotope Kalvarienberg-Gosheim where the geology of the eastern crater rim is explained. A woodland-experience path enchants along the way to the Old Town of Wemding.

The second stage begins in Wemding's moat and follows the rim past the Polsingen outcrop with impact-melt breccia. One of Bavaria's 100 best geosites, a Ries-lake limestone exposure in Hainsfarth, is a short detour. The third stage features fields and meadows alternating with heaths grazed by flocks of sheep, traditional meadow-orchards, woods and hedgerows.

The fourth stage passes chapels and picturesque natural highlights. The fifth stage leads through nature preserves, and the sixth stage follows the footsteps of history to Mönchsdeggingen. The seventh stage leads along the southern crater rim, through beautiful forests and ends at the starting point in Harburg.

Hiking is perhaps the most sustainable tourism activity, and the Geopark Ries is a wonderful place to hike. The Ries Panorama Trail is just one in an extensive system that reveals the charm of this extraordinary landscape: lush vegetation in the fertile crater basin and sparse yet species-rich heath calcareous grasslands on the crater edge. Each themed trail is clearly marked, and info-panels explain the Ries landscape and link geology, settlement history and natural-history features. The free booklets "Hiking in the Meteorite Crater" and "Hiking on the Ries Panorama Trail" provide considerable information. Hiking is the best way to experience the Ries Crater up-close, personal and sustainable.

keywords: Ries Panorama Trail, meteorite crater, Bavaria, Germany, natural highlights, UGGp Ries, Harburg Castle, chapels, sustainable tourism activity

GEODISEA, AN EVENT TO PROMOTE GEOTOURISM

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GEODISEA, AN EVENT TO PROMOTE GEOTOURISM

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Geodisea is an event that offers multiple free and promotional activities to tourists, visitors and the local population during three thematic weekends in autumn, which are defined as Geoaventura (Geoadventure), Geosabor (Geotaste) and Geocultura (Geoculture), according to the main tourist products of the Villuercas – Ibores – Jara Geopark: active and nature, gastronomic and cultural tourism. In 2024 we celebrate its seventh edition.

Geodisea is financed by the Government of Extremadura, coordinated by the leading group Aprodervi, one of the member institutions of Villuercas Ibores Jara but designed and executed by the collaborating companies of the geopark and members of the Geovilluercas business association. The participation process for the organization of the 2024 edition has generated around 50 activities that pursue the following objectives:

• **Promote the tourist resources of the destination**, with special attention to the geological ones but also giving visibility to other sustainable tourism resources representative of the territory such as birds, stars, hiking routes, olive oil, cheese, wine or traditional cuisine among others.

• **Promote companies in the territory**, making participants aware of the activities they carry out throughout the year.

• **Combat seasonality**. The event takes place in the month of November. Public financing represents support for companies during a non-holiday period.

• **Make the residents of the Geopark aware of the resources and companies**. Geodisea is also an event to raise awareness among the local population and a great opportunity for them to learn about both the resources and activities that companies in their municipalities offer.

• **Offer innovative tourist activities**. Companies can test demand response to novel and newly designed activities for possible commercialization.

• **Strengthen the identity of the destination.** Offering the main sustainable tourism resources and activities defines the tourist identity of the destination.

• **Add value to public sector projects and actions**. Some of the actions involve interpretation centers or are developed in public tourist infrastructures, which gives value to the work carried out by the public administration in tourism development.

In these nine years (since 2015), Geodisea has consolidated itself in the events calendar of Extremadura. At the management level, great progress has been made, from the centralized management of the public administration in its first editions to co-management with Geovilluercas, with the total management of the event by the companies being a challenge for the future.

keywords: activities, geotourism, sostainable development

Navigating Challenges: Promoting Langkawi UNESCO Global Geopark as an Island Geopark

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Navigating Challenges: Promoting Langkawi UNESCO Global Geopark as an Island Geopark.

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Abstract

Promoting Langkawi UNESCO Global Geopark as an island geopark presents unique challenges and opportunities due to its distinctive geological formations, natural biodiversity, and cultural heritage. This paper navigates the complexities involved in enhancing Geopark's visibility and sustainability on the global stage. It explores strategic approaches in environmental stewardship, logistical planning, and international marketing initiatives tailored to the island's geographical constraints. Case studies and best practices illustrate successful efforts in overcoming these challenges while preserving the geopark's ecological integrity and cultural significance. This study underscores the importance of innovative strategies and collaborative partnerships in positioning Langkawi as a premier island geopark destination, promoting responsible tourism practices, and fostering global appreciation for its natural and cultural treasures.

keywords: Langkawi UNESCO Global Geopark, island geopark, environmental stewardship, sustainable tourism, cultural heritage

Intangible Heritage – Preserving Cultural Elegance: The Timeless Elegance of Baju Kebaya

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Intangible Heritage – Preserving Cultural Elegance:

The Timeless Elegance of Baju Kebaya

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Abstract

Baju Kebaya, a symbol of timeless elegance and cultural identity, is a cherished heritage within Langkawi UNESCO Global Geopark. This paper explores the intricate preservation efforts surrounding this traditional attire, celebrated for its exquisite craftsmanship and historical significance in Malaysia. Langkawi embraces Baju Kebaya as a cornerstone of its intangible cultural heritage through vibrant cultural events, educational initiatives, and community-driven engagements. Case studies illustrate how these endeavors not only safeguard traditions but also foster a deeper sense of cultural pride among local residents and visitors alike. By showcasing the enduring charm of Baju Kebaya, Langkawi UNESCO Global Geopark invites the world to experience and appreciate the richness of Malaysia's cultural tapestry.

keywords: Intangible heritage, Baju Kebaya, cultural preservation, Langkawi UNESCO Global Geopark, cultural identity

Tangible Heritage Mahsuri's Legacy: Unveiling the Enduring Charm

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Tangible Heritage

Mahsuri's Legacy: Unveiling the Enduring Charm

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Abstract

This paper delves into the tangible heritage of Mahsuri's legacy within Langkawi UNESCO Global Geopark, uncovering its enduring charm and cultural significance. Mahsuri, a legendary figure in Langkawi's history, embodies the island's rich cultural tapestry through historical sites, artifacts, and narratives. The study explores efforts to preserve and interpret Mahsuri's tangible heritage, ensuring its authentic representation in the tourism experience while safeguarding its historical integrity. Case studies and preservation strategies illustrate how these efforts foster cultural identity and enrich the visitor experience. By celebrating Mahsuri's legacy, Langkawi continues to showcase its unique heritage to the world, promoting cultural understanding and appreciation in the global tourism landscape.

keywords: Tangible heritage, Mahsuri, Langkawi UNESCO Global Geopark, cultural preservation, historical tourism

“Once upon a time…in Armorica”

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Since March 2024, the **Armorique Regional Natural Park** has been officially labelled UNESCO Global Geopark. This recognition highlights the exceptional character of Armorican geology. From the vertical cliffs of the Crozon peninsula to the crests of the Monts d'Arrée, via Brest Harbor, the Aulne valley and the chaos of Huelgoat, there are **500 million years of geological history** which can be observed in **the landscapes and cultural heritage** of the Armorique Geopark.

Armorique Geopark participated on the **Interreg « UNESCO sites across the channel » program** from 2020 to 2023. One of the ambitions of this project was to be able to create **different educational tools** to tell this geological story to the public. The geopark team worked with partners to identify their needs and tools to be developed, for storytelling our geological heritage and to build an interpretation scheme.

Firstly, an **educational booklet** has been produced to illustrate this story. The booklet presents each stage of our geological history, leading to the formation of the landscapes we know today. It also links this heritage with other aspects of our cultural and intangible heritage. The book includes a **chronological frieze**, paleo-environmental **illustrations, block diagram** and **3 comic strips** explaining certain geological phenomena in a humorous way. Each element can be downloaded free of charge.

All these elements are also illustrated in the **“Once upon a time in Armorique” exhibition** at the Domaine de Menez Meur, one of the 3 Geopark visitor centres. Inaugurated on July 19, 2023, this trail is dedicated to the 500 million years of geological history that have shaped the Armorican landscapes as we know them today.

The beginning of the tour is dedicated to discover the **UNESCO Global Geopark** label and network. The tour continues with **four “atmosphere bubbles”** that reveal how some of the Geopark's most emblematic landscapes were formed. Schist, quartzite, granite, and the famous kersantite and Roz stone from the Brest harbor... **The lithotheque** presents visitors with a collection of Geopark rocks that form the basis of our remarkable built heritage, both civil and religious. A **poetic film** using paper cut-outs and sound captures from the territory complete the set-up, offering an immersive journey through the 500 million years of geological history of the Armorican massif.

keywords: geotourism ; edcuation ; exhibition ; geopark visitor centre

A certification for regional tour guides by the Mëllerdall UNESCO Global Geopark

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A certification for regional tour guides by the Mëllerdall UNESCO Global Geopark

Birgit Kausch, Mëllerdall UNESCO Global Geopark

The touristic valorisation of the Mëllerdall region started 140 years ago, when the first regional hiking trails were installed. Since then, the valorisation has been carried out by local tourism associations as well as by the regional tourism organisation „Mullerthal Region - Luxembourg's Little Switzerland“ (ORT-MPSL), which was founded in 2007. All these touristic structures are important partners of the Mëllerdall UGGp, which was recognised by UNESCO as a Global Geopark in 2022. Tour guides are important multipliers who pass on knowledge about the region to interested people, e.g. tour groups and school classes, on hikes, cultural tours or bus trips. The tour guides working for the regional tourism association have undergone national certification (by the Chamber of Commerce). This training includes a general and national part, as well as a regional part on specific topics related to the cultural and natural heritage of the region(s).

The Mëllerdall Geopark has been organising training courses on individual trails and sites (geo-trails, individual geosites) in cooperation with the ORT MPSL for many years. In winter 2023/24, the Geopark offered its own academic regional additional certification, in which the tour guides were trained in various topics of the Geopark to make them even better ambassadors for the Geopark, to improve the geopark‘s visibility for visitors and enable a better interpretation of guided tours. The offer was aimed at certified tour guides who already have sound basic training and experience in dealing with guests in the field, as well as being bookable and insured through the regional tourism organisation. 14 active tour guides took part in around 40 hours of theoretical and practical training on the topics of UNESCO, geology, archaeology, Geo-Expo, drinking water, regional products, economic history, orchard meadows, cultural landscape and nature conservation. The modules were conducted by personnel from the various departments of the Geopark as well as representatives of national institutions. In the future the Geopark will be happy to fulfil the tour guides' requests for further training on other topics.

keywords: certification, tour guides

Capacity building of Geotourism through Cooperation with Local Entrepreneurs and Education

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The Geopark's mission is to present geological history in an accessible and engaging way and to provide tools to ecosystem stakeholders to leverage this knowledge for their development. In spring 2024, Impact Crater Lake - Lappajärvi received UNESCO Global Geopark status. The Geopark has sparked enthusiasm among local entrepreneurs and other stakeholders to develop their operations and to productize new tourism services and experiences. The long-term aim is to highlight the strategic cooperation between the Geopark, local businesses and educational institutions, emphasizing the importance of sustainable development and community engagement in fostering a robust geotourism ecosystem.

Given that geotourism inherently involves geological heritage, popularizing and visualizing environmental information is a crucial part of geotourism services. The aim of Impact Crater Lake - Lappajärvi Geopark is to provide information to support the development of local businesses and stakeholder partners. The significance of services produced by the network of cooperating entrepreneurs, as well as their accessibility, is central to the geotourism ecosystem. The shared goal is to create mutual added value for both Impact Crater Lake - Lappajärvi Geopark and the local businesses. Geopark has build relations and commitment with local association, Kraatterijärven Toimijat ry, which represents local travel and tourism entrepreneurs. The collaboration with the association that unites all key regional actors, serves as a significant partner for the Geopark and its strategic development efforts.

The Geopark status has economic and social impacts on the region. Tourism is an attractive employment sector for young people, and efforts are made to retain young talent in the area. The availability of skilled labor for local businesses is promoted through new tourism-related educational program of vocational institute Järviseudun Ammatti-instituutti, JAMIN. The educational program is demand based serving the needs of travel and service companies, the Geopark and the regions economic stand. Education programs focus is on the basic principles of sustainable tourism, which are also required for geotourism. Impact Crater Lake - Lappajärvi Geopark works closely with local and regional educational organizations to strengthen the development of the local geotourism ecosystem and capacity building.

keywords: geotourism, entrepreneurship, cooperation, education

Visit Arctic Coast: An International Brand Supporting Geopark Tourism

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The Impact Crater Lake - Lappajärvi UNESCO Global Geopark has adopted the Visit Arctic Coast (VAC) collaborative brand developed by Kalajoen Hiekkasärkät Oy. This brand serves as a tool for the internationalization and marketing of tourism, attracting foreign tour operators by uniting the region's curated tourism services under a common brand. Within this strategy, the Geopark supports local tourism businesses in productization and marketing by utilizing the digital Visit Finland DataHub platform for creating and sharing product cards.

The Impact Crater Lake – Lappajärvi Geopark aims to create strong unique selling propositions (USPs) by leveraging the region's unique features and adhering to sustainable tourism practices. This approach can open new customer segments, such as educational tours and expert groups. The Visit Arctic Coast brand offers support for partner regions and companies in internationalization and product development. Training and coaching of local entrepreneurs are central elements in the Geopark's international tourism strategy.

Additionally, the Impact Crater Lake - Lappajärvi UNESCO Global Geopark maintains active connections with tourism stakeholders and regional organizations, promoting the development of a shared brand and enhancing the region's attractiveness. Through these measures, the Geopark aims to increase international awareness and boost tourism revenues in the long term.

keywords: Geotourism, International Tourism, Sustainable Tourism

Guide of Azorean Geodiversity: Discovering the Abiotic Nature of Azores Islands

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The Natural Heritage of the Azores Autonomous Region includes not only its flora and fauna but also the geological substrate that supports and controls them. In fact, the “living world” that makes up these islands, including the Azorean people, has its "roots" in the volcanoes that gave rise to the Azores islands, the rocks that make them, and the sea and atmosphere that surrounds them. In this context, alongside the biodiversity of the Azores islands, it is important to know, characterize, protect, value and divulgate its geodiversity (generally defined as the abiotic nature), which constitutes a key component of the Azorean natural heritage: those are the main goals of the “Guide of Azorean Geodiversity” now presented.

Given the archipelagic nature of the Azores and the limitations imposed by the size, distance, and distribution of the different islands, these components of the natural heritage assume added significance here. Indeed, the geodiversity of the Azores Islands, along with other determining factors such as island isolation and climate, are responsible for distinct and unique ecological conditions that reflect the close relationship between the geodiversity and biodiversity of the archipelago.

Therefore, in matters related to the environment in general, and the nature conservation in particular, the components of geodiversity and biodiversity gain increased importance, especially as they simultaneously serve as fundamental prerequisites for promoting true sustainable development, namely through geotourism.

In fact, the Azorean geodiversity is an important component of many iconic tourist sites of the Azores Islands, where a visit is mandatory, and constitutes as true ex-libris of the Azores tourism. So being, the Azores geodiversity supports, enhances, and promotes a distinctive form of geotourism, which respects the natural values of the Azores, particularly its abiotic nature. Thus, a better knowledge and characterization of the geodiversity and geological heritage of the Azores not only contribute to their preservation but also to their sustainable dissemination, promotion, valuing, and management. At the same time, these are essential pillars to policies focused on making the Azores as an international tourism destination committed to environmental, social, and economic sustainability.
The valuing and sustainable use of the endogenous resources of the Azores Autonomous Region, including its geotourism resources (such as trails, thermal activities, volcanic caves, geolandscapes, and geoenvironmental interpretation centers - all gathered under the umbrella of the Azores UNESCO Global Geopark), requires a heightened awareness for the preservation of the Azores natural values, both abiotic and biotic. And to protect and conserve the unique and diverse natural heritage of the Azores (both on its geodiversity and biodiversity components), it is imperative to fully understand and appreciate it, as “we cannot protect what we do not know"!

keywords: geodiversity, geotourism, Azores Islands, nature, volcanoes

LA HAGUE GEOPARK: A HERITAGE INTERPRETATION PLAN AT THE SERVICE OF A SUSTAINABLE TOURISM

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The La Hague Geopark is located at the tip of the Cotentin peninsula. Geologically, it is part of the Armorican massif, belonging to the Precambrian and Paleozoic eras. Come from a geological history of nearly 2.1 billion years, the succession of 3 mountain ranges now eroded, and the climatic variations of the Quaternary, the La Hague Geopark is composed of a mosaic of coastal landscapes: high cliffs, gentler cliffs, coves and bays, dunes... The main part of the sites of geological interest are located in particular on this coastal façade. This coastline is also nationally recognized and protected by law for its picturesque character. Connected by a coastal road, “the Route des Caps”, these landscapes receive 1 million visits a year. But the visitor numbers could increase due to climate change and the transfer of visitors to areas more temperate. Also the municipality of La Hague is involved in an « Opération Grand Site » (O.G.S) at the same times as its Geopark project. An O.G.S is a management tool offered by the State to local authorities to both welcome visitors, preserve landscapes and the quality of life of local residents. To establish its diagnosis and understand how tourists visit its territory, the municipality carried out a visitor study. This one concluded that the “route des Caps” generates a pressure in term of visitor flow: visitors stay a short time on each site, which increases road travel between sites. This road leads to a reduced or even passive experience of the territory. The objective of La Hague is therefore to gradually redesign this logic of visit. To do this, it has chosen to develop a new visit strategy, drawing on the diversity of its landscapes and durable mobilities. The objective is to promote no longer a territory but 4 landscape units, and various visits within and between each of them. Each unit includes a fixation site, a typical rock and visits, in the same times based on the heritage interpretation and adapted to different visitors: hikers, itinerants, family or group with different sporting levels. For this last category, interpretation trails are going to be developed, that is to say 4 trails for the entire Geopark. So, the Geopark offer the opportunity to put the heritage interpretation strategy at the service of managing O.G.S. And the O.G.S provides for the protection of the Geopark sites of interest. The two approaches supply to each other.

Preservation of the highly frequented « Mont Mézenc » geosite in the « Mont d'Ardèche » geopark

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The « Mont Mézenc » is the highest peak in the geopark and it's one of the most famous geosite of the Monts d'Ardèche Geopark. It's a volcanic dome in phonolite. It is very easy to reach and for all these reasons, more than 80 000 visitors walk to the top every year. Consequently, fauna, flora, natural habitats and the whole geosite were very degraded (trampling of vegetation and soil erosion). Indeed, people used to walk beside the trail because it became uncomfortable and too damaged (some steps were missing or too high). The presentation will show the technical solutions used to restore the trail and preserve the geosite.

Principles of planning / Restoration plan

- Restore the trail
- Channel the public
- Respect the landscape and nature
- Increase public awareness

Technical solution and first result

- Create a new, less steep trail
- Restoration of the trail to make it easier
- Canalize the public with steel ropes, stone walls, barriers or signs
- Close the other paths and restore vegetation
- Increase public awareness thanks to contemplation areas, signs and guides

keywords: restoration trail, highly frequented geosite

The underwater geology of the Geopark of El Hierro

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The underwater geology of the Geopark of El Hierro.

The limits of the Geopark of El Hierro and in general of the island of El Hierro are well defined, as they encompass the entire territory of the island and part of its waters. This is demonstrated by its 61 "Sites of Geological Interest", 15 of which are underwater, including the underwater eruption of the Tagoro volcano in 2011.
One of the objectives of the El Hierro Geopark is to help tourists understand and have a close experience of what a Geopark is, and to make the local population realize and be aware of the importance of Geoparks, learning to respect and care for them.

El Hierro is a destination known worldwide for its diving, with between 10,000 and 14,000 visitors a year who seek to discover its underwater wonders, due to its biodiversity in marine fauna and the high quality and visibility of its waters.
With the intention of also showing the magnificent marine geological heritage, the El Hierro Geopark has begun to work together with entities linked to underwater tourism, creating resources and generating tools to facilitate its divulgation.

Emphasizing the creation of underwater guides of geological interest, training courses for official guides and diving centers, focusing outreach activities such as geolodía, creating programs in different schools to help students understand the geological processes and thus respect for nature and the landscapes around them, with the creation and dissemination of marine routes that help us to make interpretations of the landscape and geological processes that formed it.

In this way, we will get visitors to understand the importance of geology on the island of El Hierro and not only the landscape, but also the underwater part of the Geopark of El Hierro.

keywords: Geopark, Underwater geology, divulgation, tourism, education.

Geoguide course in Terras de Cavaleiros UESCO Global Geopark

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Geoguide course in Terras de Cavaleiros UESCO Global Geopark

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Geoguides course. This course aimed to equip trainees with specific knowledge and advanced techniques for conducting geoguiding activities in the territory, encompassing everything from creating adapted tourist programs to raising awareness about the conservation of geodiversity and biodiversity.

The specific objectives included training guides specialized in the heritage of the Geopark, deepening knowledge about natural and cultural heritage, promoting sustainability and maximizing the tourist experience, and encouraging local development. The course was aimed at professionals in the fields of Tourism, Tourist and Sociocultural Animation, Hospitality, Catering, Museums, among others.

The course's curriculum structure comprises seven modules, covering everything from the UNESCO global network of geoparks to communication and marketing techniques, including practical field trips. With a total duration of 48 hours, the course was conducted in person. Obtaining the certificate of completion requires a minimum attendance of 90% and active participation in the proposed activities.

This article examines the structure, objectives, and expected impact of the Geoguides course, contributing to professional qualification and the enhancement of the heritage of the Geopark Terras de Cavaleiros.

Keywords

Geopark Terras de Cavaleiros, UNESCO Global Geopark, Geoguides, Natural and Cultural Heritage, Sustainable Tourism, Professional Training.

keywords: Geopark Terras de Cavaleiros, UNESCO Global Geopark, Geoguides, Natural and Cultural Heritage, Sustainable Tourism, Professional Training.

Strategic Spatial Planning for Developing Geotourism: Balancing Improved Access to Nature and Landscape with Protection and Care for the Local Environment and Communities in UNESCO Global Geopark The South Fyn Archipelago

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Development in areas with significant landscape and natural values requires a methodical approach that ensures the landscape's character and potential are leveraged while respecting its vulnerabilities. For that reason, The Geopark South Fyn Archipelago has initiated the development of a strategic-physical development plan to identify optimal locations, infrastructure, and facilities that support the growth of geotourism and active outdoor life on both sea and land. The plan should suggest how visitors are guided from the geopark's visitor centers, typically located in market towns, to experiences in nature and cultural landscapes, thus better connecting recreational opportunities across the area. Local involvement and ownership are cornerstone principles to ensure sustainable infrastructure that benefits both local communities and environmental considerations.

A strategic-physical development plan is a comprehensive plan that includes a professional mapping, a vision and strategic foundation, and a strategic-physical plan with specific initial steps and a prioritized catalog of potential development projects. The purpose of the development plan is to identify areas with potential for high-quality outdoor activities and nature and cultural experiences, and areas that should be protected from activity due to their natural and landscape significance. Additionally, the plan should outline how to invest in infrastructure and facilities that support activity development while respecting the area's inherent values.

The work is based on a specially developed method consisting of three elements: 1) Strategic Potential Analysis; 2) Vision, Strategic Foundation, and Goals; and 3) Final Planning.

The potential analysis identifies utilization potential concerning the location and development of new and the further development of existing hubs. This analysis forms the basis for a strategic plan for developing the area's recreational infrastructure. Visions, strategic foundations, and goals form the basis for ongoing strategic development work, drawing on experiences from the mapping and analysis and should be locally anchored and based on local desires. The final strategic-physical development plans are tools for realizing the vision and goals, based on the initial mapping and potential analysis.

keywords: Strategic Spatial Planning; Geotourism Development; Outdoor Activities; Local Community Engagement; Visitor Experience;

Nurturing Nature: Geotourism as a tool to engage tourists and local citizens in the co-production of regenerative environmental practices in the UNESCO Global Geopark The South Fyn Archipelago and the Baltic Sea region

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In UNESCO Global Geopark South Fyn Archipelago “Geotourism” is, among other things, used as catalyst for developing regenerative tourism. Geotourism is sustainable tourism which maintains and improves the values, heritage, aesthetics, and culture of the area, while contributing to and engaging the local communities. Regenerative tourism is an evolving sub-concept of geotourism that involves strengthening the natural environment, the landscape, and the cultural and historical heritage, through activity-based tourism products. The Geopark aims to develop high-quality regenerative tourism products, enriching and engaging for guests and the community alike. The effort should strengthen the local identity and distinctiveness, ensuring the balance between usage and preservation of the landscape and nature. The Nurturing Nature (NuNa) project, funded by the EU Interreg Programme, is a strategic cross-boarding collaboration between BUND Schleswig-Holstein in Germany and UNESCO Global Geopark the South Fyn Archipelago in Denmark. The aim is to expand knowledge in environmental regeneration and best practice in regenerative tourism experiences in the Baltic Sea region. To address the risk of destructive tourism and environmental challenges on land and in the sea, the project aims to motivate locals and tourists to engage in nature restoration and development of relevant scientific knowledge. The foundation of the approach lies in humans’ common interconnectedness with nature, and the key question is how tourists and local citizens together can engage in local regenerative actions that foster a (re)connection with nature. In the project, tourist agencies, cultural businesses, community councils, NGOs, and knowledge organizations collaborate in a holistic approach.

By working with the motto "You protect what you know," locals will be involved in the protection of local nature and sites of regional significance. The same applies to visiting tourists, who will contribute with their individual competencies at the locality and gain new insights that they can bring back home.

The outcomes of the project will include the development of activity-based tourism products that contribute to the restoration of both marine and terrestrial nature, as well as the creation of related knowledge. New forms of involvement and collaboration between local citizens and tourists are central to the project. Co-production among various stakeholders of new and innovative practices for restoring nature in the region will also be a focal point of the project.

keywords: Geotourism, nature restoration, regenerative tourism, sustainable tourism, community science, co-production, local development

Food Camino: Sustainable Journey in UNESCO Global Geopark Vestjylland

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UNESCO Global Geopark Vestjylland supports numerous activities and initiatives that blend environmental conservation, cultural heritage preservation, and community engagement year-round. Among these endeavors is Food Camino an annual initiative that commenced in 2023. With its multifaceted approach to sustainable living, Food Camino resonates with several Sustainable Development Goals (SDGs). This initiative offers a three-day guided hiking tour through the untamed landscapes of West Jutland, incorporating educational elements along the journey to provide insights into geology, biodiversity, cultural heritage, and culinary experiences, while fostering conservation awareness. Functioning as a catalyst for healthy lifestyles and physical well-being, Food Camino promotes outdoor activities (SDG 3) in the picturesque landscapes typical for the area (sand dunes, heathlands, forests, fjords, wetlands, and the sea) (Photo 1. Tour along the beach accompanied by the Geopark's geologist). By celebrating local food products and culinary traditions, Food Camino directly supports SDG 12. Participants experience the benefits of responsible consumption and production, as they taste locally sourced delicacies and learn about sustainable food practices (Photo 2. Culinary experiences with a focus on local flavors). This strengthens local food systems, promotes economic growth, and reduces environmental impact.
Furthermore, the initiative aligns with SDG 15 by fostering appreciation for biodiversity and conservation of terrestrial ecosystems. A part of the tour is dedicated to foraging edible wild herbs (Photo 3. Foraging of wild herbs and preparation of beverages), accompanied by talks on plant medicine and folklore. Participants can explore diverse ecosystems and habitats, including birdwatching, observing wild animals, gaining insights into local fish, and visit the largest insect hotel in Denmark - a collaborative effort between an artist and the local community. The final part of the tour goes through an area where wind turbine technology is undergoing testing (SDG 7), fostering a deeper understanding of the interconnectedness between human activities and the natural world.
Crucially, Food Camino exemplifies how partnerships can advance sustainable development goals, particularly SDG 17. Vestjylland UGGp collaborates closely with local stakeholders and cultural institutions, to create an inclusive and impactful experience. These partnerships leverage collective expertise and resources, amplifying the initiative's reach and effectiveness.
In essence, Food Camino embodies a holistic approach to sustainability, addressing interconnected challenges and opportunities across multiple SDGs. By promoting health and well-being, fostering education, encouraging responsible consumption, conserving biodiversity, and fostering partnerships, Geopark Vestjylland's initiative inspires individuals to embrace sustainable lifestyles and contribute to a more resilient future.

keywords: Environment conservation, cultural heritage, community engagement, geology, biodiversity, education, GeoFood

Interactive tourist map, a digital tool to promote and ease the tourism offer to Orígens Geopark visitors

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Geoparks are extraordinary places on the planet, with geology of international significance that allows us to understand and read part of the Earth's memory. The set of Geoparks in the world allow us to reconstruct the history of our planet through the 4,600 million years during which the Earth and all the living beings that have lived on it have formed and evolved. Therefore, each geopark needs to offer the story that makes them unique to the local population and visitors alike.

There are many tools to promote and disseminate sites of interest in a Geopark. From the classic approach, based on visitor centers, printed material and, web sites that showcase the full catalog of tourist services; till online reservation centers or digital apps, among others. All these options are probably valid and necessary as they all have a specific target.

We have believed that a pilot test was necessary to carry out the digital management of the territory in Orígens UGGp. Such a strategy should make possible to progressively reduce the use of paper, make information more accessible, and therefore generate more prearranged visits. In this way we aim to contribute significantly to the improvement of experiences in the Geopark. Another key factor considered was our ability to update the Geopark's promotional information, as digital tools allow this to be done quickly and at a low cost.

We ruled out the creation of a mobile application for the Orígens Geopark as we believe that generally visitors are reluctant to download apps while visiting a tourist destination. There are a large number of applications in the market and users are not willing to saturate their internal mobile phone memory. However, following meetings with tourism experts we considered that an interactive map published on the web site may have good results and we decided to explore what options this approach could offer in a mid-term.

The tourist viewer of the Orígens UGGp was published by late 2022. Its development involved the creation, configuration and implementation of a background database including all Geopark tourism focused relevant data. Parallelly, it was necessary importing and loading the basemaps required by the viewer, the installation and configuration of the web server and the design of the interactive map GeoPortal. This online viewer includes: digital topographic and orthophotography basemaps, interpreted geological and cultural sites, georutes, museums and visitor centers, tourist offices, Geopark stakeholders location, panoramic viewpoints and, bathing areas among others.

The viewer offers several tools such as a layer manager, tools to identify and find locations, a basemap switcher, a geolocation tool for mobile viewers or a popup button with site descriptions. The viewer is currently available in Catalan language. The Spanish, English and French versions are being implemented and will be soon available.

In order to explore new uses of the tourist viewer, a digital georoute accessible exclusively through this viewer has been implemented. This georoute, located in a remote mountain area at 2,200 meters above sea level, offers the entire interpretation and guiding experience throughout digital means, reducing the impact of physical elements, aiming to improve georoutes economic sustainability. During the year 2024 we will evaluate its use, its acceptance and assess visitor surveys.

keywords: tourism, digital tools, interactive map, georoute

Integrated development of geotourism and geoproducts in Taiwan Geoparks

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Taiwan is located in East Asia, with rich and diverse geological, topographical, historical, and cultural resources. According to the Cultural Heritage Preservation Act and reference to the UNESCO Global Geopark Establishment Guidelines, Taiwan has established 10 geological parks since 2018, and has established the Taiwan Geoparks Network and the Geoparks Association of Taiwan to continuously promote geopark-related works. Taiwan regards community participation, landscape conservation, environmental education, and geotourism as its core values, serving as the main driving force and direction for promoting geopark. It also regards environmental conservation as its future vision. Among them, geotourism is a sustainable tourism model that focuses on the outstanding landscape attractions and geodiversity of the geopark, combined with natural and cultural heritage such as ecology, history, and culture. Geotourism allows visitors to understand geoheritage, maintain the local environment, promote local economy, and implement the concept of sustainable development. In the process of promoting geotourism, in addition to planning diverse tourism itineraries based on the local natural and cultural resource characteristics, each geological park has at least three different geotourism trips. In order to allow visitors to have a deeper understanding of the geopark, obtain a good recreational experience, and leave beautiful memories, a wide range of geoproducts, such as geological food, accommodation in traditional stone houses and wooden houses, local traditional clothing and commemorative clothes, can be further developed based on local geological characteristics. This will promote employment opportunities and well-being for local community residents, drive local economic development and promote regional economic prosperity.
In Taiwan's geoparks, geoheritage has led to the development of geoproducts that combine geotourism, leave a lasting impression, and incorporate DIY journeys from geotourism. For example, the Lichi Badland Geopark features fruit plates and tea cups made from unique local mudstones, the paper mulberry bark lanterns by the Taitung Fugang Geopark are based on the Austronesian culture, the Matsu geopark features zebra rock cookies made from special geological heritage, and Queen's Head night lamp made from outstanding scenery by the Yehliu Geopark. These geoproducts not only make geotourism more distinctive, knowledgeable, and interesting, but also provide tourists with a sense of hands-on participation, obtaining a good recreational experience and beautiful memories, and successfully promoting geoparks.

keywords: Geotourism, Geoproducts, Integrated Development, Taiwan Geoparks

Harnessing Digital Innovation for Sustainable Tourism in Geoparks

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Geoparks, sustainable tourism and local development

Abstract:

The intersection of geoparks, sustainable tourism, and local development presents a unique opportunity to enhance visitor experiences while preserving natural beauty. The Bohemian Paradise UNESCO Geopark, a haven of natural splendor, has embraced this opportunity by partnering with SmartGuide, a global digital guide platform. This partnership aims to inspire tourists to explore less frequented areas, thereby mitigating the impact of summer weekend crowds at popular spots within the geopark.

The SmartGuide platform offers a user-friendly web editor, smart route generation, automatic text-to-speech audio, easy translations, quick content updates, big data analytics and heatmaps, all without the need for IT development. It transforms a traveler's phone into a personal tour guide, offering 1,300 guides in a single app, self-guided audio tours, offline maps, and engaging stories that play as visitors explore. The platform supports multiple languages in both text and audio formats.

SmartGuide's robust maintenance and support system is underpinned by reliable, cloud-based technology, ensuring 99.99% uptime and fast global availability. It offers unlimited scalability, automatic updates, and full app maintenance, keeping pace with the latest Android and iOS changes. Importantly, SmartGuide provides dedicated customer support and ensures GDPR-compliant handling of user data.

The platform encourages exploration of less visited places by recommending trails outside of tourist hotspots and providing engaging stories about geology, literature, culture, and nature. AI classification engine understands what any content is about and as users interact with the guide it learns that preferences and builds a personalized profile Similarly like YouTube and Spotify learn your preferences on videos and music to play, SmartGuide learns your sightseeing preferences and recommends different places to each traveler thus spreading the crowds. Unlike printed materials, the digital platform allows for unlimited content, thereby offering endless inspiration. Heatmaps illustrate the impact of spreading visitors, with an example from Prague showing that interesting content inspired tourists to spend 30% of their time outside of the crowded city center.

This innovative approach to sustainable tourism represents a significant stride in the tourism industry, demonstrating the potential of digital tools to enhance visitor experiences while promoting conservation and local development.

keywords: Sustainable Tourism

A sculpture as a symbol of the entrance to the Normandie-Maine Unesco Global Geopark

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Geotourism - Visitors

A sculpture as a symbol of the entrance to the Normandie-Maine Unesco Global Geopark

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The Normandie-Maine Geopark officially became a Unesco Global Geopark in March 2024. To celebrate this prestigious label, a number of events have been organised at the "Maison du Parc et du Géoparc" Centre. To signal to visitors that they are officially entering the heart of the Geopark, a unique and ambitious project has been launched: the creation of a sculpture.

This sculpture, carved in stone, embodies the key features of the territory. Created in collaboration with local sculptors Laura Jeary and Bryan Proctor (*STONEWORKS*), and thanks to the invaluable help of three local farmers - Gilles and Marcel Léveillé, who donated the stone, and Christian Lemaître, who helped move it - this work is a tribute to our deep connection with the Earth and our origins.

Aesthetically, the sculpture combines tradition and modernity, using artisanal techniques to create a contemporary work. Visually, it stands majestically at the entrance, drawing the eye and arousing keen interest. It is gradually becoming a landmark, enhancing the appeal of our region and raising awareness among the general public.

Each sculptural element tells a story rooted in time, reminding visitors of the area's long geological history and precious biodiversity. This project is a celebration of our local identity, a bridge between past and future, and a lasting testament to our commitment to art, nature and people. A creative and inspiring adventure, symbolising our connection with the Earth and our responsibility to protect its geological heritage.

keywords: Intangible Heritage, Local Development, Geological Heritage, Sculpture, Stone

Developing a Geobike trail in Hämeenkangas area

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Mountain biking became popular in Finland during the pandemic years. Hämeenkangas has been a popular area for mountain biking enthusiasts even before, but now a new group of cyclists emerged: novice cyclists with limited experience in navigating in the forest. The area is an important Geopark site with good infrastructure, including many trails and shelters, but a marked novice friendly MTB trail was lacking. Developing a trail was however not simple, as the main use of the area is not tourism but training: the main user of the state owned area is the Finnish Defence Forces. Development of a new route required involving many stakeholders.

In 2022 in a project funded by the EU agricultural fund a mountain bike route was developed in co-operation with Metsähallitus, the landowner of the area. A 10 km long route was planned. The aim was to develop an easy but enjoyable route that would also be suitable for people renting bikes and just starting to familiarise oneself with the sport. The trail would also serve enthusiast cyclists, providing a fixed base route in an area full of small, unmarked trails and forest roads. The route would connect the main geopark attractions in the area. A marked route would also channel users to a certain area, away from the areas where the Defence forces have most of their training activity in.

After identifying the main area for development, fragile areas and occurrences of rare species were identified and avoided, the trail network was mapped using a mountain bike and local entrepreneurs were interviewed to aid route planning. After planning, testing and approval of the planned route, the signage was planned and implemented. The route follows mostly old trails that required very little building to be rideable with a mountain bike.

The new Geobike Hämeenkangas trail was officially inaugurated in spring 2023, when a free and guided mountain biking event was organized by the Geopark. Over 20 people participated in the event. At the time there were still some singns lacking along the route. The route was finalised in the autumn 2023. The total budget for the new route was ca. 7000 euros.

keywords: Geotourism, MTB, route development

INNOVATIVE RESOURCES TO INTERPRET GEOLOGICAL HERITAGE

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INNOVATIVE RESOURCES TO INTERPRET GEOLOGICAL HERITAGE.

Jameos del Agua is a site of scientific interest located in the Lanzarote Geopark. It is a volcanic tube, adapted for visitation by the artist César Manrique and opened in 1966. This is a specially protected center, where it is not possible to incorporate any exhibition and interpretive element.

This center is an exemplary geotourism site in our geopark, attracting over 600,000 visitors annually. In 2023, a new space was established for the interpretation center of the House of Volcanoes and the Geopark. T**he new and diverse rooms of the museum offer cutting-edge museographic resources, ranging from audiovisuals to immersive experiences and virtual reality, which will be showcased in the presentation.**

The various thematic axes that make up the museum are highly diverse, posing a significant challenge in utilizing the latest, most innovative and cutting-edge resources to explain their content.

Thematic axis 1 on the CROWN VOLCANIC TUBE. The volcanic tube is taken as a reference to explain to the visitor the conditions under which volcanoes appear, the monitoring of volcanoes, the theories about the formation of the Canary Islands, and how Lanzarote was formed. Resources such as video mapping, 3D printing, and the so-called information scanner are used.

Thematic axis 2 on the HOUSE OF VOLCANOES AND GEOPARK. The History of the House of the Volcanoes is narrated since it was the first comprehensive museum of Volcanology in Spain and we also present the UNESCO World Geopark of Lanzarote. Resources such as the Infinity Mirror Experience, the magic book, audiovisuals and video mapping are used.

The last thematic axis 3 on PLANETARY ANALOGUES. The UNESCO Lanzarote Global Geopark has established itself as a leading global reference in the study of planetary analogues. Various resources are used, such as audio dialogues between a scientist and a child, 360º Mars landing experience, circular projection simulation of Mars, and more.

Autor: Isabel Betancort

keywords: Innovative resources, volcanoes

LAC sustainability indicators – Assessment of effects of visitors in Lauhanvuori - Hämeenkangas UNESCO Global Geopark, Finland

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Title: LAC sustainability indicators – Assessment of effects of visitors in Lauhanvuori - Hämeenkangas UNESCO Global Geopark, Finland

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Lauhanvuori - Hämeenkangas UNESCO Global Geopark located in western Finland. The main economic activities have traditionally been agriculture, forestry, commerce, and industry. For example, the area has a long history of utilizing peatlands as agricultural land and for industrial-scale energy peat mining which is currently being run down. Tourism, a relatively young but more and more important industry in the Geopark area, is mainly concentrated around three localities which include most of the geosites, as well: Lauhanvuori and Kauhaneva-Pohjankangas National Parks and Hämeenkangas multi-use area, owned by the Metsähallitus Parks & Wildlife Finland.

From the beginning of the Geopark development of the area the number of visitors has increased by 50 000 visits. Most of the sites were rather unknown, and the visitor numbers were modest. Improved hiking infrastructure and augmented visibility of both the area and the geosites have attracted more and more visitors. The LAC sustainability, biodiversity and geodiversity indicators have been created to assess unwanted effects of visitors in the Geopark area and to measure the carrying capacity of the area. From social and economic point of view, also a few positive effects are monitored. The indicators are set and monitored together with Metsähallitus Parks & Wildlife Finland and the municipalities of the area including several other stakeholders, as well.

In the LAC method only effects of visitors and recreation are assessed. The unwanted effects of visitors e.g., on species occurrences, habitat types, geodiversity, cultural heritage, and on other visitors' experiences are monitored. Also, effects on the local economy and employment are studied. There are both general and area-specific indicators and different data-gathering techniques depending on the indicator: e.g., expert opinions, field surveys, and quantity and quality measurements. Target states and limits of acceptable change of each indicator are set and monitored regularly by a large group of experts on a site-by-site basis.

The risks are related above all to increased number of visitors, disturbance and trampling, recreational erosion, littering, and breaking rules. Off-trail activities occur while photographing for social media, off-road biking and in mass events. As an example, dogs are left unleashed, and visitors trespass in restricted areas, set illegal campfires and drive all-terrain vehicles without a permit. If the limits of acceptable change are exceeded, actions are taken, e.g., duckboards, fences, or stairs are built to guide visitors and to protect the geodiversity and biodiversity and other values of the site.
In the Lauhanvuori – Hämeenkangas Geopark area, new indicators have been set recently, and the first assessments are available. Assessment scale from 1 to 5 is used. Number five indicates that there are no signs of weakening in values of a site, species, or habitat etc., number one indicates that the values are lost. The time span of the follow-up measures for different indicators varies. The results are evaluated, and the possible actions are designed together once a year.

Key words: Sustainable tourism, Limits of acceptable change, monitoring effects of tourism

Benchmarking science communication in UNESCO Global Geoparks

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Every year, millions of residents and visitors from UNESCO Global Geoparks worldwide engage with science thanks to innovative communication strategies and approaches developed over the past 24 years. Geoparks are deeply committed to bridging the gap between geoscience and society, and they are already recognized as a global reference for geoscience communication. Despite its importance in the overall strategy and its broader impact, research on science communication within Geoparks is notably scarce.

To address this lack of comprehensive research, a benchmarking methodology was conducted to systematically analyze science communication strategies, identifying best practices and critical factors and providing data-driven insights to support strategic planning. Benchmarking is a highly advantageous approach within this scope, enabling systematic data collection and comparison and identifying best practices from comparable scenarios. For this study, a convenience sample of 8 Geoparks was selected from 213 worldwide.

The data collection involved a literature review and site visits for direct observation in the Geoparks, consistently applying a detailed instrument covering multiple indicators categories. This approach was complemented by indirect observation through semi-structured interviews.

After all the information was gathered and compiled, the data were analyzed using Key Performance Indicators (KPIs) to assess the quality by the best criteria established by science communication research. Rather than analyzing practices in isolation, this research focuses on studying science communication as a structured strategy within the global scope of Geoparks.

The results generally outline a heterogeneous range of perspectives and approaches but a clear commitment and dedication to communicating science and geoscience to lay audiences. Several different practices were found, demonstrating a concern for diversification and innovation. There was a particular prevalence of unidirectional practices focused on dissemination, even though there is a recognition of the importance of adopting more dialogic and engaging strategies. One of the main critical factors is the lack of boundaries between public science communication and education, evident in a strong inclination towards conventional educational approaches beyond school contexts. Challenges were also identified regarding, for example, targeted strategic communication and public engagement in complex and controversial issues.

In summary, this pioneering study represents the first comprehensive empirical research. It provides the groundwork for developing a strategy to promote, stimulate, and enhance science communication in Geoparks and, eventually, address the identified challenges and meet specific segmented needs in analogous contexts.

keywords: benchmarking, science communication, UNESCO Global Geoparks

Interpreting landscape and geology through culinary experiences

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Platåbergens UGGp is located in Western Sweden and was designated as Sweden's first UNESCO Global Geopark in 2022. The area's international status as a geopark is due partly to its unique geology but also to its rich industrial and cultural history. It is a resource that should be better utilized in both tourism and product development, such as in food and local cuisine.

The table mountains in Västergötland are composed of various rock types, creating a diverse landscape with unique natural environments. These different rock types provide varied conditions for flora and fauna. One plant that is closely associated with the mountains, particularly with the rock types limestone and alum shale, is wild garlic, which is already an important part of the local culinary craftsmanship. The mountains have a strong intangible cultural heritage, which is evident in myths surrounding the many natural springs that flow from the table mountains' sedimentary rocks. Surrounding the mountains, there are numerous old quarries, which have the potential to become unique venues for outdoor culinary experiences.

The project "The Flavors of the Table Mountain Landscape," funded by 1.8 million SEK from the EU's Rural Development Program (through the Swedish Board of Agriculture), aim to create culinary experiences and unique products related to the geopark area. As part of the project, we have initiated a handbook to help stakeholders within the geopark area enhance the visitor's overall experience through deepened knowledge and sensory engagement. One section of the handbook is dedicated to flavor profiles of the various mountains, which are intended to inspire how the landscape and geology can be interpreted through culinary experiences.

keywords: Geoparks, sustainable tourism, local development, food, geoproducts

The Cilivestri Fountain in Matera (Basilicata, Southern Italy): Geological features promoting the presence of a water resource leading to the existence of biodiversity in the area

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The Cilivestri Fountain, little known even to most local people, is an important example of how a geological resource can influence the ecology of a small area. Located near the Torre Spagnola plateau, south of Matera town (a UNESCO World Heritage Site in Southern Italy), the spring exists thanks to the presence of clays below coarse-grained porous deposits occupying the flat-topped upper portion of gentle hills. This geological feature favours the presence of local shallow aquifers and several springs that represented a resource for the development of local communities in pre-modern times. Beyond that the "modern" use of water, which dates back to the Middle Ages, as evidenced by the numerous historical wells or aqueducts that collect or replace the ancient springs, this geological resource led the origin of small and unique ecosystems. The relationship between geodiversity and biodiversity is one of the main themes for the development of educational, social and geotourism activities.

keywords: Geodiversity, ecosystems, spring, Matera, Southern Italy.

Geological and geomorphological mapping of the Folafótur peninsula: geodiversity marvels in the Westfjords, Iceland

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Geological and geomorphological field surveys and mapping have been carried out in the Folafótur peninsula (Westfjords, Iceland), which provides an impressive landscape dominated by Mt. Hestur (536 m a.s.l.), whose silhouette resulting from the interaction of volcanic, tectonic and glacial activities, is a landmark for people of the whole region. The volcanic rocks of the Westfjords were produced by the extinct older Snæfellsnes-Skagi rift zone, consisting in basaltic lava flows building up a 4-5 km thick pile that ranges between 16 and 8 Ma in age (Kristjánsson et al., 2003). The heavily incised fjord network, the main macroscale landscape feature of the Westfjords, was carved in the Late Pliocene due to the first dated glaciation in the region (Roberts et al., 2007). The successive Quaternary glaciers and deglaciation processes contributed greatly to shaping the current landscape. Our study highlighted that the Folafótur peninsula holds a geodiversity of great value derived from the combination of significant features of geology, exemplifying Earth's geodynamics, and geomorphological processes related to climate changes.
The 1:10,000 scale Geological and Geomorphological Map of Folafótur (Ellero et al., 2023) displays the main geodiversity sites, as well as, the cultural (archaeological and historical-literary) sites illustrating the connection between geology and human history. The cultural heritage of the area was enhanced starting from the reconstruction of the topographic base, integrated with toponyms never before published on a topographic map, obtained from lists of land types and descriptions documented in the archives of the Árni Magnússon Institute for Icelandic Studies at the University of Iceland (Árnastofnun).
From a geological point of view, the outcropping bedrock is represented by a 600 m thick succession of basaltic lava flows regularly alternating with reddish sedimentary levels. Two main basaltic dykes cut the flood basalt pile of Folafótur, characterized by different directions coinciding with those registered for fracture systems and fault surfaces, showing a clear correlation between fault systems and magmatic intrusions. In addition, a considerable amount of information on Quaternary deposits and landforms has been mapped, mostly connected to glacial and periglacial, slope, and coastal processes.
The geological and geomorphological map of Folafótur (Ellero et al., 2023) represents the first large-scale map regarding the relationships between geology and landscape in the Westfjords of Iceland, becoming a useful tool for understanding and enhancing the significant geoheritage of this area and consequently increasing public awareness for its conservation and protection.

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keywords: geological mapping, geodiversity, glacial geomorphology, geosites, geoheritage, Iceland

Earth's silent sentinels: Unconformities as guardians of deep time

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Relegated to the margins of public consciousness, geology, the science that delves into Earth's history and physical structure, paradoxically forms the bedrock of our existence. This apparent disconnect stems, in part, from the inherent complexity of the geological lexis (Fildani, 2022). Unravelling this intricate narrative – a fragmented chronicle of our planet's past – demands a highly descriptive and engaging interpretive approach to bridge the communication chasm and foster effective geological education.
This research originates from a perception during a geological field trip to Gravina in Puglia, Italy. Observing the angular unconformity between deformed Cretaceous carbonates (below) and undeformed Quaternary carbonates (above) exposed in Puglia (southern Italy) along a small canyon featuring the town of Gravina sparked a key question: can unconformities be made intelligible? Can the stories embedded within the rocks be transformed into captivating narratives that effectively convey the immense concept of deep time? The contact between distinct rock formations represents a condensed step between contrasting worlds, a period marked by profound Earth transformations. The unconformities at Gravina and Siccar Point, each chronicling tales of worlds forever altered, share a unifying theme: the overarching narrative of deep time. This study investigates the potential of translating geological knowledge into a format that facilitates education and enhances the value of geodiversity.

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keywords: geology education, geodiversity awareness

Geosystem Services Assessment and the Application of DPSIR: Insights from European UNESCO Global Geoparks

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This study investigates the assessment of geosystem services and the application of the Drivers-Pressures-State-Impact-Response (DPSIR) framework across European UNESCO Global Geoparks (UGGPs). UGGPs, designated areas aimed at preserving, managing, and promoting geological heritage alongside natural and cultural aspects, offer a unique opportunity to study geodiversity and its associated services. The research focuses on understanding the abiotic ecosystem services ("geosystem services") provided by geodiversity, such as water quality and quantity, and terrestrial processes. By applying the DPSIR framework (Driver-Pressure-State of the Environment, Impact, Response), we analyzed various geosites within the Chablais UNESCO Global Geopark in France and the Sesia Val Grande UNESCO Global Geopark in Italy.

Our study evaluates the effects of both human activities and natural processes on geodiversity and geosystem services in these geoparks. Human activities such as tourism, leisure, and resource extraction, alongside natural phenomena like climate change, significantly impact these geosites. We assessed the state of geodiversity and geosystem services in locations such as Lake Montriond and Lake Vallon, formed by slope instability in glaciated valleys, and the Monte Rosa region, influenced by glacial and fluvial processes.

The findings include detailed geosystem services maps and DPSIR assessment tables, providing essential tools for policymakers and managers. These tools aid in the development of effective management strategies, including geosystem services monitoring, sustainable tourism, water management, and landscape restoration. Our research highlights the importance of understanding the intricate relationships between human actions, natural processes, and geodiversity for the effective management of geosystem services.

This study underscores the value of the DPSIR framework in raising awareness about geodiversity, guiding decision-making, and fostering sustainable development and conservation within Geoparks. The insights gained from European UGGPs can be instrumental in informing broader environmental management practices and policies aimed at preserving geosystem services amidst ongoing environmental changes.

keywords: Geosystem Services; DPSIR Framework; UNESCO Global Geoparks; Geodiversity; Sesia Val Grande UNESCO Global Geopark; Chablais UNESCO Global Geopark

Aerial geotourism: introducing the landscape of the Miyaneh Aladaghlar colored mountains in Iran

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Aerial geotourism is a new branch of geotourism and tourism that has expanded with the rise in popularity of drones in recent years. This area of knowledge explores the beautiful landscapes of geomorphological phenomena in order to protect them by diversifying attractions and reducing physical contact. This is in line with the growth and development of tourism in a geographical area. The knowledge of air geotourism helps in defining and introducing locations for air sports and air routes for airlines by examining geological landscapes.

This article introduces the Aladaghlar mountains of Miyaneh, one of the most beautiful landscapes of the Miocene layers in northwest Iran. It is located near the route of domestic (Tehran-Tabriz) and international (Tehran-Istanbul) flights. This area covers nearly one thousand square kilometers and is one of the most beautiful outcrops of Miocene formations in Iran. It showcases a diverse range of red to gray limestone, marl and clay rocks, as well as large folds, faults, and the interweaving of layers. The presence of these natural features has given this region an indescribable landscape.

Introducing this area as an air geotourism route can define a special air route and, as a result, foster the growth and development of tourism in local communities.

Keywords : Geodiversity. Geotourism. Geoheritage. Flying. Aviation. Aerial geotourism. Geoconservation. Aladaghlar Iran

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keywords: Geodiversity. Geotourism. Geoheritage. Flying. Aviation. Aerial geotourism. Geoconservation. Aladaghlar Iran

From Geodiversity to Landscape and Cultural heritage – examples from the Oeste UNESCO Global Geopark (Portugal)

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Geodiversity may be simply defined as the variety of earth materials, forms and processes that constitute and shape the Earth. The materials and the forms are tri-dimensional geological objects, including rocks/minerals/fossils and also the naturally shaped landscapes. On the other hand, processes are not directly visible and may only be perceived as part of a personal explanation. In both cases, its "cultural dimension" is related to the individual observation of those objects and the related stories that may be told about them, either scientific or other.

A different kind of "cultural dimension", related to Geodiversity, is the collective human approach to those materials and forms, from pre-historical to present-day times. This includes procuring raw materials for daily use or building houses and monuments, but also the almost imperceptible historical adaptation of different communities to the landscape and its resources. The use of a certain territory by the local communities is a long and slow process of choices, made by a group of people who decide to install themselves in a specific place. Depending on the success of each settlement, the next generation will follow the same paths or invest in different ones. That success depends mainly on the availability of water and soil, as well as the topographical position for defence, mobility and material exchanges. In a sense, the cultural use of a certain region, based on its geodiversity, i.e. availability of materials and distribution of landforms, may be considered one of the main cultural services provided by the geodiversity of a territory.

The Oeste Geopark is located in Central-West Portugal, 50 to 100 km North of Lisbon city. It is a mainly rural area, with growing services and small industries, besides an important Atlantic coast providing fisheries and tourism. Its human occupation dates to pre-historical times, with several archaeological sites, Roman villas, Islamic heritage, historical castles, and Christian churches. The adaptation of these different communities to the landscape and geological resources of the territory shows the importance of Geodiversity, and several examples will be addressed (from Prehistory to the Present), namely from human shelters, defence structures, historical battles, religious sites, land use and coastal settlements

ccThe distribution of historical settlements, monuments, and events throughout the territory is clearly influenced by its geodiversity, including both geological materials and landscapes. Cultural heritage is therefore closely linked to geodiversity and this strong relationship should be used as an important tool to promote it.

keywords: Geodiversity, Landscape, Culture, Oeste Geopark, Portugal

Building Bridges between Portugal, Norway and Iceland

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With the aim of promoting the Sustainable Development Agenda, in particular SDG 17 - Promoting global partnerships for sustainable development, the Estrela UGGP, in partnership with Gea Norvegica UGGp and Katla UGGp, promoted the project “Building Bridges - Sharing of good practices among UNESCO Global Geoparks” over the last two years. Funded by EEA Grants Bilateral Relations Fund, this project, which ended in 2024, was an important milestone to establish a closer relationship between these countries, by strengthening the work between UNESCO Global Geoparks. As territories based on networking and the construction of strategies for the sustainable development of their communities, the implementation of this project has enabled the acquisition of knowledge and the exchange of experiences that have allowed for the construction of new ideas and future projects that could have socio-economic impacts on each of these geoparks. The missions carried out have strengthened this link between the territories, which have become better acquainted with each other's realities and, above all, the points on which they are aligned and which could be explored jointly with a view towards the future. Through the knowledge acquired, some of the successful projects could be replicated, particularly those with the direct involvement of partners from each of the territories, allowing successful models from an economic point of view to be used by partners looking for new solutions. During the Building Bridges initiative we were able to identify, along with the partners, coinciding subjects for our strategies, such as Climate Action, Glacial Geomorphology, Science Communication, Community Involvement and Education, which will be the first target areas to approach.

Overall, through this networking, bilateral relations were strengthened by these initiatives, promoting a greater involvement between the partners within the European Geopark Network, thus helping to implement new development approaches in the three UNESCO designated territories.

keywords: networking, exchange, building bridges

Valuing and Interpreting Geoheritage: a continuous work in the Estrela UGGp

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Geological heritage is a common legacy that must be valued and preserved. Through their geosites, UNESCO Global Geoparks contribute to understanding the history of planet Earth, but also to build future strategies anchored in this important heritage. In the Estrela UNESCO Global Geopark (Estrela UGGp), its rocks and landforms help tell the story of ancient oceans, large mountain chains, planation surfaces and glaciers that shaped the higher sectors of the Estrela mountain, these last originating landforms that contributed to its designation as a UNESCO Global Geopark. This heritage represents an important tourist and educational attraction for the Estrela region, which is why it is imperative that they are used in a sustainable way, ensuring their conservation and making them an instrument for raising public awareness.

Throughout its existence, the Estrela UGGp has committed to a holistic geoconservation strategy, focused on both conservation and the interpretation and valorisation of its geosites. Thus, for 2024, the project "Improving the Visitation of the Geoheritage classified by UNESCO" was implemented, which aimed to provide the territory with new structures that promote, on the one hand, the dissemination of scientific knowledge, the enhancement of natural heritage and environmental awareness, and, on the other, greater control and less impact of visitation on geosites and surrounding habitats. At the same time, this project could also be an important contribution to the creation of a distinctive tourist offer that encourages demand for these sites integrated into a protected area, reducing the pressure over the areas that are already the most visited, and which, in the case of the PNSE, coincide with the most sensitive habitats, through new touristic products.

Under this project, various interventions were implemented in eight geosites of the Estrela UGGp: Penha de Prados tor (Celorico da Beira), Cortes fluvial valley (Covilhã), Mondego pothole and Mondeguinho Spring (Gouveia), Metasediments of Quinta da Taberna and Serra de Bois tin and wolfram Mines (Guarda), Poço do Inferno (Manteigas) and Cabeço de Santo Estêvão viewpoint (Seia). For these geosites, the following actions were implemented: i) 5 new pedestrian routes; ii) 4 new viewpoints with infrastructures to accommodate the visitants; iii) 7 electronic visitor counters to monitor the carrying capacity of the locations; iv) 15 new interpretative panels.

In the end, this project represents one more action that is contributing to the preservation and valorisation of the geoheritage of the Estrela UGGp, asserting the natural heritage of this territory as a tool to boost the tourism and educational activities, making it a territory to learn and enjoy.

keywords: geoheritage, valorisation, interpretation

The importance of drone monitoring of geosites in a coastal UNESCO Global Geopark

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The Oeste UNESCO Global Geopark (Oeste UGGp) is located in Central West Portugal, 50 km North of Lisbon city, encompassing the municipalities of Bombarral, Cadaval, Caldas da Rainha, Lourinhã, Peniche, and Torres Vedras. Its geological internationally relevant highlights are the presence of the Toarcian GSSP ("Golden Spike") and an abundant and unique fossil record, particularly of Late Jurassic dinosaurs (with a dozen holotypes) and Cretaceous angiosperms. Most of the geosites are located along the 72 km of Atlantic coastline, which poses enormous challenges in terms of geoconservation and monitoring.

There are a number of challenges and needs with the coast line geosites, and Oeste UGGp presents itself to the local communities as a supra-municipal entity that can contribute with data and information to be worked on, by partners linked to the study of paleontology. On the other hand, this data is fundamental for the municipalities that manage the territory, as well as people's access to beaches and monuments, among others, and it is also those entities that can implement containment and correction measures that should be needed.

With this in mind, Oeste UGGp teamed up with local partner PIXAIR, a specialist in drone flights and the production and management of information related to photometry, so that it could specifically access the information produced by the latter through the SIMEC project (https://www.eeagrants.gov.pt/pt/programas/crescimento-azul/projetos/projetos/simec/). The SIMEC project aims to carry out aerial photogrammetry data collection campaigns of coastal plots for the purpose of building high-precision 3D digital terrain models, in order to create a database with cyclical information. The data collected is intended to enable the detailed analysis of coastal geosites, their sharing with the scientific community, and the establishment of digital mechanisms for obtaining information. In addition, the existence of this database will make it possible to establish comparative and predictive models that generate more detailed information on rates of retreat and rates of loss of territory to the sea, in order to support the management and decision-making of the authorities in terms of coastal security and planning.

Through this project, it has already been possible to regularly monitor more than a dozen coastal geosites, where the data and information collected and produced is now essential for the effective management of natural heritage, enabling municipalities to develop containment strategies more quickly and preventively, scientific entities linked to paleontology can go into the field whenever a landslide is identified, thus reducing the risks associated with rapid erosion and delays in prospecting these sites. And finally, it provides a real digital map of coastal dynamics and their ecosystems.

This project was piloted in 2022 and 2023, and it is hoped that it can become a long-term tool in the Oeste UGGp for monitoring coastal geosites, but also for inland geosites.

keywords: Geosites, Drone, Coastal dynamic, Geoconservation

The implementation process of a protected area through the coordination of an UNESCO Global Geopark

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The Oeste UNESCO Global Geopark (OUGGp) is located north of Lisbon (Portugal), in an area covering the municipalities of Cadaval, Caldas da Rainha, Bombarral, Lourinhã, Peniche and Torres Vedras. With a total of 1,154 km^2, the OUGGp has 72 kilometers of Atlantic coastline and around 213,000 inhabitants.

In 2021, the Intermunicipal Community of Oeste, composed of 12 municipalities, delegated the responsibility of coordinating the management of the Planalto das Cesaredas Strategic Plan to the OUGGp. The Planalto das Cesaredas (Cesaredas Plateau) is a limestone massif, managed by four different municipalities, containing dozens of villages and towns scattered in about 80 km^2. It has a rich natural heritage, with more than 1,400 different fauna and flora species observed on a regular basis (see www.inaturalist.org/observations?place_id=124343), making this a unique place for nature tourism activities. On the other hand, human occupation dates back to the neolithic age, transforming this place into a territory of stories and legends that still enrich the local material and immaterial cultural heritage of many villages, turning it into a tourist product in itself. The Planalto das Cesaredas territory is also important in the history of the geological (mainly salt tectonics and marine fossils, including more than 20 unique fossil species) and archaeological studies in Portugal.

Considering that the creation of a protected area is one of the main goals of the civil society, the OUGGp, as the main actor and a recognized entity in the territory, sought funding for the development of scientific studies that could justify the implementation of such a protected area. Funding was obtained from private companies and municipalities, and a multidisciplinary team was created to implement the necessary studies and compile a scientific dossier of the area. Based on this data, a possible new protected area within the territory of the OUGGp will be created.

This process is based on 3 essential factors for its success, namely: 1. Bottom up - This process was born from a Strategic Council composed of more than 20 local entities that develop direct and indirect activity in the territory of the Planalto das Cesaredas, among environmental and local development NGOs, parish councils, municipalities and local companies; 2. Specialists from national universities were hired to bring the scientific knowledge on fauna, flora, geology, fossils and landscape, allowing to join the academy to the intrinsic knowledge of the territory, but above all to the service of civil society; 3.The OUGGp is an entity recognized by the organizations of the Planalto das Cesaredas' Strategic Council, but also by the set of municipalities that make up the territory of this plateau, allowing it to establish a relationship of trust, important for the creation of a future protected area, but above all as a way to ensure the essential political and financial support for the implementation of a project of this magnitude.

keywords: Protected Area; Natural Heritage; Network

The Environmental Emergency? How the Geodiversity Potential of European UNESCO Global Geoparks Can Contribute to a Resilient Future

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(PROPOSED WORKSHOP)

Nature is a complex and interlinked system comprised of biotic and abiotic elements. There is an incredible range of natural diversity on Earth, both of biodiversity and geodiversity. Studies investigating geodiversity are not new, however the field is still emergent compared to that of biodiversity. Although methods, classifications and techniques are in development, there is convergence over the definition of geodiversity. Research has established that in general areas with high geodiversity are also areas with high biodiversity.

UNESCO Global Geoparks (UGGp's), regions with geological heritage of international significance, have been recognised throughout the world. As of 2024, there are 109 UGGp's concentrated in 28 different European countries; this represents an extraordinary pool of areas actively working to conserve and promote geodiversity and geoheritage. Many European UNESCO Global Geoparks are engaged to understand and share their geodiversity, many using innovative approaches.

It is proposed that the European Regional Network (EGN) examines and discusses how to pool its geodiversity potential, not only to advance general knowledge of geodiversity, but also to support effective management of natural heritage and for full UGGp participation in European Union initiatives supporting nature, for example the Green Deal or the Biodiversity Strategy. This capacity building is essential, not only to establish an understanding geodiversity, but also for the contributions that European UNESCO Global Geoparks can bring to management of the natural environment and to broader conservation agendas in the face of climate change and anthropogenic pressure.

keywords: geodiversity;biodiversity; EU policy; capacity building

The Geodiversity of Anglesey and its Role in the Theory of Evolution

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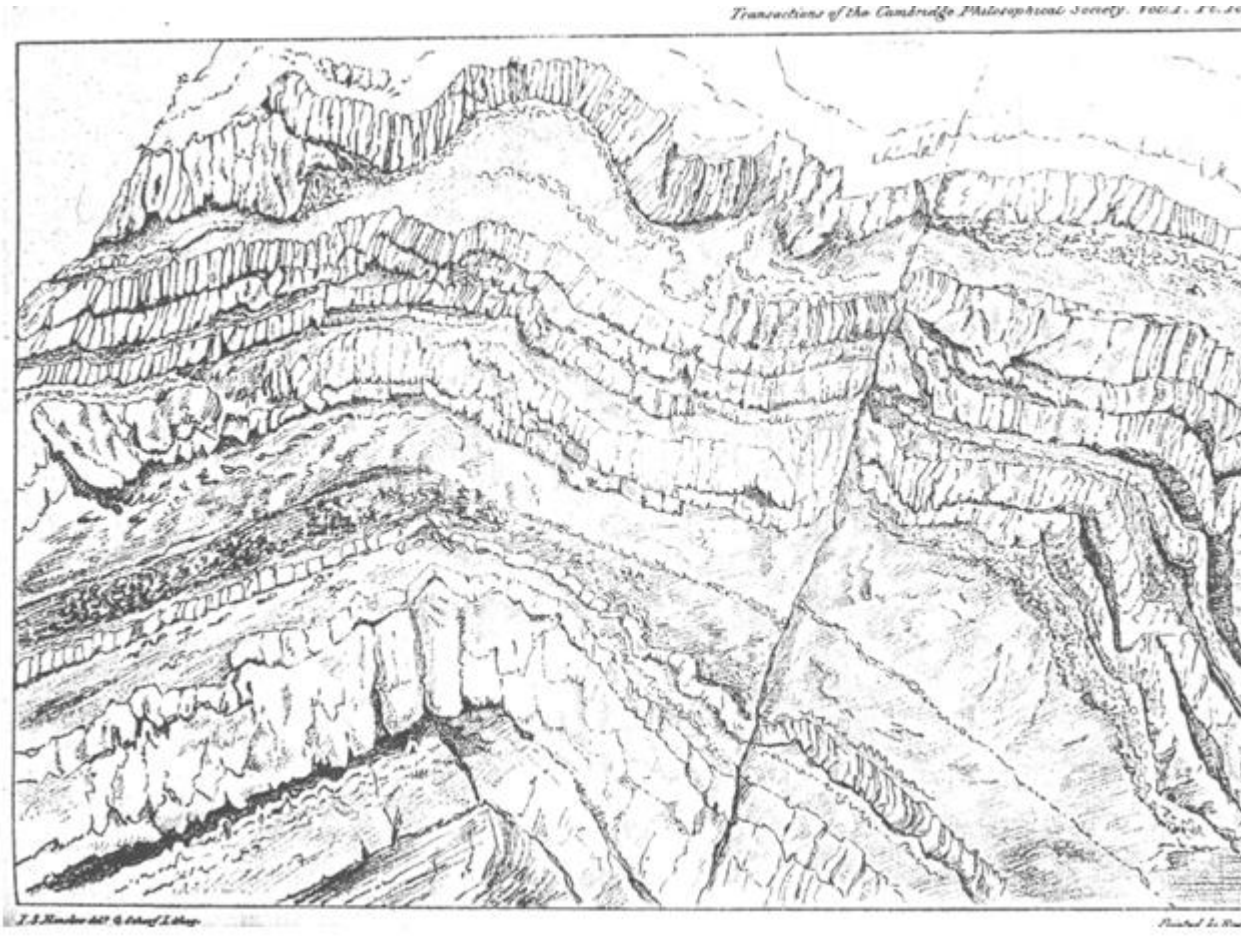
The Geodiversity of Anglesey and its Role in the Theory of Evolution

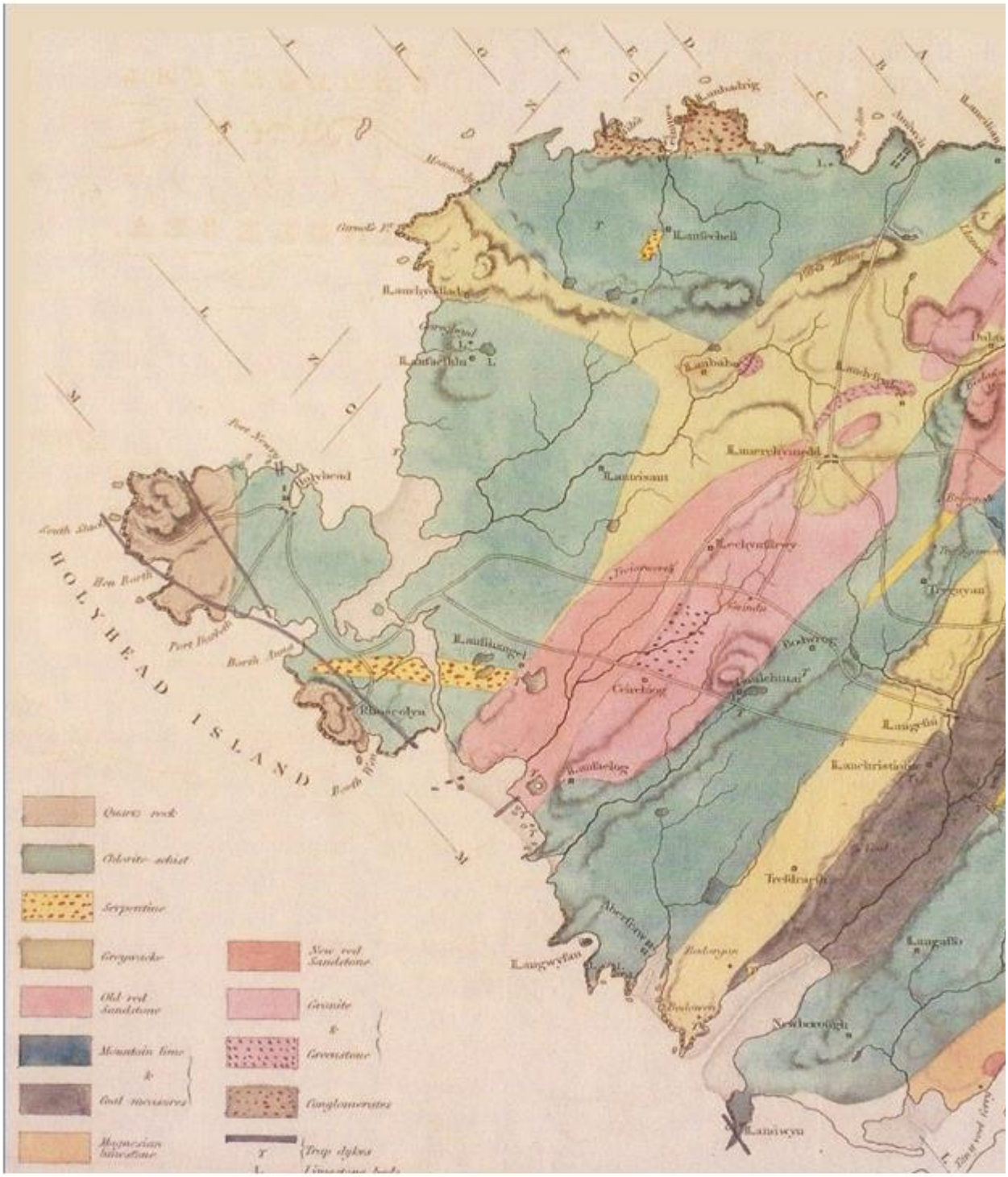
The GeoMôn Team, North Wales

Anglesey was already known as a source of copper, coal, limestone and serpentinite when the geodiversity of Anglesey caught Henslow's attention. He was just 24 years old when he travelled from Cambridge to the island and in one summer collected 980 rock samples for the university.

Henslow made many insightful observations at the outcrops. He adapted the principles of crystallography to structural analysis and described lateral variations in the sedimentary strata of Anglesey. His interpretations of relationships between structures and unconformities showed he had developed a good understanding of the enormity of geological time, and grasped the huge range of geological processes displayed in the rocks of the island.



Henslow's scientific prowess was widely recognized and he was invited to join the HMS Beagle voyage to circumnavigate the Earth. Instead, he recommended a promising student he had been mentoring called Charles Darwin for the Beagle voyage. And the rest is history…….



Darwin often described himself as a geologist, and the accurate descriptions and geological interpretations he made during his voyage surely owe much to Henslow's mentorship.

Reference: Geological Description of Anglesea, J.S. Henslow, 1822, Transactions of the Cambridge Philosophical Society.

keywords: Henslow Cambridge Charles Darwin Beagle

Quaternary glaciers in Crete: glacial landforms on Mt Ida, Psiloritis UGGp, Crete, Greece

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In this study we present the first concise evidence of multiple Quaternary glaciations on the mountains of Crete in southern Greece. The work focuses on a typical moraine/cirque system at the NW slopes of Mt Ida within the Psiloritis UNESCO Global Geopark. The glacial deposits (moraines, glaciofluvial fans) and other glacial landforms in this valley, such as the imposing cirque directly below the highest peak of the massif, are exceptionally well-preserved and constitute a unique feature of the Geopark. The coincidence of this geosite with the most popular and well-trodden hiking route on Mt Ida, increases the potential for expanding its geotouristic value.

In the framework of this study, we conducted preliminary geomorphological mapping with field surveys assisted by UAV aerial photography. Panoramic mosaics were created with this material and are available through a dedicated application of the geopark. The geomorphological mapping and a preliminary morphostratigraphical classification of this complex glacial sequence indicate at least three distinct glacial phases. Being in accordance with the glacial record of mainland Greece, these phases could be tentatively ascribed to MIS12, MIS6 and MIS2 respectively.
So far, evidence of glaciation on Crete has been a controversial issue and further research was deemed necessary to clear this out [1]. A detailed description of a cirque-moraine system was given in [2] but lacked any documentation. Given the controversial reports of earlier geomorphological studies, this claim was thus disregarded [1]. Interestingly, another study [3] had presented convincing photographic evidence of the moraine and a geomorphological sketch map of Mt Ida. However, this study was only recently digitized (March 2019) and remained unknown to the scientific community [1,4].

The presented study creates the base to date the southernmost, and thus most diverse, Quaternary glaciers in the SE Mediterranean. The development of a precise chronostratigraphic framework of these glacial phases and its correlation with other regional paleoclimatic records (e.g. marine records, pollen sequences) can significantly expand our understanding of spatiotemporal patterns of glaciation and thus of the paleoclimate in the Balkans.

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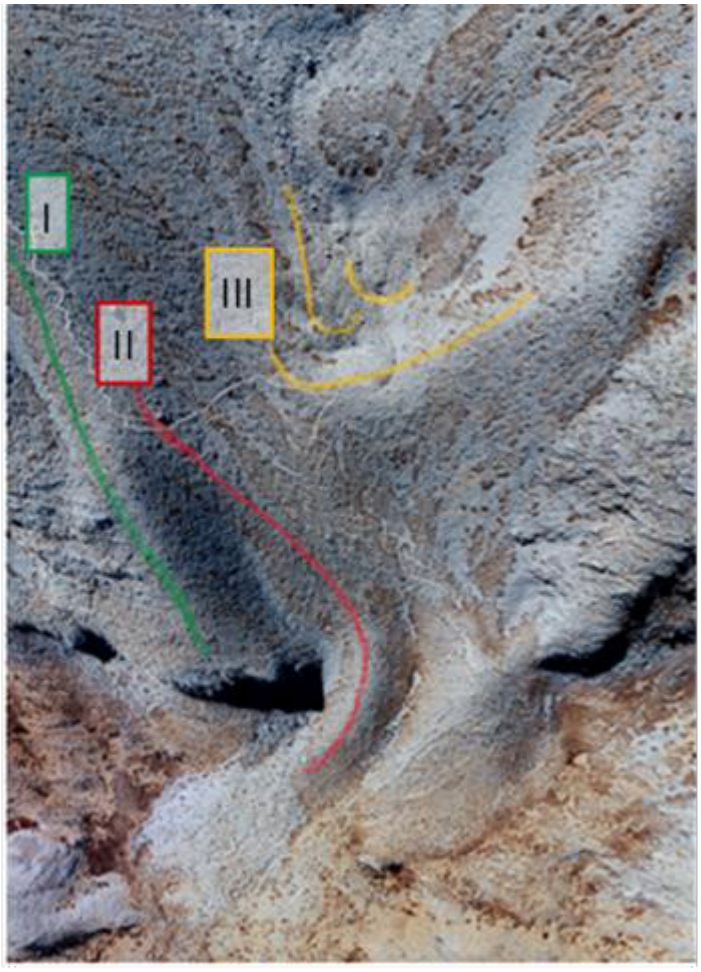

Aerial photograph of deposits and ascribed glacial phases on Mt Ida

keywords: glacial geomorphology, paleoclimate, Pleistocene, Greece, Psiloritis

SOIL HEALTH SURROUNDING FORMER MINING AREAS – A UNIVERSITY RESEARCH PROJECT WITH THE INVOLVEMENT OF SCHOOLS & COMMUNITY IN THE AROUCA UNESCO GLOBAL GEOPARK (PORTUGAL)

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"Soil health surrounding former mining areas: characterization, risk analysis, and intervention" was a project supported by the European Structural Funds FEDER. It was developed between 2021 and 2023 by a consortium composed by five R&D Institutions of Oporto University: Earth Sciences (ICT and CERENA), Chemistry (CIQUP), Sociology (IS-UP) and Art, Design and Society (i2ADS). This project allowed the assessment of the hydropedological impacts associated with mining and industrialization, and their contribute to the mitigation and/or remediation of these impacts, promoting soil protection and health. The Regoufe Mines – a geosite of the Arouca UNESCO Global Geopark (UGGp) was one of the study areas selected under this project.

In Regoufe mines tungsten-tin deposits occur in the granite body and in mineralized quartz veins. Mining exploration ended in the 1950s, with the first mining concession granted in 1915. The peak of exploration was after 1941, during the Second World War, with the exploitation under British capital and administration. In this context, the aim of this project was to perform an integrated characterization of mining waste, soils, and waters affected by this mining structure to identify environmental impacts and contribute to their mitigation by assessing soil and water health. This integrated study, based on advanced methodologies and techniques in petrography, geochemistry, physics, geophysics, and environmental sciences, allowed the assessment of alterations occurring in waste materials and soils, providing insights into potential environmental impacts. Representative soil and waste samples from Regoufe mines were prepared and magnetic properties were analyzed showing the presence of authigenic magnetite in the soil, which can be related to the deterioration of the metallic parts of the remain washing plant that still exists in the area (Sant'Ovaia *et al.*, 2023). Geochemical analyses of soils and waste materials have shown the presence of potentially toxic elements such as arsenic, which can be leached due to the circulation of groundwater in the granite of the Regoufe mine.

During the project were also developed studies and awareness actions with the population of Regoufe to understand the sociological impact associated with the exploitation. Also, an artistic engagement and dialogue with the community and researchers was accomplished, including artistic residences and the exhibition «Rocks» that were held in two important museums with the support of Arouca UGGp: the Museum of Trilobites (located in the vicinity of a quarry still under mining) and the Arouca Monastery, from 20/12/2022 to 21/01/2023, which received 892 visitors. Were also promoted fieldtrips to Regoufe with students from Oporto and the Arouca Secondary School. The fieldtrip with students of Arouca involved scientific and artistic activities, contributing to the development of the critical spirit and scientific knowledge, with the participation of Oporto University researchers and technicians of the AGA – Arouca Geopark Association.

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keywords: Arouca Geopark, Regoufe Mine, Abandoned mines, Soils, Geoeducation

Valorisation of Historical Flood Research in Speleothems for Public (Re-)engagement with Climate Knowledge in the UNESCO Global Geopark Famenne-Ardenne

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In 2021 important floods in southeastern Belgium resulted in about 39 deaths and important social and environmental damage. In several caves of the region, pristine calcite deposits of several decades old were covered with centimeters-thick clay layers. Coring and study of such calcite flowstone deposits may therefore provide information on successive floods.

In the frame of the LEAP project, *Learning from the past: The impact of abrupt climate changes on society and environment in Belgium*, we investigated the Hotton cave, located in the UNESCO Global Geopark Famenne-Ardenne, Belgium. We cored a pristine flowstone covered by clay during the 2021 flood, and U-Th dated several levels of the flowstone. The core shows five other distinct clay layers, that are attributed to floods in the last 5,000 years (fig 1). The chronology with uncertainties of several hundred years is not precise enough to enable a direct comparison with the historical flood record in the region. Nevertheless, the ~1550 AD flood observed in the speleothem may correspond to the flood of 1573 AD whose flood level is engraved on a stone column of the *Collegiale* church in Dinant, a nearby medieval city.

The study shows the potential for floods reconstruction through speleothem research. In this particular cave, severe floods existed before the one of 2021 AD. Similar studies in other caves will refine the chronology of past mega-floods and the respective influence of (human-induced) climate or land-use changes. Is the clay-layer in speleothems due to increased rain, or to intense land-use, increasing sediments in the flood water and consequently in the speleothem?

Speleothems are particularly suitable to 'visualize' events on mid-to-long-term timescales and therefore make the Earth history more understandable: they contribute to create awareness on a mostly invisible geoheritage (i.e. caves, invisible at the surface), and are important for our knowledge on past environments, climate change and human-earth evolution interactions. The research was already disseminated to the large-public through a tv-program and a dedicated event will be organized next year in the UGG Famenne-Ardenne.

keywords: Climate, floods, caves, speleothems, valorization

ClimEmpower, a cooperation Horizon Europe research and innovation programme

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The presentation will be based on the project ClimEmpower which concerns the empowerment of five south-European regions (Croatia, Cyprus, Greece, Italy, Spain) with high Climate Change (CC) risk and exceptionally low adaptive capacity to enhance their CC-resilience, establish the regional Communities of Practice (CoP) and co-create the resilient development strategies adapted to the regional needs and potentials. This will be achieved through the combination of user-driven climate applications, capacity building and "best practices" transfer from other European projects and regions.In the case of Cyprus, the area is focus on the Troodos UNESCO Global Geopark boundaries and it mainly concerns are Sahara dust, Wildfires, Drought and Heat waves.

Throughout the project the ClimEmpower team will aid the regional administration in organizing the regional CoPs where representatives of "quadruple helix" stakeholders will discuss their Climate Adaptation needs and capabilities, assess potential pathways towards CC-resilient, societally just, and sustainable future and elect sustainable and CC-resilient regional development pathways that are best suited to their needs and capabilities. This activity will be supported by provision of the data driven Decision Support service(s) for strategic CC-adaptation planning, as well as through provision of easy to understand educational materials illustrating the CC risks and possible technological, natural and societal adaptation options and strategies, explaining the use of the project tools, as well as knowledge transfer on existing data, tools and best practices in climate adaptation from successful EU projects and regions with higher adaptive capacity.

keywords: cooperation, geo-education, sustainability, European funding programs, local development, geopark, climate change

"THE PERAPEDHI FORMATION REVEALS THE TIME INTERVAL OF THE CREATION OF THE TROODOS OPHIOLITE COMPLEX (CYPRUS)"

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"THE PERAPEDHI FORMATION REVEALS THE TIME INTERVAL OF THE CREATION OF THE TROODOS OPHIOLITE COMPLEX (CYPRUS)"

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Keywords: *Neotethys, Sea-floor Spreading, Umber, Troodos ophiolite.*

The Troodos Ophiolite Complex (TOC), which dominates the central part of the Cyprus island, is a fully developed fragment of oceanic crust that features well-preserved and well-exposed upper mantle sequence, plutonic, intrusive and volcanic rocks, as well as chemical sediments such as umbers. Umbers were formed along the Neotethys seafloor spreading axis, when hydrothermal fluids reached the seafloor at temperatures of around 350°C in the form of "black smokers". The finer material of the black smoke that was rich in iron and manganese oxides, was spread over the seafloor by ocean currents and precipitated, infilling paleodepressions on the surface of the lavas and formed these brown to dark brown fine-grained metalliferous chemical sediments.
Each group of nearby umber deposits, represents an individual hydrothermal vent system on the Neotethys seafloor, which became inactive when seafloor-spreading distanced it from the rising magma, and a new system was activated near the spreading axis. Subsequently, these sediments that are locally exposed today on top of the Upper Pillow Lavas around the foothills of the Troodos massif, were formed at different ages during the creation of the TOC.
The umbers towards their top are intercalated with pelagic cherts and cherty mudstones consisting the Perapedhi Formation. Some chert layers and concretions yield abundant well-preserved radiolarian assemblages, that contributed significantly towards the age determination of these sediments. Based on these radiolarian assemblages it is estimated that the time interval of the creation of the umbers is between upper Turonian – lower Campanian (approximately 92-82 million years ago). These results reveal a reliable estimation for the duration of the TOC formation for approximately 10 million years.
The determination of the depositional time interval of the most significant exposures of chemical sediments around the foothills of the Troodos Massif, could be a very useful tool that will contribute significantly, in decoding the complexity of the hydrothermal activity that took place along sea-floor spreading centers, during the formation of the TOC. In order to promote the significance of the TOC chemical sediments, a series of 2D and 3D animations have been created that explain to the general public how these deposits were formed on the sea floor of the ancient Neotethys ocean.

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keywords: Neotethys, Sea-floor Spreading, Umber, Troodos ophiolite

Testing the UGGp community: preliminary results from the questionnaire on the 6.8M Marrakech earthquake, September 8, 2023, Morocco

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On September 8, 2023, at 22.11 UTC, an earthquake of magnitude 6.8 occurred near the town of Adassil in the High Atlas Mountains, Al Haouz Province, Morocco. The number of confirmed fatalities was around 3.000, with over 5.500 injured. The earthquake, also felt in Spain, Portugal and Algeria, caused the destruction of several villages near the epicenter. It also struck with great intensity in the city of Marrakech, where it caused numerous collapses especially in the historic city, involving around 300.000 people, including 100.000 children, according to World Health Organization data.
In those days, Marrakech was the venue of the 10th International Conference of UNESCO Global Geoparks, an event that brings together around a thousand people who, in different ways, deal with geological-environmental issues.
Considering the scale of the event and the involvement of a large number of experts present on site, a questionnaire was proposed to collect the memories and sensations of the conference participants. The aim was to get a picture, especially from people familiar with disaster risk reduction strategies, of how the earthquake was perceived, what the reactions were, the awareness of how such events happen and the behavioral rules to follow.
The survey was structured using the Google Forms platform, administered by the geohazards working group and advertised on the Global Geopark Networks webpage and social media channels.
The questionnaire was divided into three large subject areas: a first area concerning personal and professional information, a second area dedicated to the specific experience lived in Marrakech and a final area referring to knowledge regarding the topic of earthquakes. These three subject areas include twelve specific sections. In particular, the sections regarding the September 8 earthquake require information about where the individual was at the time of the event, what their perception of the earthquake was, what sensations were experienced and what the reactions and behaviors were.
In addition, observations are requested on the effects and damage caused by the earthquake, such as fallen objects and furniture, damaged buildings and any reactions by animals. The third and last area is very important to get an understanding of the specific knowledge on the topic of earthquakes, and consequently on the perception of seismic risk. These last indications are even more significant as they should concern a population sample already formed from a geological point of view.
In this contribution we discuss the preliminary results of the survey that may contribute to the development of tools and methodologies based on experts' responses, for the dissemination of information useful for improving awareness of seismic risk, in agreement to one of the crucial missions of UNESCO Global Geoparks.

keywords: Al Haouz earthquake, geohazards, disaster risk reduction, seismic risk perception, awareness dissemination

The contribute of LIFE Projects of the Regional Secretariat for Environment and Climate Action, to the preservation of natural values in geosites of the Azores UNESCO Global Geopark – the case of LIFE SNAILS

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Geoconservation is one of the main segments of action of any UNESCO Global Geopark (UGGp) and the implementation of measures that promote the balance between the use and conservation of the inventoried geosites must be a priority. In an archipelagic Geopark as it is the Azores, the monitorization of geosites is performed by Nature Rangers, framed in a Cooperation Protocol existing between the management structure of the Azores UGGp and the Regional Secretariat for Environment and Climate Action (SRAAC). This cooperation constitutes an important contribute for designing measures to enhance and protect sites of geological relevance that characterize the mosaic of geodiversity of the Azores UGGp and to promote an integrated management that considers nature as geodiversity+biodiversity. The fact that the vast majority of these sites is under protection measures, whether through the nine island Nature Parks, either through areas designated for habitat conservation, as the Natura2000, ensures the preservation of the natural values inherent to the different sites. In the Azorean archipelago four LIFE projects (LIFE IP Azores Natura; LIFE IP CLIMAZ; LIFE BEETLES; LIFE SNAILS) are ongoing through SRAAC, which represent an extremely important direct or indirect contribute to the valorization and conservation of the habitats and integrity of the Azores UGGp's geosites. We choose to highlight the Project LIFE SNAILS (**S**upport and **N**aturalization in **A**reas of **I**mportance for **L**and **S**nails), a nature conservation project co-financed by the LIFE Programme of the European Union with the main objective being the conservation of endangered species, engagement of community and the implementation of a pilot educational program that considers the Azorean biodiversity and ecosystems. SNAILS is focused on three species of terrestrial molluscs endemic to Santa Maria island: *Azorivitrina angulosa* and *Oxychilus agostinhoi* (Critically Endangered – IUCN), and *Leptaxis minor* (Endangered – IUCN). The area of intervention of this project intersects with the geosite of national relevance ''Praia Formosa and Prainha'', which is characterized by the existence of a semicircular bay with white sand resulting from the erosion of carbonatitic rocks and of stream valleys like Ribeira da Praia and Ribeira do Farropo. The different formations in this geosite tell us part of the geological history of the island, the oldest in the Azores (6 million years), with the higher number of island endemic land molluscs. Being geodiversity the base for the development of unique biodiversity, and considering that the existence of endangered species, endanger the natural integrity of the geosite, this project is considered of high relevance as it will improve the habitat of target species, control invasive species, implement instruments to support conservation in marginal areas and promote youth and senior volunteering for biodiversity. In this way, it will enable the long-term recovery of the habitat, increase its availability, reduce its fragmentation and improve its quality, through an integrated mosaic of ecological corridors. In turn, these corridors connect high-quality habitat hotspots through watercourses and property edges, covering public and private lands.

In conclusion, the contribute of LIFE projects, in specific LIFE SNAILS, is considered of high relevance for the maintenance of the natural identity of the geosite ''Praia Formosa and Praínha'', within the Azores UGGp, preserving specific habitats and endangered species.

keywords: nature conservation, geosites, LIFE projects, biodiversity, integrated management

The morphostratigraphic imprint of the Baltic Ice Lake drainage event in southern Finland

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Saimaa UNESCO Global Geopark (UGGp) is located in Southeast Finland. It covers the southern part of Lake Saimaa, the fourth largest natural freshwater lake in Europe and largest in Finland. The Paleoproterozoic bedrock of the area is covered by loose Quaternary deposits and formations, including parts of the First and Second Salpausselkä end moraines / ice marginal formations. These formations consist of ice-contact deltas and subaquatic fans, that were deposited into the Baltic Ice Lake, where the Scandinavian Ice Sheet terminated. Lake Saimaa was formed and developed as a result of uneven glacioisostatic uplift. Before becoming an independent lake basin, it was part of the ancient lake and sea phases of the Baltic Sea, including Baltic Ice Lake and Yoldia Sea phases.

In article “The morphostratigraphic imprint of the Baltic Ice Lake drainage event in southern Finland” by Juha Pekka Lunkka (University of Oulu) digital elevation models were used to study glaciofluvial Gilbert-type ice-contact deltas in the Younger Dryas Salpausselkä end-moraine zone in southern Finland. The geomorphological data analysed were used to reconstruct the water-level drop of the late glacial Baltic Ice Lake to the early Holocene Yoldia Sea and tie these changes to a wider stratigraphic context.

The results indicate that the sudden drainage event at around 11 650 cal. yrs BP left its imprint not only on the varved sediments but also on ice-contact glaciofluvial deltas in the Second Salpausselkä zone throughout southern Finland. This morphostratigraphic boundary can be placed at locations where the ice-contact deltas occur at two different levels; the higher-level deltas formed during the Baltic Ice Lake B III water-level stage and the lower-level deltas during the Yoldia Sea Y I water-level stage. This morphostratigraphically defined boundary in southern Finland marks the Pleistocene/Holocene chronostratigraphic boundary in southern Finland and shows the corresponding positions of the Scandinavian Ice Sheet’s Finnish Lake District Ice Lobe and the Baltic Sea Ice Lobe.

The morphostratigraphically defined stratotype area for the Pleistocene/Holocene boundary and its type localities in Finland is suggested to locate in the Second Salpusselkä zone, southern Finland. One of the type localities is located inside the Saimaa Geoparks boundaries (and other inside Salpausselkä Unesco Global Geopark). The research also contributes to the story of Saimaa UGGp, the story of lake Saimaa.

Reference: Lunkka, J. P. (2023). The morphostratigraphic imprint of the Baltic Ice Lake drainage event in southern Finland. Bulletin of the Geological Society of Finland, 95(1), 47–58. https://doi.org/10.17741/bgsf/95.1.004

keywords: Finland, Stratigraphy, Pleistocene/Holocene boundary, glaciofluvial ice-contact delta, LiDAR DEM, Baltic Ice Lake, Yoldia Sea, Salpausselkä

Experiencing and investigating the use of geo-mascots, emojis,-cartoons and -comics in Global Geoparks: your action is needed!

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Geoscience communication is next to international geological heritage protection and link up geo-topics with natural and cultural including intangible heritage, a core of UNESCO Global Geoparks (UGGp) objectives. At the end of the 20th century, it started with the format of geo-trails with interpretation panels plus printed books and leaflets as well as guided tours. Even if at that time some geoparks have developed „geo-cartoons i.b.s." (i.b.s.: in the broadest since (Frey, M.-L., Ciobanu, C., Rodrigues, J. & C. Toma 2024)), they have achieved a new blooming during the last years: 1st and 2nd decade of 21st century, especially in geoparks of the Asia-Pacific Global Geoparks Network. Main action fields seem to be tourism and education. However, detailed data and systematic information is lacking on e.g. which categories of "geo-cartoons i.b.s." exist, when did UGGps create them, why were they created, which results shows the existence of "geo-mascots i.b.s." in education and or tourism and which topics are being transmitted to the broad audience with "geo-mascots" or are they used in schools and if when, for which age and in which format? The information on "geo-mascots i.b.s." in e.g. European Geoparks is scarce, even though many geoparks employ them. Therefore a group of scientists working in UGGps and on science communication started to tackle this topic as it seems to bring in a new perspective in modern IT-related education and tourism activities including „gamification i.b.s.".

The scientific background of this approach is „anthropomorphism", the attribution of human characteristics to animals, gods, or natural elements, assuming they have human-like features or behaviors. It is interesting to note that characters like this have been used since ancient greek time! Modern versions can be found in the 1970s, such as Olympic Games mascots or in sports, e.g. National Football League mascots like e.g. San Francisco 49ers called: Sourdough Sam. The anthropomorphic characters, "mascots" are mainly animals, except a few that are human-like. Even if they, in this context, seem to serve for promotion and sale of merchandise like souvenirs, they can also represent meaningful concepts, as seen with mascots for events like the Olympic Games 2024 in Paris. Recent publications indicate that "mascots, cartoons" or "comic figures" can support the communication of complex topics, such as in the field of medical explanations to general audiences. Very few examples exist connected with landscape or geology of a territory in the broadest sense, as so-called **geo-mascots?** This type has also been used for the 20th anniversary of the Global Geoparks Network in 2024, Figure 1.

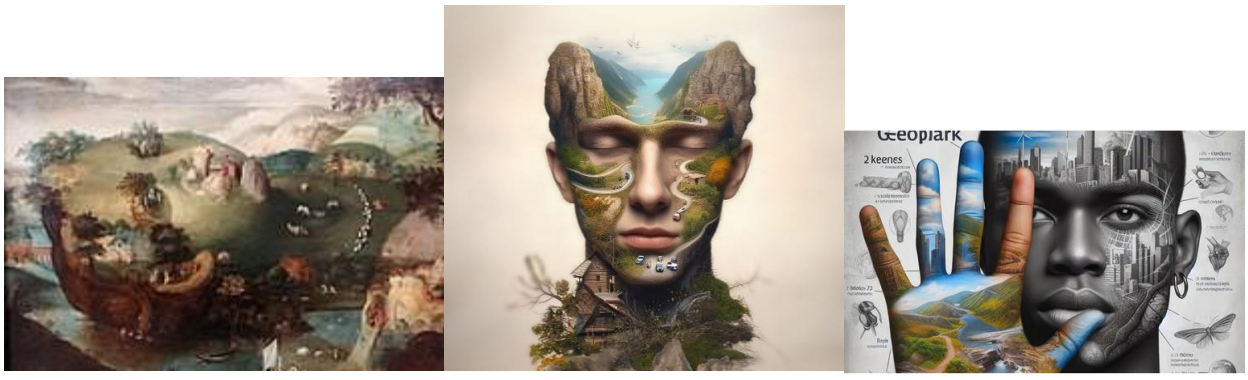

Fig. 1a (left) Anthropomorphe Landscape, 2nd half of 16th century. Source: https://de.wikipedia.org/wiki/Anthropomorphismus

Fig. 1b (middle) and 1c (right) 20th GGN Aniversary poster 2024, Source: ExcB GGN, Idea: Guy Martini, Design by TAPAS, Brazil; Source: https://tools.ggn20anniversary.com/contests

A preliminary analysis of mascot uses in UGGps already revealed a wide range of mascot types and utilization strategies across various contexts. Nevertheless, the information gathered so far suggests that, with further research, the use of mascots on geo-related topics could open a new type of geoscience communication to the broad public. The team of scientists therefore has prepared a questionnaire to go ahead to activate colleagues from EGN UGGps on this topic. This team invites all EGN colleagues to support their work by filling in an electronic questionnaire. Results for sure will be shared with all EGN and GGN members and in the education and tourism working groups.

keywords: mascot, geoeducation, gamification, science communication

Unifying geology across borders: the geological map of the transnational UNESCO Global Geopark Schelde Delta (Belgium – The Netherlands)

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The new UNESCO Global Geopark Schelde Delta bridges the boundary of Belgium and the Netherlands. The geological maps of both countries stop at the border but geology itself does not. To show the geology of the Geopark area in all its uninterrupted beauty and complexity a new cross-boundary geological map of the Geopark was constructed.

The map was made to fit A3 paper size which translates to a scale of approx. 1:340.000. The legend mainly uses map units and conventional colours of existing geological maps of Belgium and the Netherlands, making it easily understandable in both countries. Some Pleistocene and Neogene units had to be combined for the purpose of better cross-boundary correlation. Remaining connection problems across the state boundary were solved with the help of information from DEM's and detailed geological, geomorphological, pedological, historical and palaeogeographical maps.

Compared to existing national geological maps, the new map gives a much better view of the cross-border geology in both countries, showing the entire Schelde estuarine coastal region in its cross-boundary context. Especially in the coastal plain, the map is essential to visualise geology and relate it to low-relief landscape features which are not always easy to see in the terrain. It even elucidates some historical aspects of the state boundary itself, as the border position was largely determined by 16th century military defensive lines which followed geological features such as tidal channels that mostly have been filled in since and effaced from the present-day landscape.

The map is available in English and Dutch as well as in a simplified version for educational purposes. The GIS-version of the map can be combined easily with other information such as historical geography or hill-shaded topography, further improving visualisation of the landscape and its development. A 'mobile' GIS-version can be used interactively in the field on tablets and smartphones.

The cross-boundary geological map can be found on the website of the UNESCO Global Geopark Schelde Delta:

https://www.scheldedelta.eu/en/node/250

The GIS- and PDF-versions are available here:

https://dataportaal.zeeland.nl/dataportaal/srv/eng/catalog.search#/metadata/ff34dd24-4744-4640-bb21-ee8aebd77304?tab=relations

keywords: geological mapping, transnational, correlation, visualisation, landscape, coastal, estuarine, historical, Holocene, Pleistocene, Neogene, Paleogene

Community-Based Geoconservation and High-Value Sustainable Geotourism Experience Produces Important New Fossil Discoveries in the Cliffs of Fundy Global Geopark

Tim Fedak[1].
[1]Curator of Geology, Nova Scotia Museum (CA).

As if the Earth were breathing, the world's highest tides rise and fall twice a day along the shores of the *Cliffs of Fundy Global Geopark* in the Minas Basin, Bay of Fundy, southeastern Canada. These tides cause the slow but constant erosion of the red sandstone cliffs at Wasson Bluff near Parrsboro and expose 200-million-year-old basalt escarpment that formed during the break-up of the supercontinent Pangea. Within a unique one kilometre stretch of beach that represents the ancient fault scarp, the sandstones preserve a wide diversity of environments, from basalt talus formed along the ancient cliff face, to ancient shoreline deposits of small lakes, rolling sand dunes, and ephemeral sandy stream channels. These sandstones also contain the bones of Canada's oldest dinosaurs and a unique diversity of animals that survived the end-Triassic mass extinction.

Following the rich discovery of Early Jurassic fossils in the early 1980s, the Parrsboro Fossil Site at Wasson Bluff was protected by the Special Places Protection Act in 1989. The Fundy Geological Museum, a locally managed site of the Nova Scotia Museum, was established in Parrsboro by the Cumberland Geological Society in 1993. For the last thirty years, researchers from the small museum (5 full time staff) have worked with local volunteers and the visiting public to monitor and collect new fossil specimens from the fossil site. In 2015, the Museum worked with local communities along the Minas Basin shore in a federally funded Strategic Tourism Expansion Program (STEP) and was assisted by Nova Scotia Tourism in developing a unique and high-value visitor experience, "*Tidal Reveal – Digging Canada's Oldest Dinosaurs*". The one-year STEP program resulted in a report and plan that led to further community collaborations, and eventually to the development of the *Cliffs of Fundy UNESCO Global Geopark* in 2020.

From 2016 through 2018, the *Tidal Reveal* program provided museum staff with financial and logistic resources to visit the fossil site more regularly, and to systematically collect small fossil samples from a 20-metre beach exposure of actively eroding fluvial sandstone. The collection of these small, disarticulated and fragmentary fossils would not have been possible without the structure and activity of the strategic tourism program. The collection of fossil teeth and bones of small lizard like Sphenodontids, fast running terrestrial Protosuchid crocodilians, and the first bone of a theropod dinosaur have been recovered from the site. The fossil collection that has resulted from this sustainable tourism experience demonstrates the value of community based geoconservation activity. The Tidal Reveal program has evolved to feature a unique tourism experience by horseback and continues to provide new fossil specimens of scientific value. These fossils, exposed today because of the constant erosion by the world's highest tides, also provide tourists with unique and powerful connections to the past in the *Cliffs of Fundy Global Geopark*.

keywords: Tides, Tourism, Palaeontology, Geoconservation

Collaborative Engaging of the Portuguese UNESCO Global Geoparks in Climate Action: Achievements and Commitments of the Biennium for Climate Action 2022-2024

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The United Nations (UN), within the framework of the 2030 Agenda for Sustainable Development, proposes Climate Action as one of the goals (SDG 13), identifying three main targets: i) strengthening the resilience and adaptive capacity of territories; ii) integrating measures related to climate change into national policies, strategies and planning; iii) improving education and awareness of climate change.

Within this international organisation, the UNESCO Global Geoparks are territories with the potential to become benchmarks in the study of climate and climate change and in the definition of strategies to reduce and better respond to their impacts. It is important to promote knowledge about changes in ecosystems and biodiversity, the increase in extreme weather events, the increased risk of forest fires, changes in river systems and groundwater quality and the abandonment and depopulation of the territory.

Given the challenges these territories are facing, the Portuguese UNESCO Global Geoparks and aspiring territories implemented the project "Biennium for Climate Action in the Portuguese Geoparks". Coordinated by the UNESCO National Commission with the collaboration of Tourism of Portugal, it promoted various initiatives in the areas of Education, Science and Tourism, which have helped to diagnose climate impacts, raise awareness among communities, strengthen the educational and scientific role of Geoparks and foster collaboration between territories. Its implementation, between 2022 and 2024, culminated in the signing of the Declaration of Portuguese Geoparks for Climate Action 2025-2030, in which, for this subject, these territories commit to: 1) Strengthen research in the territories; 2) Encourage educational programmes and teaching resources; 3) Promote sustainable entrepreneurship; 4) Implement touristic itineraries with a lower carbon footprint; 5) Empower the territories and stakeholders.

At the end of this project, the Portuguese UNESCO Global Geoparks and aspiring territories were able to acquire new tools and develop pertinent activities like a SWOT analyses on the impact of Climate Change; engagement of youth through a school contest (that culminated in a Youth Meeting) and a new educational resource directed to geohazards and climate change; empower stakeholders and geoparks teams. These achievements will hopefully enable their communities to be more alert and prepared for this global problem.

The Biennium for Climate Action marked the commitment of Portuguese Geoparks to SDG 13, reinforcing the role of the UNESCO Global Geoparks as important territories for resilience, mitigation and adaptation to climate change, through the empowerment and involvement of the communities.

keywords: climate action, networking, 2030 Agenda

KaraMon - IMPROVING RESILIENCE TO NATURAL DISASTERS IN THE CROSSBORDER GEOPARK KARAWANKEN/KARAVANKE GEOPARK THROUGH THE DEVELOPMENT OF A COMMON DIGITAL NETWORK FOR MONITORING, COMMUNICATION, PREVENTION AND INTERVENTION (In the frame of INTERREG SI-AT Programme)

Gerald Hartmann[1], Suzana Fajmut Štrucl[2], Danijela Modrej[3], Lara Piko[4], Darja Komar[5].

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The area of the crossborder Geopark Karawanken/Karavanke, has faced severe storms over the past decade, including high winds, freezing rain, heavy rainfall, 100-year floods, landslides, and forest fires. These events have posed significant challenges**.** In the frame of INTERREG SI-AT programme, the KaraMon project aims to enhance disaster monitoring and warning systems to better protect the population through improved cross-border communication between crisis teams and emergency organizations.

Key initiatives include advanced risk assessment modelling, strengthened disaster communication, and bilateral aid protocols for early crisis recognition and response. The project targets experts in meteorology, hydrology, and geology, as well as crisis management teams, emergency organizations, and government entities at various levels.

The KaraMon project focuses on severe weather prevention via risk assessment and intervention by bolstering fire department resources. It also aims to improve strategic policy for future measures, involving local decision-makers, specialists, and scientific experts.

Leveraging recent disaster experiences, the KaraMon project integrates risk assessment models from both sides of the border, enhancing assessments with detailed data. Improved data collection and modelling will support an effective early warning system. The project addresses communication issues and resource shortages, investing in essential equipment and developing a bilateral deployment corridor. This collaborative effort seeks to improve disaster management through cross-border solutions and enhanced crisis communication.

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keywords: KaraMon, UNESCO Global Geopark, Geopark Karawanken/Karavanke , Geohazards, Risk prevention, disaster management

RescueME and Psiloritis UGGp: a research project to strengthen the resilience of cultural landscapes in coastal regions of Europe

Chara Papailiou[1], Maria Kolendrianou[1], Charalampos Fassoulas[1-2].

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How can we protect European cultural heritage from climate change, natural hazards and other stressors such as pollution and over-tourism? At this conference, the progress of the RescueME project is going to be represented by Psiloritis UGGp.

RescueME (Resilient Cultural Landscapes) is a Research project funded by the Horizon Europe programme, where five Resilience Landscape Laboratories (R-Labscapes) are working with 12 consortium partners to create new approaches of protecting coastal cultural heritage and landscapes and implementing innovative resilience solutions and culture-focused strategies.

In specific, this project is going to produce digital tools and innovative solutions for climate change adaptation and natural disaster risk management in five target areas, including Psiloritis UGGp. Planned actions focus on shielding the northern coast of Psiloritis UGGp (parts of the Municipalities of Mylopotamos & Rethymnon) from the impacts of extreme weather phenomena such as droughts, water shortages and, secondarily, floods. Currently, the case study area has been determined as well as the main hazards the area faces due to climate change.

Local stakeholder task forces, comprised of local CCSIs (Creative & Cultural Sectors and Industries) and other businesses, experts with local knowledge, researchers as well as civil society, have been established and are being maintained to participate in the co-creation process of the project. Local stakeholders have already been engaged in an intensive resilience baseline survey for a better understanding of the local knowledge/awareness and in two “impact chain” workshops to address the impacts from heatwaves and temperature rise and possible adaptive measures, on the sectors of agriculture and tourism.

Based on this co-creation process, a predictive model is being created, modeling and quantifying the impacts of the considered hazards and stressors and specifically addressing the aspects of ecosystems services and local heritage values. Also, for the purpose of defining measures, solutions and conditions to guide Cultural Landscapes in building their transformative resilience strategies, existing knowledge and solutions on community- or system-based resilience have been mapped and gathered to create a RescueME resilience meta-repository, as well as local policy tools.

Furthermore, in order to deliver a set of advanced digital solutions, social media posts are being analyzed and available local actionable data sources have been gathered so as to be inserted in a Data Lake of AI based tools.

All these actions are only the beginning of a long co-creation and decision-making process to protect our common heritage with the collaboration of research, governance and technological project partners, local stakeholders and representatives from the private and public sectors, the research community and civil society.

keywords: innovative solutions, climate change adaptation, resilience baseline survey, impact chain, RescueME

ResiliAge: building sustainable resilient communities with local heritage drivers

Alain Petit[1], Babbis Fassoulas[2], Carlos Carvalho[3].
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Recent crises and disasters have affected the European citizens' lives, livelihoods, and environment in unforeseen and unprecedented ways. These disasters are exacerbated by social inequality, lack of adequate information and technology, as well as economic and political crises, that reduce the effective preparedness and response.

RESILIAGE is a three-year project funded by the Horizon Europe programme (https://resiliage.eu/) composed of 18 experienced partners, that will have an important role in providing more precise information and make it accessible via user-friendly tools and soft solutions for supporting first responders and empowering citizens in crisis and disaster situations.

The project's objectives are to:

- Better understand society's reactions and support community's response to crises
- Transform qualitative data into quantitative information
- Co-shape and co-develop a data-driven novel holistic knowledge
- Produce actionable knowledge on societal resilience
- Build and foster community resilience
- Improve communication and contribute to Sustainable Development

The project will achieve these by operationalising the following activities:

- Map crisis preparedness in 5 Community Resilience locations against the background of international crisis preparedness to identify gaps in risk awareness, preparation, policy implementation, training and identify potentialities & best practices to incubate community resilience.
- Identify human factors critical in crisis response, risk perception, risk communication & cooperation for 5 crisis scenarios and beyond.
- Develop and test digital and non-digital tools, methods and solutions for a community better connected to first responders, while being better prepared to recover in post-disaster traumas.
- Co-shape and co-develop digital tools and soft solutions with the communities.

The project has already set up 5 Community Resilient Labs (CORE Labs) in real communities at the European level, being at the core of the research target. They support RESILIAGE through data co-mapping to model behaviors, co-shape strategies and validate tools and solutions with local stakeholders.

In each CORE Lab, some usual natural hazards were identified, as well as one research area based on RESILIAGE's Systemic Resilience Innovation (SyRI) framework.

The Famenne-Ardenne UNESCO Global Geopark in Belgium, encompassing councils like Beauraing, Durbuy, Hotton, Marche-en-Famenne, Nassogne, Rochefort, Tellin and Wellin, is a unique geological hub.
Renowned for its extensive karstic phenomena, the Geopark merges heritage conservation with tourism and scientific research. In 2021, the area faced a tornado and severe floods,

highlighting the need for resilience. Within RESILIAGE, the Geopark aims to strengthen socio-economic resilience against natural disasters, ensuring both the preservation of its geological wonders and the well-being of its communities.

Crete is the largest Greek island located in the southern border of the Aegean Sea, at the center of the Hellenic Seismic Arc, generating a high and complex seismic risk.
Devastating earthquakes have affected the island in both historical and modern times. The most recent one in 2021 caused significant damage to the infrastructure, human lives, economy, and environment of the area. Within RESILIAGE, the University of Crete, with the Psychology Department and the Natural History Museum, aim to mitigate earthquake risk and foster resilience within the local community and concomitantly provide practices and tools that can be applied internationally.

Naturtejo UNESCO Global Geopark located in Central Portugal is devoted to understanding how the landscape evolved for over 600 million years, and today foster sustainable development of local communities.
Climate changes left their marks in outstanding geological sites for millions of years. However, in the last 20 years, large areas of the geopark have been affected by an increasing number of wildfires that threaten natural resources and cultural heritage. This seriously affects the development of rural areas and puts in danger our lives, our families and patrimony.
Naturtejo will focus on fostering individual and societal interconnections through inclusive social and cultural exchanges, including strategies to promote inclusion of all society groups and social cohesion in all Disaster Risk Management phases.

A call for Associated CORE labs has been recently announced, inviting territories to take benefit from the project’ s outcomes.

keywords: Climate change, resilience, heritage, adaptation, drivers, communities

An Integrated and Systematic Approach to the Development of Geoparks in Iran (A Look at the Activities of the Geological Survey and Mineral Exploration of Iran)

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An Integrated and Systematic Approach to the Development of Geoparks in Iran

(A Look at the Activities of the Geological Survey and Mineral Exploration of Iran)

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The Geological Survey and Mineral Exploration of Iran (GSI) was one of the first geological organizations in the world to initiate the evaluation of geological heritage and geoparks immediately after UNESCO's call. This effort has been systematically and meticulously pursued over the past two decades.

Among the executive activities of the GSI aimed at defining the objectives of geoparks in Iran are the preparation of systematic geotourism maps at a scale of 1:250,000, localization of the method for inventory and quantitative assessment of geosites in Iran, collaboration in organizing geopark educational courses in schools within the scope of the Qeshm, Aras, and Tabas Unesco Global Geoparks, establishing specialized Earth sciences museums (specialized museums in the cities of Mashhad and Tehran), producing documentaries to familiarize and empower the general public with geoparks (documentaries on Earth heritage, Tabas Global Geopark), and conducting extensive studies nationwide to identify areas with potential for new geoparks (30 areas).

Despite the rich geodiversity and numerous geological heritage sites in Iran, and although Iran has been a pioneer in identifying and studying geotourism and geopark potentials globally, unfortunately, it has not been very successful in introducing and establishing geoparks at the global level, having only three geoparks listed in the UNESCO Global Geoparks.

This study attempts to systematically review the current status of geopark activities in Iran, conduct a SWOT analysis, and assess land-use planning to emphasize the necessity of an integrated and systematic approach to the development of geoparks. The results indicate that the main challenges to the expansion of geoparks in the country include the lack of public, official, and managerial awareness of the importance of geoparks, the absence of geoparks as an effective and profitable economic component in the government's top-tier documents and land-use planning regulations, the lack of interaction and coordination between relevant organizations in the geopark establishment process concerning territorial governance issues, and insufficient funding for creating the necessary specialized tourism infrastructure.

As a result, based on the actions taken, the Geological Survey and Mineral Exploration of Iran succeeded in obtaining the resolution of the "*"The National Reference for Identification, Capacity Assessment and Determination of Technical Criteria to Geoparks study in Iran"* by the law approval of the Council of Ministers.

Subsequently, this organization formed the National Geopark Committee of Iran, centered on the Geological Survey. The goal of this committee is to organize the process of establishing geoparks from identification to management and exploitation, coordinate the relevant agencies, and develop regulations

for the identification, management, conservation, and exploitation of aspiring geoparks, which will soon lead to the creation of an efficient system for the development of geoparks in Iran.

Keywords: UNESCO Global Geoparks, Geotourism, GSI, Land-use planning, Iran

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keywords: UNESCO Global Geoparks, Geotourism, GSI, Land-use planning, Iran

Meteorological and Climate Change Observatory of Penhas Douradas

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[1]Estrela UNESCO Global Geopark (PT).

The year 1881 is one of the most important dates for understanding the Serra da Estrela. It was in this year that the Lisbon Geographical Society organised its expedition to the Serra da Estrela, and to this day it is the date on which the most scientists have gathered in this territory in pursuit of a common goal: to study the mountain in all its facets. It is because of the work of these scientists that we know so much about this mountain and that, in a way, was the starting point for the classification of Estrela as a UNESCO Global Geopark in 2020.

One of the most important projects of this expedition was the establishment, in 1882, of the Penhas Douradas Meteorological Observatory, at an altitude of almost 1 500 metres, which is currently one of the oldest observatories in the country and holds a long series of data that provide a better understanding of the climate of the Serra da Estrela. After more than 120 years, this observatory continues to be a reference point for meteorological forecasting and understanding the mountain climate.

From the notion of the importance that this mountain and its observatory represent, the project “Penhas Douradas Meteorological and Climate Change Observatory” was born, an initiative that aims to restore and give new purpose the buildings and surrounding area, in a strategy that aims to: i) foster research and scientific knowledge in the areas of climate, meteorology, environment and biodiversity; ii) develop a strategy for monitoring climate change in mountain areas; iii) foster community participation and involvement in the production of knowledge; iv) stimulate science communication and scientific dissemination; v) promote educational and scientific tourism in the Serra da Estrela.

Structured around 4 axes: "House of Weather and Climate - 1882"; "House of Observers and Science - 1385"; "House of Expedition - 1881"; "Trail of Weather and Climate", this is a project that, once implemented, will enable the Serra da Estrela to affirm itself as a key territory in understanding, mitigating and adapting to the issue of climate change, as well as a reference for monitoring and studying these phenomena.

keywords: climate change, meteorological observatory, mountain climate

Estrela Green Hub – a new strategy for Serra da Estrela

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The Serra da Estrela has resources of enormous value, representing a regional development leverage based on its unique landscapes and historical and cultural heritage, intrinsically related to mountain environments. However, successive fires have caused damage to various natural environments, jeopardising the soils, biodiversity and landscape value, which make the region so attractive. For this reason, it is understood that the territory must assert itself by preserving the areas that were not affected by the fires, by revitalising and regenerating the burnt areas and also by promoting new territorially-based economic activities, based on the endogenous resources, heritage and identity around this mountain, contributing to a sustainable and lasting regeneration of the Serra da Estrela mountain range.

Thus, given the characteristics of this territory, the challenges posed by the current climate change scenario and the need to create more resilient territories, the Estrela Green Hub project was born, which aims to constitute a new territorial approach for the Serra da Estrela, through the valorisation of the territory's natural heritage. This will be much more than a project, it will be a preservation and valorisation strategy based on ecosystem services, making the territory more resilient and empowering it for active management. Its aim is to create a new way of perceiving and experiencing the forest and its value. In a more sustainable approach, the aim is to help attract new visitors and encourage communities to settle, with the forest and the natural landscape of a mountain area as the basis.

In view of the above, the Estrela Green Hub will be piloted in the municipality of Manteigas, with the aim of replicating this strategy throughout the Estrela territory, through the refunctionalisation/restoration of various natural and forest areas, whose history is linked to the Forestry Services, implemented in 1888, and the entire landscape that resulted from their work, especially in the first quarter of the last century.

In fact, this project is the embodiment of a new strategy, based on tourism, which at the same time contributes directly to the enhancement of the landscape, the restoration of ecosystems, the resilience of territories and carbon sequestration, while also contributing to better managed and living forests. We are certain that this is a paradigm shift in the management, valorisation and attractiveness of natural resources, particularly those related to the forest and the entire ecosystem associated with it.

keywords: sustainable development, forest management, resilience, ecosystem services

Building Bridges between Portugal, Norway and Iceland

Fábio Loureiro[1], Emanuel Castro[1], Lucas Cezar[1], Magda Fernandes[1].
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With the aim of promoting the Sustainable Development Agenda, in particular SDG 17 - Promoting global partnerships for sustainable development, the Estrela UGGP, in partnership with Gea Norvegica UGGp and Katla UGGp, promoted the project “Building Bridges - Sharing of good practices among UNESCO Global Geoparks” over the last two years. Funded by EEA Grants Bilateral Relations Fund, this project, which ended in 2024, was an important milestone to establish a closer relationship between these countries, by strengthening the work between UNESCO Global Geoparks. As territories based on networking and the construction of strategies for the sustainable development of their communities, the implementation of this project has enabled the acquisition of knowledge and the exchange of experiences that have allowed for the construction of new ideas and future projects that could have socio-economic impacts on each of these geoparks. The missions carried out have strengthened this link between the territories, which have become better acquainted with each other's realities and, above all, the points on which they are aligned and which could be explored jointly with a view towards the future. Through the knowledge acquired, some of the successful projects could be replicated, particularly those with the direct involvement of partners from each of the territories, allowing successful models from an economic point of view to be used by partners looking for new solutions. During the Building Bridges initiative we were able to identify, along with the partners, coinciding subjects for our strategies, such as Climate Action, Glacial Geomorphology, Science Communication, Community Involvement and Education, which will be the first target areas to approach.

Overall, through this networking, bilateral relations were strengthened by these initiatives, promoting a greater involvement between the partners within the European Geopark Network, thus helping to implement new development approaches in the three UNESCO designated territories.

keywords: networking, exchange, building bridges

“Primitive life. The Cambrian Explosion”. A video about the appearance of skeletons as an educational tool

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The origin of skeletons was one of the biggest steps taken by animals to evolve and spread across the planet. It was just before the well-known Cambrian Explosion, a short period of time of only 5 million years in which all the groups of animals that we know today appeared.

To explain this fascinating evolutionary event, the Villuercas-Ibores-Jara UNESCO Global Geopark together with the Institute of Geosciences (IGEO), the Geological and Mining Institute of Spain (IGME), the University of Extremadura, the University of Barcelona and the University Complutense of Madrid has made a video showing the evidence of this process in the geological record of Spain. The video is part of the results of the research project *Environmental and biogeochemical disturbances associated with the Cambrian Explosion and Ordovician Biodiversification in Western Gondwana and Baltica* (PID2021-125585NB-I00), funded by the Ministry of Science, Innovation and Universities of the Government of Spain.

The video has been made in the most didactic way possible, but mainly taking into account the First Year of Compulsory Secondary Education, which includes these contents in its syllabus. Thus, it is planned that at the beginning of the 2024-2025 school year its official presentation will be made in institutes that know the field sectors that appear in the video (institutes in Extremadura, Zaragoza and Girona (although it will be open to all those who wish to participate). In the case of the geopark, it will be done with the institutes of the same educational project (Geocenters), but also with those of the two Biosphere Reserves of the province of Cáceres (Monfragüe and the cross-border one with Portugal Tajo-Tejo Internacional) and that of the province of Badajoz (La Siberia), and with some of the city of Cáceres (World Heritage Site), as an example of collaboration between different UNESCO figures. After viewing, the students will be able to give their opinion on the information offered by the landscape where they live and find out their opinion about the geological information that the mountains keep. It will also be made available to other entities (Universities, master's programs, etc.) for use as an educational and dissemination tool.

You are invited to enjoy it and know where we come from!!!

keywords: Science, skeletons, Cambrian Explosion, video, education

Mourne Gullion Strangford Geopark Aims to Stimulate Seagrass Growth with Ad-vanced Mooring Systems

Darren Rice[1].
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A pioneering pilot scheme is underway in Mourne Gullion Strangford Geopark's Strangford Lough Marine Protected Area to stimulate the growth of seagrass by testing advanced mooring systems, an initiative crucial for carbon sequestration and combating climate change. Seagrass meadows, often termed blue carbon habitats, have a superior ability to absorb and store carbon compared to terrestrial forests. This project aligns with several United Nations Sustainable Development Goals (SDGs), including SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land).
Traditional mooring systems, characterised by swinging chains, have been identified as harmful to the seabed, scarring it and damaging the vital seagrass habitats. In contrast, the advanced mooring systems being trialled are designed to mitigate this damage. The innovative systems—Seaflex, an elastic mooring solution, and Sterling, which uses floats to elevate the chains—aim to preserve the seagrass while accommodating boating activities.
The pilot scheme involves detailed monitoring and evaluation. Diver inspections and video recordings document the seagrass condition around the moorings, ensuring the effectiveness of the new systems in fostering seagrass recovery.
Early findings indicate that these advanced mooring systems significantly reduce the physical impact on the seabed. If successful, this approach could be expanded across numerous mooring sites in Strangford Lough Marine Protected Area, potentially revitalising the seagrass ecosystems and enhancing biodiversity. The long-term goal is to establish sustainable mooring practices that protect marine environments, support biodiversity, and contribute to carbon sequestration.
This initiative not only promotes marine conservation but also serves as a model for integrating environmental sustainability with recreational and commercial marine activities. By fostering seagrass growth and protecting marine habitats, the project directly contributes to global efforts in climate change mitigation and marine ecosystem conservation, underscoring the importance of innovative solutions in achieving sustainable development.
Furthermore, we have applied for a new project which involves replacing 75 high-impact moorings and monitoring the subsequent recovery. This study will extend to pressure assessments of tidal flats, linking subtidal, intertidal shellfish, and saltmarsh fringe habitats, creating a comprehensive natural experiment of seagrass recovery and ecosystem stabilization.

keywords: Marine Protected Area, Mooring Systems, Climate Change, Seagrass, Carbon Sink

Touristic potential and community perception of the geoheritage value: developing a functional and sustainable geotouristic strategy in the ophiolites of Beigua UGGp

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In recent year, geoheritage is becoming an important asset for the development of nature conservation and valorization strategies. Geotourism is one of the most useful tools for geoheritage promotion and it could have a pivotal role to foster sustainable development of a territory, particularly in a Geopark. The Beigua UNESCO Global Geopark (UGGp) is an area rich of geodiversity, which tells a complex geological story of over 200 million years. The territory is mostly composed by metamorphosed ophiolites and their oceanic sedimentary cover, representing the main ophiolitic complex of Italian Alps-Apennine system.

In terms of tourism, Beigua UGGp can be divided into coastal and inland domains. The challenge to be faced is to redirect part of the coastal tourist flow to inland zones in a way that is more sustainable for the area. Beigua UGGp is already actively involved in the development of sustainable tourism, particularly geotourism, to create a virtuous circle leading to the awareness on the importance of geoheritage and nature conservation.

This study shows the method used to analyze the geological heritage of Beigua (UGGp) and to identify the most suitable sites for geotourism activities to be submitted to the Park Authority for the creation of tourism products (e.g., georoutes) and to preserve geoheritage from the risk of degradation.
This study had several phases, including i) a review of the 54 inventoried geosites, ii) the qualitative and quantitative assessment of touristic potential and degradation risk of geosites, iii) the mineralogical, lithological and chemical characterization of the lithotypes and soils outcropping in the area, iv) the realization of a georeferenced database of geosites and v) the investigation of community perception about geoheritage value.
This kind of work is fundamental as the first step in building a geotourism strategy targeted at i) valuing the touristic potential to increase both sustainable geotourism and sustainable development of the geopark's area and ii) conserving and protecting geoheritage of high scientific value. The results of the assessment and of the study of community perception were applied for the realization of a thematic georoute including geosites with a high touristic potential.

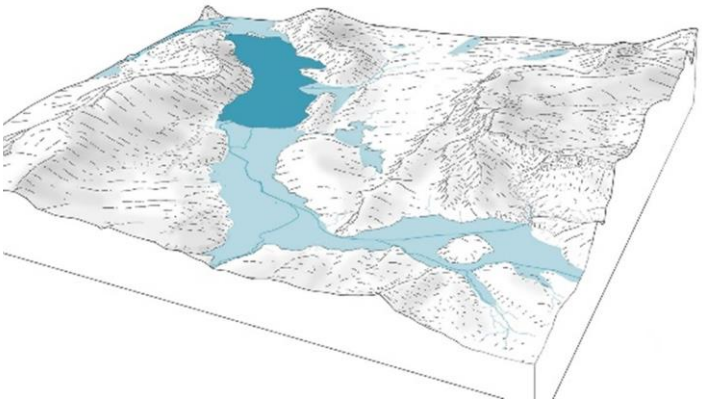
keywords: geotourism, geoconservation, georoute

Popularising the subject of water facing climate change

Christophe LANSIGU[1], Manon MOREL[1-2], Fabien HOBLEA[2], Jean Luc DESBOIS[1].
[1]Massif des Bauges UGGp (FR); [2]Université Savoie Mont Blanc (FR).

The accelerating effects of climate change have led the Massif des Bauges UGGp to take a more intensive interest in the subject of water resources. Water used to be present and available all year round, meeting the demands of the area's activities and ensuring that ecosystems functioned properly. The change in rainfall patterns is leading to more severe and prolonged low-water periods. It is leading to a smaller volume of snow, which used to store water effectively, being released back into the environment and aquifers during the spring and summer. Higher temperatures and long periods of drought have an impact on farming, forestry and the ecological status of rivers and wetlands. This issue has become an integral part of the new Geopark charter, the guiding and planning tool for the Geopark's policy over the next 15 years. The Geopark is therefore deploying a strategy based on knowledge of the resource, but above all is working on the production of tools to enable residents and elected representatives to become aware of the reality of the resource and the impacts of climate change. The aim of this action is to mobilise people to help put in place the best possible adaptation, between changes in practices and optimal management of the resource. We are presenting various representations designed to share our knowledge of water resources, produced for conferences and educational tools. The aim is to present, as clearly as possible, the nature and functioning of our aquifers. The aim is to show the interactions with the natural or man-made environment, and to show, for example, the relationship with exposure to natural hazards. Local representations are more likely to interest the public, who can then project themselves more easily. 3D representations, animated diagrams and videos are all part of an attractive way of exploring the issue of water. Particular attention is paid to highlighting the interactions with agriculture and forestry.

The diversity of players involved in water issues is also presented, as our Geopark is covered by a number of authorities with responsibility for drinking water supply, wastewater treatment, wetlands and flood risk management. The overall vision that the park wishes to develop is to share information more effectively in order to contribute to a wider appropriation and better coordination of action to satisfy and, if



movemont.at

Oliver Gulas-Woehri[1].
[1]Styrian Eisenwurzen UNESCO Global Geopark (AT).

Topic: Geoscience

Title: movement.at – The moving mountains

Oliver Gulas-Woehri UNESCO Global Geopark Styrian Eisenwurzen, Austria;

Request for an oral presentation

Landslides are common processes in mountainous terrain. They occur at a broad range of magnitudes and frequencies and form an integral part of the long-term destruction of mountain areas. To human societies, such phenomena may result in risks and even disasters, having triggered a huge bulk of research on landslide hazard and risk analyses. However, landslides may also represent significant natural and cultural heritage and offer services to society, aspects that are under-researched and may be included in the yet rather scarcely used concept of geosystem services. In this context, landslides also help us to learn how Earth surface systems are functioning. UNESCO Global Geoparks represent ideal environments of exploring and highlighting geosystem services related to landslides, particularly in Austria where the three existing UNESCO Global Geoparks (Karawanken/Karavanke, Erz der Alpen, Steirische Eisenwurzen) are characterized by the occurrence of a broad range of landslide types and magnitudes.

On this basis, the objectives of the movemont.at project are defined as follows:

1. We will elaborate an integrated theoretical framework considering landslide processes and their ecological and societal relevance in a comprehensive way, including chances and risks over various scales in time and space. In this context, we will pick up the concept of geosystem services, which has repeatedly appeared in the literature as a spin-off term of the more broadly employed ecosystem services, but not yet come into more widespread use.
2. We will map and characterize the landslides in each of the involved UNESCO Global Geoparks, using a common methodology and exploiting existing databases, as a basis for the further steps.
3. We will develop an integrated tool set for the GIS-based modelling of landslide preconditioning and dynamics, considering a broad range of process types, temporal and spatial scales. Thereby, we focus on broad-scale analysis of stress distribution in mountains and its role for slope stability, and on the simulation of the dynamics of slow-moving mass flows and complex deep-seated landslides and slope deformations - fields which have yet been rarely considered in operational GIS-based landslide modelling tools.
4. We will merge all the research outcomes to develop and implement strategies to better use landslide phenomena for environmental education, employing the involved UNESCO Global Geoparks as pilot areas.

The movemont.at project will be organized into five strongly interlinked work packages, each of them associated to one of the objectives. It will be implemented by an interdisciplinary team of scientists of the University of Graz and the University of Salzburg, and environmental education specialists from the three involved UNESCO Global Geoparks. The project will be embedded into the international research and geopark landscapes through various collaborations. First steps have been presented at the GGN conference in Marocco. With this oral presentation we can highlight first interdisciplinary outcomes relevant for other mountainous UGGp.

keywords: Austria, natural hazards, landslides, education, virtual reality

Research as an instrument for the conservation and dissemination of heritage in the local community in Las Loras UGGP

José Ángel Sánchez[1], Karmah Salman[1].
[1]Las Loras Global Unesco Geopark (ES).

Las Loras Geopark, a 1000 Km^2 wide territory, is situated to the south of the Cantabrian Mountain Range western sector, extending to the north of Burgos and Palencia regions. It was declared a UNESCO Global Geopark in 2017 and it is the only Geopark in Castille and Leon Autonomous Community for the time being.

Even before its declaration, several lines of action have been carried out related to research and knowledge transfer for local communities, and geological heritage protection.

The Geopark currently has a programme of aid to research with a budget over EUR 15 000 and three strategic priorities. On the one hand, a partnership agreement has been established between the provincial councils of Burgos and Palencia and the Department of Geology of the University of Salamanca, enabling research projects framed within the Geopark. On the other hand, an agreement with the local enterprise Gullón Biscuits was brought forward by the Geopark and a Euro 4 000 grant is awarded every year to any research group in Spain presenting a project within the Geopark. Furthermore, research on different fields has been developed by the Geopark with its own staff or through collaboration with other research groups and private entities. The grant and the agreements and collaborations involve the commitment by the researchers to carry out knowledge transfer activities for local communities by means of talks, field trips and information material undertaken in the framework of the European Geoparks Week and other events. The local population has occasionally been actively involved in the research process, collaborating with the scientific groups by collecting data or in field work.

Several proceedings referring to geological and mining heritage have been set up by the Geopark. The most important was the collaboration with Sargentes de la Lora town council to urgently declare its Oil Field as Asset of Cultural Interest, thus avoiding the dismantling of mining heritage connected to this field after the end of its exploitation. Furthermore, thanks to the support of the Geological Survey of Spain and the funding of the provincial council of Palencia, it was possible to rescue *Cycadeoidea* fossil trunks in Aguilar de Campoo reservoir, which were exposed due to the drought and were already being plundered. The works were fast, complex and hard but enabled the recovery of this exceptional palaeontological material and the future emphasis on its value.

keywords: Geological heritage, Geoparks, Science and research, Knowledge transfer, Dissemination

The study of exchanges between Karst and river in the Célé valley at the Causses du Quercy UGG, a project supported by UNESCO

Vincent Biot[1], David Viennet[1].
[1]Causses du Quercy UGG (FR).

In March 2022, UNESCO and the abrdn Charitable Foundation (aCF) launched a three-year partnership to promote sustainable development through research and education, with the aim of developing innovative solutions related to the environment, water and the ocean. As part of this, a call for applications Promoting sustainable development through UNESCO programmes and sites was launched in 2023. The Causses du Quercy UGG was the winner of this call for applications, which focused on three themes: research, education and innovation.

The Park's project responds as follows:

- Research: to develop conceptual models of hydrogeological functioning and groundwater/river relationships in karstic environments.

- Education: to strengthen the Geoparks educational offer with a programme for secondary school pupils (aged 12-14) on the groundwater of the Causse.

- Innovation: testing and proving the effectiveness of a method of searching for resurgences in karstic rivers using airborne thermography by drone.

The research and innovation project focuses on monitoring a pilot area of major scientific interest: the Célé karstic watershed (Lot-France). The aim is to determine the conditions under which the river is fed and to identify the flow dynamics during sensitive periods.

It also has the general objective of integrating the results into a regional study to reconcile better management and protection of water resources with the uses to which they are put.

The expected results are :

- a better understanding of how springs and their catchment areas function (thesis in progress and Masters course in progress);

- training secondary school pupils and raising their awareness of the issues surrounding drinking water, where it comes from, how it is extracted and treated, and its cost;

- the development of new methodologies and instruments adapted to the study of exchanges between Karst and rivers.

keywords: groundwater, Célé river, researche, education, karst

World Cube - futuristic Geopark Visitor Center; Impact Crater LAke UNESCO Global Geopark, Lappajärvi, Finland

Heikki Mäkipää[1].
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World Cube – futuristic Geopark Visitor Center

Impact Crater Lake UNESCO Global Geopark, Lappajärvi, Finland

World Cube is an exceptional project focused on developing the Impact Crater Lake Geopark in Lappajärvi, which has recently achieved UNESCO Global Geopark status. This visionary initiative aims to create a premier educational and tourism destination that narrates the story of the universe from the Big Bang to the present day.

Unlike a traditional natural science museum, World Cube offers visitors a first-hand experience of the processes that have shaped our world, from its birth to the present day, through the latest technology. VR and AR are extensively integrated, providing an immersive experience for all.

At World Cube, a meteorite impact on Earth is used to blend environmental education, geological history, geoculture, and tourism. Visitors begin in the Orientation area, proceed to the Natural Treasure Hall featuring rare minerals, and visualize meteorite effects in the Space and Geology Exhibition Hall. They explore the Archaeological Hall with real fossils, the Biological Exhibition Hall, the Aquarium, and the Human Evolution & Culture Hall, which simulates the history of mankind.

The experience center offers interactive virtual activities in the Collision Center, virtual tours, the culinary delights of Geofood, a meteorite-themed adventure park, and a Discovery Center for children. Training includes films, diamond hunting, and geological workshops.

Events and culture are essential part of the World Cube. World Cube building enables the organization of large concerts, theaters and performances. Events can be produced in an unprecedented way in Finland using a new kind of led screen, AR and artificial intelligence technology.

Investing in World Cube is a unique opportunity to support an initiative that respects and protects the geological and cultural heritage of the Impact Crater Lake Geopark in Lappajärvi, Finland. We invite you to join us in creating a new technology-based visitor center that meets international standards within the UNESCO Global Geopark network.

keywords: meteorite, world cube, universe, futuristic visitor center

The Arrifes geosite: a fascinating glimpse into an Early Cretaceous ecosystem within the Algarvensis aspiring UNESCO Global Geopark (Portugal)

Hélder J.R. Pereira[1,2,3*], Francisco Lopes[3], Jordi Pérez-Cano[4], Vanda F. dos Santos[5,6,7], Elisabete Malafaia[5,8], Márcia Mendes[9], Zélia Pereira[9], Steven C. Sweetman[10], Paulo Fernandes[2] & Pedro M. Callapez[1,7]

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Over a century after Paul Choffat's initial description of the Arrifes section, a pioneering figure in Portuguese geology who highlighted the vertical arrangement of the strata and the occurrence of a limestone bed containing a copious quantity of orbitolinid tests, this upper Barremian–lower Aptian stratigraphic succession, which is fully exposed along a coastal cliff section located 2.5 km west-southwest of Albufeira (Algarve, southern Portugal), has become one of the most outstanding geosites within the Algarvensis aspiring UNESCO Global Geopark.

Geoscience

Beyond its geomorphological, stratigraphic, and tectonic relevance, recent palaeontological discoveries have shed new light on the high scientific value of the Arrifes section. This geosite yielded not only the first record of Early Cretaceous sauropod tracks in the Algarve Basin, but also an unexpectedly diverse microvertebrate assemblage comprising both aquatic and terrestrial taxa, invertebrates, and plant remains. To date, the fauna of this new vertebrate fossil-bearing locality is represented by actinopterygian and chondrichthyan fishes, lissamphibians, chelonians, crocodyliforms, dinosaurs, lizards, and pterosaurs. The microfossil flora assemblages are represented by charophytes, pollen and spores, and dinoflagellate cysts. Moreover, among many other trace fossils, this geosite also yielded Portugal's first Mesozoic record of termite coprolites.

Ongoing research on the Arrifes fossil biota will further open a window into an Early Cretaceous ecosystem from the Algarve Basin. This will contribute to a more comprehensive understanding of this geosite's palaeobiodiversity and palaeoenvironments, as well its palaeoecology and paleobiogeography.

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