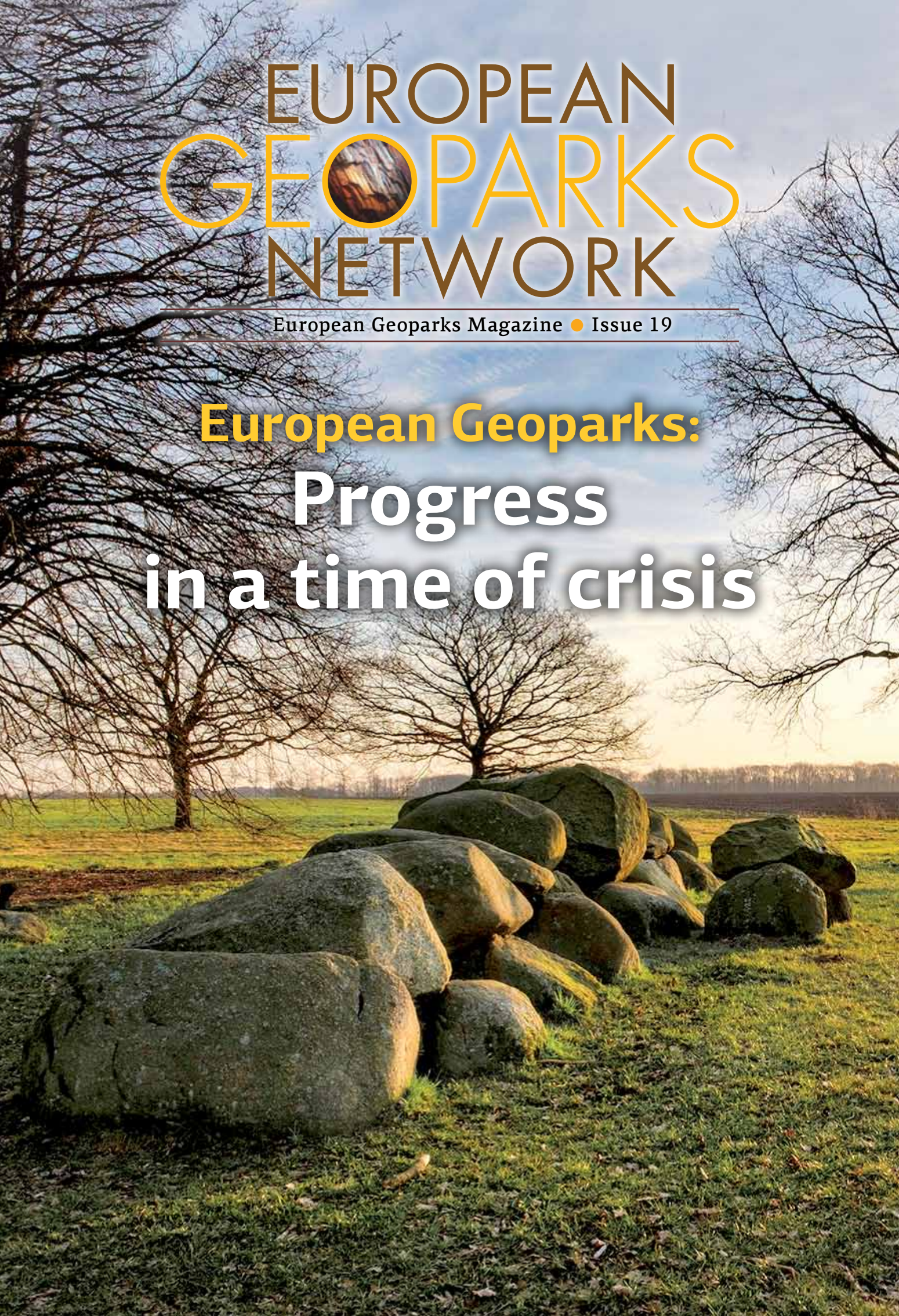


EUROPEAN GEO PARKS NETWORK

European Geoparks Magazine ● Issue 19

European Geoparks: Progress in a time of crisis



THE EUROPEAN GEOPARKS NETWORK

www.europeangeoparks.org

Calendar of Events 2022

- 22 March:** World Water Day
- 21 April:** Welcome Event for the new UNESCO Global Geoparks
- 22 April:** International Mother Earth Day
- 22-28 April:** APGN WEEK
- 26-30 April:** EGN Spring Meeting
De Hondsrug UNESCO Global Geopark (Netherlands)
- 30 April:** GGN Annual General Assembly for Accounts
- 11 May:** International Migratory Bird Day
- 18 May:** International Museum Day
- 22 May – 5 June:** EGN WEEK
- 31 May:** Evaluators' Seminar
- 5 June:** World Environment Day
- 8 June:** World Oceans Day
- 8-10 June:** RURITAGE Conference - UNESCO (Paris)
- 17 June:** World Day to Combat Desertification & Drought
- 15-25 June:** Digital Course "UNESCO Global Geoparks: Geoparks and Geotourism", Lesvos Island UNESCO Global Geopark, Greece
- July:** Plastic Free July
- 13-15 July:** 6th International Summer University on 'Geoparks, Sustainable Regional Development and Healthy Lifestyles'
- 9 August:** International Day of the World's Indigenous Peoples
- 4-11 September:** 7th Asia Pacific Geoparks Symposium
- 26-30 September:** 16th European Geoparks Conference, Sesia Val Grande UNESCO Global Geopark, Italy
- 27 September:** International Tourism Day
- 6 October:** International Geodiversity Day
- 13 October:** International Day for Disaster Risk Reduction
- October:** IUGS event of the announcement of the first 100 IUGS geological heritage sites
- November:** Workshop for African projects on UNESCO Global Geoparks
- 11 December:** International Mountain Day



European
Geoparks

European Geoparks Network Magazine

Issue No 19 / 2022

Published by:
Natural History Museum
of the Lesvos Petrified Forest
on behalf of the European Geoparks Network

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Print: Epikinonia Aigaiou S.A.

Cover photo: Papuk
UNESCO Global Geopark, Croatia

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Geoparks: Progress in a time of crisis

The European Geoparks Network (EGN) is one of four regional networks designated as UNESCO Global Geoparks (UGGps).

Despite the ongoing pandemic and continued restrictions, European Geoparks demonstrate once again their resourcefulness and creativity. Through networking and collaboration between geoparks, as well as with their respective communities and stakeholders, the variety of accomplished activities and innovations are evidence that remarkable progress has been achieved in a time of crisis. Papuk UGGp organized the outstanding 5th EGN Digital Forum, and with the designation of seven new Global Geoparks the EGN membership increased to 88 members in 26 countries. In 2021, the exceptional commitment of EGN evaluators enabled UNESCO to conduct 46 missions of which 41 were in Europe.

Geotourism and associated developments in infrastructure are significant components of sustainable economic development. Links between geology, industrial and cultural heritage and climbing are highlighted by Magma, Maestrazgo and Massif des Bauges UGGps. Estrela UGGp launched Guia, an interactive users guide, and Bakony Balaton UGGp celebrates its volcanic heritage in an interactive exhibition. The 560 Suspension Bridge, the Super-Cayrou drystone refuge and the new Discovery Point and Learning Lab are examples of improvements in infrastructure in Arouca, Causses du Quercy and Fforest Fawr UGGps. Styrian Eisenwurzen UGGp revitalized the Gams Geovillage and GeoPath theme trail and Troodos UGGp restored a popular nature trail. Removing loose rocks from the roof and walls of a sea cave reduces the risk to tourists in Trollfjell UGGp.

All UGGps engage in marketing. Once again EGN Week raised public awareness about geoparks. Luberon UGGp meets inhabitants with the Lub'ambule, a refitted trailer. TERRA.vita UGGp's database promotes people involved in traditional handicrafts and intangible traditions. In 2021 the movie "Il Buco" documented the discovery of the Bifurto Abyss in Pollino UGGp and the selection of the Villuercas Peak in Villuercas-Ibores-Jara UGGp as a stage in La Vuelta, one of the leading international cycling races, advertised the Geoparks nationally and globally.

The role of UGGps in progressing social inclusion is highlighted in Beigua UGGp's Mountain Therapy project for children with complex needs, the Vikos-Aoos UGGp's "Listen-Touch-Feel" project and North Pennines AONB Geopark's involvement with diverse groups. A photographic competition connects visitors and inhabitants with the Chelmos Vouraikos Geopark.

Every UGGp provides formal and informal education. Schoolchildren in Beaujolais UGGp created a time trail. The GEOclimHOME -Pro Erasmus project, described by Sesia Val Grande UGGp, involves three geoparks in raising awareness about climate change in secondary school students. The

Nordplus project introduces secondary school students to the geological, natural and cultural heritage in the Rokua, Trollfjell and Katla UGGps and in Vatnajökull National Park. Hateg UGGp focusses on online training, through conferences and workshops, in partnership with UGGps and aspiring geoparks. Idrija UGGp's school network is preparing a programme for seventh grade students. Sitia UGGp surveyed primary schools to assess the Geopark's significance as an educational tool. Children are introduced to the relationship between man and boats in in Vis Archipelago UGGp's Baby Boat Show Workshop.

UGGps support the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015. Bergstrasse-Odenwald UGGp achieves this through cooperation across continents and its "Climate Heroes" and "Areas of Diversity" projects. Odsherred UGGp's 19 new project initiatives included the world's first Sustainable Development Goals 2030 sculpture park. Harz Braunschweiger Land Ostfalen UGGp promotes SDG 6 Clean Water and Sanitation. Swabian Alb UGGp's SDG Geocache project demonstrates the relevance of each of the 17 SDGs to the local population.

All geoparks engage in geoconservation and concern for the environment. The Fossils Thematic Group highlights geoconservation in European Geoparks. Lesvos Island UGGp's exhibition focuses on climate change in a Cenozoic ecosystem. In The Black Country UGGp a nature reserve became accessible through geoconservation and post-industrial restoration. Muskau Arch UGGp highlights its geosite sponsorship programme. Burren Cliffs of Moher UGGp introduces its new river catchment awareness project and Kula-Salihli UGGp presents an international programme involving hazards and water resources. Drystone walls ensure harmony between brown bears and beekeepers in the Courel Mountains UGGp. Ecological corridors safeguard wildlife conservation in Djerdap UGGp. Gea Norvegica and Reykjanes UGGps focus on litter picking in coastal areas and wild bees provide the focus for the new educational trail in Vulkaneifel UGGp.

UGGps are a focus for scientific research. Students in Katla UGGp's Geoschool monitor seasonal changes in beach profiles. Naturtejo UGGp is involved in investigating a groundwater system. Microbial biodiversity is a focus for research in the Ore of the Alps UGGp. The results of research in the Apuan Alps UGGp are published in the Geopark's scientific journal Acta apuana.

The activities documented in Magazine 19 are an assertion of progress made by Geoparks in a time of crisis and bodes well for their potential to respond to the bigger crisis created by climate change and its multifaceted consequences.

Tony Ramsay
Publication Editor

Papuk UNESCO Global Geopark, Croatia The 5th European Geoparks Network Digital Forum – Papuk Special Edition



Image from the screen during the 5th EGN Digital Forum - Papuk Special Edition.

Biokovo-Imotski Lakes was introduced by Ksenija Protrka, Ivana Ćapin and Hrovje Škrabić on Day 2. Photos, videos and recipes from both days of the meeting can be found on the official website of the event - <https://www.5egndigitalforum-papuk.com/agenda-2/>.

Mrs. Kristin Ragnes from Norway, Coordinator of the European Geoparks Network (EGN) attended the Digital Forum as a special guest. Following the official part of the meeting, we showed her the attractions of Papuk UGGp, our future "Geo Info

Centre", our Educational Centre "House of Panonian Sea" and of course the most spectacular geosites "Rupnica" and "Jankovac".

The final comments from colleagues from UNESCO Global Geoparks across Europe, confirmed their appreciation for a well and successfully organized Digital Forum.

Thank you all!

Goran Pavić – papukgeopark@gmail.com
Goran Radonić – papukgeopark@gmail.com

The 5th EGN Digital Forum – Papuk Special Edition was held from 1 - 2 September 2021. Considering the fact that we live in Covid-19 pandemic times, it was not possible for 150 delegates from European UNESCO Global Geoparks to travel to Croatia and participate live in the 45th EGN Coordination Committee Meeting. So, the meeting was held digitally. The event was designed in such a way that various digital presentations evoked the character of Papuk UGGp.

Before the meeting we sent "Taste of Papuk" packages with local products all over Europe. We also recorded 12 videos showing and presenting what you can do, see and expect when you visit

Papuk, including delicious local products and the wonderful people who live and work in the Geopark. The Forum was held at the studio located in the City Library of Požega. However, we completed the Papuk experience with interesting guests in the studio, showing morning exercises in Jankovac, preparing Papuk breakfast, tasting various products from Geopark partners, cooking sarma and plum jam and hosting young musicians from the Požega Music School and the Požega Folklore Ensemble.

In addition to the programme involving the standard agenda, on Day 1 Prof. dr. sci. Marijan Herak presented Earthquake Hazards in the vicinity of Papuk UGGp and Croatia's aspiring geopark

Greetings to all participants from the studio in Požega.

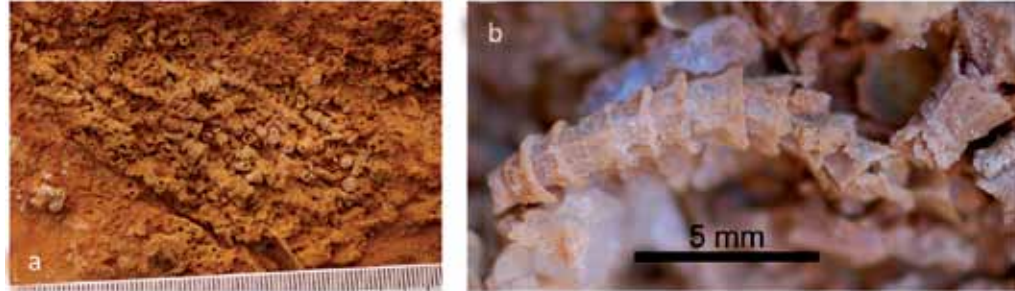


1. Presentation of the new «Geo Info Centre» mascot.

2. Introduction to the aspiring Geopark Biokovo-Imotski Lakes.

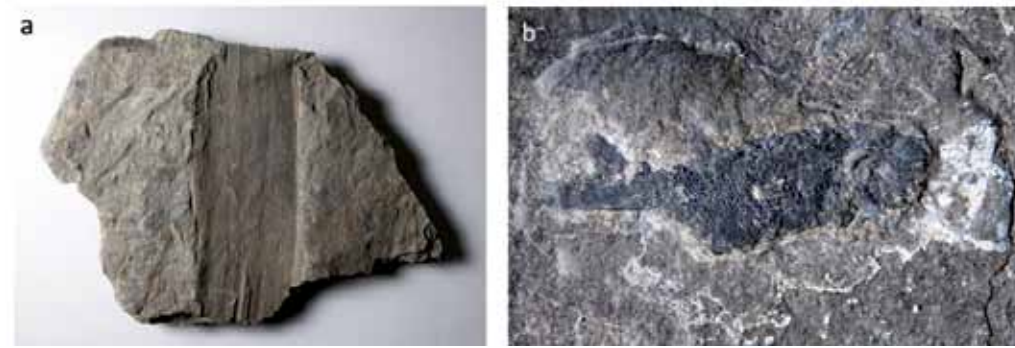
3. The musical interlude provided by the Musical School of Požega.

European UNESCO Global Geoparks Fossils Thematic Group Book on Fossils, natural heritage, geoconservation and cooperation in European Geoparks.



The beginning of the process of mineralization, during the Ediacaran Period in the Villuercas Ibores-Jara Geopark. (a) Surface of a carbonate block showing mineralized tubes of Cloudina, a primitive organic structure (b) Cloudina (detail from the same block).

The beginnings of life on continents in the Devonian of Shetland Geopark: (a) remains of the earliest terrestrial plants; (b) freshwater fish.



The two issues of the special volume Paleontological heritage and geoconservation in UNESCO European Geoparks edited online by the Geoconservation Research Journal (www.gcr.khuisf.ac.ir) were published recently. It includes 63 articles on fossils and palaeontological geosites in European UGGp's Precambrian and Palaeozoic presented in stratigraphical order, from Precambrian to Quaternary. The articles provide glimpses of the evolution of the life forms in Europe, depicting biological and geological phenomena and events. The articles show the role that fossils play in educating children and the general public about the history of their importance in dating rocks and in reconstructing ancient environments. Various methods practiced in the geoconservation of paleontological sites and the ways they are used in geoeducation and in organizing touristic routes are described. Some articles demonstrate that well and poorly



Cover page for the second issue of the Paleontological heritage and geoconservation in UNESCO European Geoparks

preserved fossils are equally useful in geoeducation and in revealing the processes involved in their preservation. Preparing the article for publication has reinforced collaboration between the geoparks and researchers in institutions and universities not directly associated with individual geoparks. Consequently, many articles are co-authored by scientists and the geoparks' managers.

The special volume resulted from the Fossil Thematic Group's poster exhibition "Images of the ancient lives in the UNESCO European Geoparks" presented during the the 43rd European Geopark Network CC Meeting, Swabian Alb UGGp, Germany and the 15th European Geoparks Conference Sierra Norte de Sevilla UGGp, Spain. The publication of the Second Volume, Special Issue with 35 articles on Mesozoic and Cenozoic fossils is expected at the end of 2021.

Dan Grigorescu – danalgrigorescu@gmail.com

Exceptionally preserved trilobites showing multifaceted eyes (a, b, c and d) from the Devonian of Vulkaneifel UGGp.



EGN

SPRINGMEETING 2022

A TRAVEL BEYOND TIMES & BORDERS

DE HONDS RUG

TERRA.vita



Tuesday 26 April - Sunday 1 May



provincie Drenthe

The European Geo parks Week 2021



AROUCIA UGGp, PORTUGAL



BASQUE COAST UGGp, SPAIN



BEIGUA UGGp, ITALY



CAUSSES DU QUERCY UGGp, FRANCE



APUAN ALPS UGGp, ITALY



AZORES UGGp, PORTUGAL



COUREL MOUNTAINS UGGp, SPAIN



DJERDAP UGGp, SERBIA



EL HIERRO UGGp, SPAIN



ESTRELA UGGp, PORTUGAL



MOLINA-ALTO TAJO UGGp, SPAIN



CUILCAGH LAKELANDS UGGp, NORTHERN IRELAND-REPUBLIC OF IRELAND



HAUTE-PROVENCE UGGp, FRANCE

The European Geoparks Week, often called the Geoparks Festival, is held in late May and early June and these dates are a major item in the annual calendar of events for all European Geoparks. This European-wide festival aims to raise public awareness about Geoparks, their role in conserving the geological heritage, educational activities and how they endeavour to provide economic benefit for the local people by promoting geotourism. It also demonstrates to geopark communities that they are part of a wider European Network. During EGN Week 2021, despite the need to socially distance because of the pandemic, 79 European Geoparks organized 693 face to face events attracting 78,720 visitors and 223 online activities with 21,645 participants. Nowadays on-line promotion of the Geoparks on the web and social media plays an increasingly important role, and in addition 347 press releases, 82,098 programme flyers and 10,108 printed articles were published.

Events in the 2021 European Geoparks' programmes involved a variety of activities and, by highlighting the links between the natural heritage and local communities, informed the wider public about the holistic nature of the Geopark concept. Guided tours provide an opportunity to showcase landscapes along established way-marked trails and to introduce new trails. However, guided tours are not just restricted to following trails through the landscape. The Azores UGGp brought geology to the city through its Geo-Urban routes. The Apuan Alps UGGp combined a guided tour with wild food foraging. In Beigua UGGp a guided walk to a geosite was combined with a visit to cheese producer. Granada UGGp included a visit to an archaeological site and an open-air session of yoga meditation. Haute Provence UGGp integrated geology and contemporary art in a one-day hike. In the Tuscan Mining UGGp guided excursions to geosites were followed by visits to very beautiful and evocative sites to listen to music and readings from Dante's Divine Comedy. Combining fieldtrips with an astronomy workshop filled the day in Karawanken-Karavanke. UGGp. Bakony-Balaton UGGp celebrated International Volcano Day on 1 June with a guided tour of the volcanic heritage along Hungary's first nature trail, named after geologist Lajos Lóczy. The exploration of karst landscapes provided a theme for guided walks in the Idrija, Harz.



DE HONDRUG UGGp, THE NETHERLANDS



CHELMOS VOURAIKOS UGGp, GREECE



GRANADA UGGp, SPAIN



FAMENNE-ARDENNE UGGp, BELGIUM



HOLY CROSS MOUNTAINS UGGp, POLAND



LAUHANVUORI-HAMEENKANGAS UGGp, FINLAND



LUBERON UGGp, FRANCE



IDRIJA UGGp, SLOVENIA



KARAWANKEN-KARAVANKE UGGp, AUSTRIA-SLOVENIA



HATEG COUNTRY UGGp, ROMANIA



GREVENA-KOZANI UGGp, GREECE



HARZ. BRAUNSCHWEIGER LAND. OSTFALEN UGGp GERMANY



KATLA UGGp, ICELAND



KULA-SALIHLI UGGp, TURKEY



MASSIF DES BAUGES UGGp, FRANCE



LAS LORAS UGGp, SPAIN



MADONIE UGGp, ITALY



NATURTEJO UGGp, PORTUGAL



NORTH PENNINES AONB & UGGp, UNITED KINGDOM



LANZAROTE AND CHINIJO ISLANDS UGGp, SPAIN



MUSKAU ARCH UGGp, GERMANY & POLAND



PAPUK UGGp, CROATIA



TROODOS UGGp, CYPRUS



TERRA.VITA UGGp, GERMANY

Braunschweiger Land. Ostfalen, Sitia and Sobrarbe UGGps. Las Loras UGGp highlighted research projects funded by the Geopark in this year's activities. Geology and nature were combined with field trips to orchard reserves in Courel UGGp, and with biodiversity in Estrela UGGp. European Geoparks Week provided Naturtejo UGGp with the opportunity to provide field training for school teachers and Grevena-Kozani UGGp with the chance of introducing the Geopark to the Vice-Minister of the Environment, Giorgos Amira and Vice-Minister of Tourism Sofia Zakaraki.

A beautiful landscape can also be appreciated in other exciting ways. Trollfjell UGGp designed a course in kayaking. The geology and landscapes in the Lauhanvuori and Massif des Bauges UGGps were explored by bike and a cycle race was a highlight in Villuerca-Ibores-Jara UGGp. In Katla UGGp's Hjörleifshöfði Race participants could choose between running 7 or 11 km. Central Catalunya UGGp introduced geocaching as an activity to get to discover the natural and cultural heritage. Guided tours showed participants how Troodos UGGp can provide an alternative tourist destination, through hiking, traditional climbing, cycling and many other adventures.

In some geoparks fossils provide an added attraction during European Geoparks Week. In Yangan Tau UGGp participants in the palaeontological rafting trip collected bones of the woolly rhinoceros, mammoth and horses. Luberon UGGp introduced participants to an important fossil footprint site. Searching for fossils provided an added attraction in Bohemian Paradise and Burren and Cliffs of Moher UGGps. Novohrad-Nógrád UGGp organised special thematic guided tours to fossil sites. North Pennines AONB & UGGp developed a fabulous fossils event for families and field trips for young adults with additional needs.

Activities designed for children and students are a regular feature during European Geoparks Week. Celebrating Children's Day, one of the most important



POLLINO UGGp, ITALY



ROCCA DI CERERE UGGp, ITALY



NOVOHRAD-NOGRAD UGGp, HUNGARY-SLOVAKIA



ORIGENS UGGp, SPAIN



MAGMA UGGp, NORWAY



VESTJYLLAND UGGp, DENMARK



VIKOS-AOOS UGGp, GREECE



PSILORITIS UGGp, GREECE



ORE OF THE ALPS UGGp, AUSTRIA



SITIA UGGp, GREECE



ROKUA UGGp, FINLAND



SIERRAS SUBBETICAS UGGp, SPAIN

activities in Terras de Cavaleiros UGGp, involved preschool and primary school pupils from the Agrupamento de Escolas de Macedo de Cavaleiros. Magma UGGp organized two days in the field with secondary school pupils. Saimaa UGGp spent European Geoparks Week guiding school groups introducing them to common rock types including granite and gneiss. The Children's Day in the Botanical Garden in Kielce was a significant event in the Holy Cross Mountain UGGp. Children engaged with Molino Alto Tejo UGGp during outings in the surroundings of the Geopark's schools. TERRA.vita UGGp's game TERRA.bingo in which children had to find a rock, a tree or an information panel was very well received by visitors and the media. Papuk UGGp created workshops for schoolchildren.

European Geoparks Week also provided an opportunity for a variety of group activities and online programmes. Psiloritis UGGp celebrated its 20th anniversary with an exhibition involving local products and artisans. Arouca UGGp celebrated the Opening of the 516 Arouca, the world's longest pedestrian suspension bridge. Basque Coast UGGp initiated Nautilus, a new classroom for research and teaching, and Cilento Vallo di Diano e Alburni UGGp opened the Museum of Landscape and Nature. European Geoparks Week was initiated with an exhibition and conference in Maestrazgo UGGp. The reopening of the exhibition "The 15th 8000 m high mountain in the world – the biggest rockslide ever in the Himalayas" was the highlight in the Ore of the Alps UGGp. Models of past landscapes, e. g. 2.8 billion years ago, are a feature of three new exhibitions in Reykjanes UGGp. Bergstrasse-Odenwald UGGp shared a photographic exhibition with its partner Lushan UGGp, China. Chelmos-Vouraikos UGGp also promoted the Geopark with a photographic exhibition. A survey of visitors in the Cabo de Gata-Níjar UGGp was designed to test their knowledge about the Geopark. In the English Riviera UGGp events delivered by its new Associate Partner Taleblazers, combined storytelling with environmental education. Planting olive and pine trees provided a significant activity in Kula-Salihli UGGp. Fammene-Ardenne UGGp was a partner

in the Belgian Micro-adventure Festival proving that adventure is open to everyone. Movies from the Geopark projected from the Geopark's trailer promoted Vestjylland UGGp. The Deputy Minister of Environment and Energy, George Amyras and the Deputy Minister of Tourism, Sofia Zacharaki visited the Vikos-Aoos UGGp's Information Centre on 15 June, Global Environment Day. The Old Brickery in Klein Közig, was the venue for wine tasting in the Muskau Arch UGGp. The creation of a shared fresco, drawn by the local population showing the wealth of the heritage, was the highlight in the Chablais UGGp.

Virtual events in the Copper Coast UGGp included the launch of the first issue of the local mining heritage journal 'Copper Coast Connects'. Cuilcagh Lakelands UGGp focused mainly on social media posts highlighting current projects in the Geopark. This year De Hondsrug UGGp focused on digital events including educational films and quizzes. «Did you meet the first Geopark in Serbia?» was organized on Facebook and Instagram pages of Djerdap UGGp. El Hierro UGGp celebrated International Volcano Day in an online event with Lanzarote and Chinijo Islands UGGp. The re-published digital guided tours from different locations on Gea Norvegica UGGp's web page and on YouTube are a valuable contribution in promoting the Geopark. Hateg Country UGGp used EduGeopark Science to unite schools in Geopark's territory. Lanzarote and Chinijo Islands UGGp highlights collaborating in a webinar with El Hierro UGGp. Origenes UGGp engaged in virtual exchanges with six groups of students ranging in age from 14 to 16 years from the Origenes, Adamello Brenta, Hateg and Lesvos Island UGGps.

In spite of the problems created by the Covid-19 pandemic, the variety of activities delivered during European Geoparks Week 2021 are a successful outcome in a difficult year. The European Geoparks can look forward to building on this success by offering even more exciting and diverse activities in 2022.

Tony Ramsay
Barnabás Korbély

Bergstrasse-Odenwald UNESCO Global Geopark, Germany Facing the COVID crisis and supporting the Global Agenda 2030: Cooperation across the continents, “Climate Heroes” and “Areas of Diversity”

In these times, we all have learned, that each crisis provides an opportunity for new developments, creativity and alternative options for cooperation both regionally and internationally. In this context, Bergstrasse-Odenwald UGGp developed combined digital methods with ongoing projects and developments in a series of new activities. Thus cooperation, without travel and face to face meetings was achieved.

International cooperation involved a joint photo exhibition together with our partner UGGp Lushan, China titled “West-East Impressions” consisting of 20 landscape photos from both Geoparks presented in a west – east oriented exhibition hall. Maps accompanied by information about the Geoparks and partnership and a series of 36 photos emphasized the longstanding friendship between the Geoparks. The exhibition was opened virtually in both Geoparks in German/English and Chinese/English with video messages from the Geopark presidents. Due to the pandemic, the first four weeks of the exhibition occurred virtually (video at Geopark YouTube Channel and 3D-tour) and was open to the public for another two months. Both Geoparks considered the exhibition as a perfect tool for cooperation during the restrictions resulting from the pandemic.

Regional networking in combination with the support of the Global Agenda 2030, involved the creation of the project “Climate Heroes”. This citizen science project focuses on involving the outcomes from education about climate change and climate protection measures in our daily activities. It consists of four workshops and a smartphone app, developed with the Survey123 Framework from Esri. The workshop topics include an in-



Poster of the joint exhibition “West East Impressions” together with our longstanding partner Geoapark Mt. Lushan (China).

roduction to the process of climate change (WS 1), forests and climate change (WS 2), an expert round table about flood prevention and climate change (WS 3) and a final summary of the previous events and outcomes (WS 4). Participants can engage in interactive smartphone polls and also use our citizen science app to capture climate relevant information and collect in parallel “hero points”. Every data entry, recorded on a virtual dashboard, results in a hero point and participants receive prizes and awards from “climate pioneer” up to “climate hero” at the end of the project.

We also focus on the protection of biodiversity. Our programme „Areas of Diversity” targets and involves our member communities in recognizing areas with a potential for ecological improvement, e.g. watercourses, railway embankments, traffic islands, and creating habitats for insects, especially for wild bees. The programme, which is funded by the Geo-Naturepark involves Step 1 GIS documentation of the areas and proposed actions; Step 2 implementation of the actions.

The projects presented above show how Bergstrasse-Odenwald UGGp supported its regional network and international partners during the pandemic. As a model territory for the Agenda 2030, we also provide examples of best practice for implementing SDGs like „Climate Change” (Goal No. 13), „Life on Land” (Goal No. 15) or „Strong local communities and international partnerships” (Goals No. 16 and 17).

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Identifying „Areas of Diversity” as biodiversity project for our communities.



Burren and Cliffs of Moher UNESCO Global Geopark, Ireland Working together while apart in a time of crisis; a new river catchment awareness project from the Burren and Cliffs of Moher UGGp, Ireland.



Aille Engaged citizen scientist Mr. Pat Dowling collecting daily rainfall data. Inset shows daily rainfall data displayed live on Burren and Cliffs of Moher UGGp website.

In September 2020, the Burren and Cliffs of Moher UGGp launched a new citizen science project in collaboration with a group of dedicated local volunteers, the Earth and Ocean Sciences Department of the National University Ireland, Galway and funding from Geological Survey Ireland. In the middle of a global pandemic which introduced unprecedented restrictions it was possible to work together and progress a new project in a time of crisis.

The ‘Aille Engaged’ project focuses on the catchment of the small, but locally significant Aille River, which flows through the town of Lisdoonvarna and the village of Doolin before entering the sea close to the Cliffs of Moher on the west coast of Ireland. The river system is complex due to underlying lime-

stone dissolution and the formation of subsurface flow conduits and cave systems. The Aille River flows for much of its course on the contact between Pennsylvanian shales and the underlying Mississippian limestone. It only flows for about 12km from source to sea, however it is fed by a significant, largely underground, tributary which captures flow from a larger catchment area to the north. During high rainfall events this leads to local flooding. Understanding the nature of the contribution from the underground source is vital to modelling the flow characteristics of the entire river system.

The aims of the Aille Engaged project are to promote catchment awareness in line with the EU Water Framework Directive, and to promote Climate Change awareness using locally collected rainfall and river level data. The daily data is entered directly by the volunteers into a database and is displayed ‘live’ on a graph on the Burren Geopark website; www.burrengeopark.ie/learn-engage/rainfall-river-level-data/

By engaging with both the data collection and the data entry and seeing that data go live to the public this project has empowered the local community to be directly linked to their river catchment as well as to the future climate change models for the river system.

A full year of data has now been collected and over the coming months this data will be processed and linked to various climate change rainfall predictions for Ireland to forecast how the river system will respond to future climate change, this will provide vital information on possible mitigation or adaptation measures required.

Dr. Eamon Doyle - edoyle@clarecoco.ie



Dr. Eamon Doyle measuring water temperature as water emerges from a limestone spring.



Dr. Tiernan Henry, National University of Ireland, Galway, processing data from Aille River data loggers.

“Climate Heroes” – a citizen science project for our communities and schools.



Chelmos Vouraikos UNESCO Global Geopark, Greece The Chelmos Vouraikos UGGp Photo Contest as a way to communicate with people during the pandemic crisis!

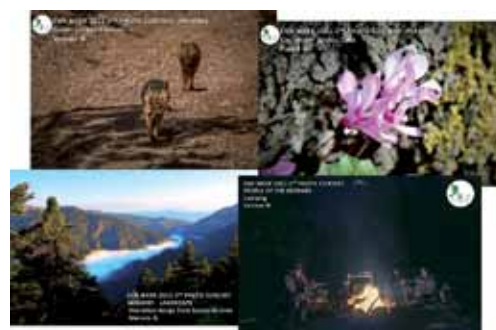


2nd EGN Week photo contest showing examples of the three categories.

The past two years have posed several challenges to the geopark communities due to the worldwide pandemic crisis. One of the most important challenges was the necessity to change the way of communicating with people, since exchanging views and opinions in person was no longer possible. During 2020 Chelmos Vouraikos UGGp's administrative staff responded creatively to the new challenges and came up with the idea of organizing a digitally held amateur photo competition dedicated to the area of the Geopark and its people. People of all ages and status were invited to participate and send a photo of the aspect that most impressed them while living in, visiting, engaging in sport, admiring geology and nature or just passing through the magnificent landscapes of the Geopark area. The huge success of the first photo contest led to its establishment as an annual event during the EGN Week. Thus, the 2nd Chelmos Vouraikos UGGp photo contest was organized enthusiastically during 2021. We received photos of impressive geological formations, landscapes, animals and plants from the

area and photos depicting the everyday activities in the Geopark's territory. We discovered, with great relief, that the people in our Geopark share the same need to interact with us. In total, 31 incredible photos were evaluated according to their aesthetic criteria and relevance to the Geopark's interests. Four of them stood out and serve today as representative photos for our diverse territory. Of the photos submitted for the Geology and Landscapes category, the photo of the magnificent Vouraikos Gorge by Marosis G. captivates the eye. The continuous deep erosive action of the water of the River Vouraikos combined with continuous tectonic uplift, have resulted in the formation of this impressive feature. Two photos of the rich biodiversity of the area, were nominated in the category Animals and Plants. The photo by Velanas N. depicting *Canis aureus* in Loukas Plateau and the photo by Pappa I., showing a spectacular close view of *Cyclamen (Cyclamen rhodium subsp. peloponnesiacum)* from Tsiplou Lake Geosite were outstanding. Our Geopark is one of the few regions in the country where these species can be found. Finally, the photo of campers, from Velanas N. was awarded first place of the category People of the Geopark! Integrating the 2nd Chelmos Vouraikos UGGp photo contest with EGN Week activities has given us the opportunity to see the Geopark through the eyes of its people. What if we can't meet - we will continue with the effort to promote the beauty of our area through communication and encouraging the local societies and visitors, until better days return!

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2nd EGN Week photo contest winners from the three categories.



Fforest Fawr UNESCO Global Geopark, Wales UK Dealing with the present and looking to the future



The Discovery Point's landscape and underlying geology is represented in a bronze relief model.

With some areas legally out of bounds to visitors for periods during Covid lockdown, 2021 was a challenging time for Fforest Fawr UGGp. Some developments which had been planned prior to the pandemic, for example the 'Touchwall' at the National Park Visitor Centre were delayed. However, a new hub at Craig-y-nos Country Park was launched as the Geopark Discovery Point during European Geoparks Week in late May 2021. This was closely followed by the creation of a 'Geopark Learning Lab' at the Country Park aimed at education groups and the wider public.

Three steles highlight the geology and attractions of Fforest Fawr UGGp and show examples of spectacular landscapes in other UNESCO Global Geoparks.



The Discovery Point was conceived as an introduction to Fforest UGGp, providing visitors with an overview of the area's geology, landscape, industrial and social history. The local landscape is represented in a bronze relief model encouraging visitors to explore the area. Further connections can be made through a series of colourful images on tabletops at the "Changing Seasons Café". The Discovery Point also features three steles which highlight the attractions of Fforest Fawr UGGp and present it as a member of the growing family of UNESCO Global Geoparks.

A time trail leads visitors to the Learning Lab which featuring rocks, industrial artefacts and video

presentations which provide a deeper insight into the Geopark's geology, industrial and cultural heritage. Maps, introduce education groups and visitors to the locations of the European and UNESCO Global Geoparks and their Regional Networks.

The new challenge for those managing sites and welcoming visitors is how to adapt to the changing circumstances arising from the pandemic. These include greatly increased visitor numbers and a changed visitor profile placing unanticipated strains on car parking capacity, toilet facilities and information provision. Mitigation measures include increasing the regulation of roadside parking, working with landowners to create overflow parking and enhancing online information about the availability of parking spaces. We are developing pre-book parking and Park & Ride schemes which will help to reduce the capacity issue and reduce the carbon footprint of visiting the Geopark.

The Geopark is also looking at extending its southern boundary to include a number of sites and communities. This would enhance its ability to tell coherent stories and to draw visitors away from sites experiencing 'overtourism' to communities where extra footfall will generate sustainable economic benefits. The proposed expansion will introduce visitors to important aspects of Welsh industrial and social history at a time when Wales was a major player on the world stage.

In recent years training local businesses as Ambassadors has become an important component in the programmes of Fforest Fawr UGGp and the wider National Park. The programmes will be made more widely available through on-line provision combined with in-person training. Provision of hybrid meetings (mixed in-person and digital) for Ambassador training and meetings of the Geopark's management team will assist in reducing the Geopark's carbon footprint.

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One of the colourful table tops at the "Changing Seasons Cafe" presents visitors with a time line illustrating major events in Earth's history.



Kula-Salihli UNESCO Global Geopark, Turkey International collaboration during tough times in Asia



Prof. Demir giving his presentation about Kula Salihli UNESCO Global Geopark.

As in most parts of the world, the influence of the Covid-19 pandemic still continues in Turkey. This situation has had a significant negative impact on many sectors, especially on the economy, education, and tourism in our country. Geoparks and their collaborators, like other institutions, have been and continue to be substantially affected by these unfavourable conditions. However, it is necessary not to despair and to re-establish normality in one's life or to adjust to the new normality. In 2020, Kula Salihli UNESCO Global Geopark established a partnership in the project entitled IGCP 727 Geological heritage – "sustainable management of geological hazards and water resources in the transboundary region of Kyrgyzstan", led by the Tien-Shan Geological Society. One of the aims of the project was to conduct geo-heritage research in the Batken region of Kyrgyzstan. On the 18th to the 21st of September, an international seminar was held in Batken, Kyrgyzstan, with the support of UNESCO, as a part of this project. The seminar's theme was «Geoparks in Central Asia: Supporting Geotourism and Sustainable Geological Heritage, Natural Resources, and Disaster Risk Reduction.» About 70 representatives from Kazakhstan, Kyrgyzstan, Uzbekistan, Russia, Turkey, Switzerland and Germany attended the seminar. At the meeting, representatives from the Kula Salihli UNESCO Global Geopark gave two presentations, entitled «Kula-Salihli UNESCO Global Geopark» and «Geoparks as a Sustainable Development Tool.» Representatives from

the Yangan-Tau UNESCO Global Geopark (Russia) were also present at the meeting. Yangan Tau Geopark representatives also spoke about their experiences in building a geopark and the establishment of the Yangan-Tau Geopark.

At the end of the meeting, an international partnership agreement was signed with the suggestion and guidance of the Kula-Salihli UNESCO Global Geopark representatives. As part of this agreement, Kula-Salihli UGGp, Turkey, Yangan Tau UGGp, Russian Federation, Batken aspiring UGGp, Kyrgyzstan, Cappadocia aspiring UGGp, Turkey, Issyk Kul aspiring UGGp, Kazakhstan Geoparks National Commission and Uzbekistan Geological Research Institute agreed to cooperate and share experiences on issues such as geo-conservation, the establishment of geoparks, geo-tourism, education and sustainable development.

This seminar, together with the subsequent cooperation agreement, clearly demonstrated the necessity for unity and cooperation in tough times. At the end of the meeting, the Uzbek representatives announced that a seminar would be held on geoparks in Uzbekistan in November. Even in the face of adversity, people continue to work together. We have received all of our vaccinations. We will have PCR tests, and we will continue to share our knowledge and experience in Tashkent on November 12–16, 2021.

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Signing ceremony of the cooperation agreement.



The Cooperation Agreement and partners.

Lesvos island UNESCO Global Geopark, Greece Exhibition: "Understanding Climate Change": Exploring the consequences in the geological record. Cenozoic ecosystems and the current threat

Overview of the exhibition "Understanding Climate Change: Exploring the consequences in the geological record. Cenozoic ecosystems and the current threat" at the Visitor's Centre of the UNESCO World Heritage Site Messel Pit.



Lesvos island UNESCO Global Geopark makes combating the climate crisis one of its major goals together with activities for supporting the local community in understanding and adapting to climate change through various initiatives. Through exhibitions and public events we utilize the Lesvos Petrified Forest, a unique natural monument, to present past climate changes during the last 20 million years. The results of excavations are exhibited as climate change indicators for the reconstruction of the paleo-environment and paleo-ecosystems and to demonstrate the severe consequences of the past changes in climate that led to the extinction of many plants and animals. Through educational programmes and activities on climate change we transform the Lesvos Geopark into a learning platform on climate change for the young generation.

In 2021 Lesvos Island UGGP designed and organized an exhibition entitled "Understanding Climate Change: Exploring the consequences in the geological record. Cenozoic ecosystems and the current threat". The aim of the exhibition is to introduce to the public the unique natural monument of Lesvos, the Lesvos Petrified Forest, and to raise public awareness about climate change by presenting evidence for past changes in climate and their consequences. It explores the question about the impacts that climate change had on ecosystems during Earth's history. Using the example of the Petrified Forest of Lesvos in Greece, we convey how we can learn from the processes that have repeatedly changed our planet over millions of years to shape our own future.

The exhibition includes impressive parts of petrified tree trunks, leaves, branches, roots, fruits and volcanic rocks, as well as detailed information about the Lesvos Petrified Forest. All these exhibits are indicators of past climate changes. The visitors thus have an opportunity to understand in depth the history of the Earth and how climate systems have worked. The information provided leads them to realize how humans are currently intervening significantly in these large-scale and long-term processes and the potential outcomes of these activities.

The exhibition "Understanding Climate Change: Exploring the consequences in the geological record. Cenozoic ecosystems and the current threat" was organized from 10th July to 31st October 2021 by the Messel Pit Fossil Site, an UNESCO World Heritage Site and the most important fossil site in Germany, in collaboration with the Geo-Naturpark Bergstraße-Odenwald UGGp.



The opening of the exhibition, on 10th July 2021 at the Visitors' Centre of the UNESCO World Heritage Site Messel Pit.



Ms Angela Dorn, Minister of Science and Art, Federal State of Hesse, Germany, Prof. Nickolas Zouros, Director of the Natural History Museum of the Lesvos Petrified Forest and Lesvos Island UGGp and Ms. Ionna Kriebardi, Consul General of the Hellenic Republic of Greece at the opening of the exhibition.

The exhibition was opened on Saturday, 10th July, in the presence of Ms Angela Dorn, Minister of Science and Art, Federal State of Hesse, Germany, Ms. Ionna Kriebardi, Consul General of the Hellenic Republic of Greece, Andreas Larem, Mayor of Messel and Prof. Nickolas Zouros, Director of the Natural History Museum of the Lesvos Petrified Forest and Lesvos Island UGGp together with Dr. Marie-Luise Frey, Managing Director of the UNESCO World Heritage Site Grube Messel gGmbH and Dr. Jutta Weber, Managing Director of Geo-Naturpark Bergstraße-Odenwald. It was supported by the «Rural regeneration through systemic heritage-led strategies — RURITAGE» Programme in which the Natural History Museum of the Lesvos Petrified Forest-Lesvos Island UGGp and the Geo-Naturpark Bergstraße-Odenwald UGGp are participants.

Due to the high levels of attendance, the exhibition was extended until May 2022.

UNESCO Global Geoparks can effectively join forces in the fight against climate change by organizing a variety of activities and events. For example, this exhibition could travel to other UGGPs and be part of the UNESCO Global Geoparks' campaign to raise awareness of climate change and biodiversity loss around the world and their effort to contribute to climate change mitigation through education and sustainable regional development.

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Sesia Val Grande, Italy, Chablais France, Rokua, Finland, UNESCO Global Geoparks

Travelling through a pandemic: the GEOclimHOME-PRO exchanges delivered during the Covid-19 outbreak



Fieldwork activities

Photo by Ilaria Selvaggio.



Laboratory experiments and data collection, Labs

Photo by Ilaria Selvaggio.

Planned for a three-year period between 2018 and 2021, GEOclimPRO - Geoheritage and climate change for highlighting the professional perspective was an Erasmus+ project which involved secondary school students from three European UNESCO Global Geoparks: Rokua in Finland, Sesia Val Grande in Italy and Chablais in France.

The aim was to increase the awareness about climate change and to improve students' understanding of man's active and passive roles towards the environment. The objectives of the educational activities were also to enhance students' awareness of social responsibility, in order to stimulate active citizenship and to discover new job opportunities accomplishing the needs of sustainable development, sustainable future and lifestyle.

A strong, central point of the project was its methodology. The students were deeply engaged through transnational exchanges where they were involved in conferences and practical experiences with researchers. They worked mainly in mixed nationality groups to collect data and deliver final talks to share their results with a public including students, teachers, the geoparks educators

and families. This practical approach proved to be a weakness in the project during the Covid pandemic. It was either impossible or really difficult to travel around Europe and meet people. How did the project cope with this?

During the 2020 the suspension of activities during lockdown followed by different rules in each country led to uncertainty about what could be achieved in the following months. New plans "ready for anything" were required and teachers and educators arranged different programmes, involving physical or virtual meetings, as in the table shown below.

As an example, in February 2021 the mixed (physical and virtual) meeting between Finland and Italy opened with a conference shared online. The students then carried out separate experiments, data analysis and meetings with experts. Finally the students shared their experiences during a plenary virtual meeting.

Therefore, GEOclimPRO provides an unexpected way to directly experience the "resilience" we aimed to encourage for the future global changes.

Ilaria Selvaggio - selvaggio.ilaria@gmail.com

| Timetable | | | |
|---------------|---|-------------------|---|
| TIME | MEETING | REMOTE ACTIVITIES | ADJUSTMENTS |
| October 2018 | Finland to France | Italy | Done (1) |
| March 2019 | France to Finland | Italy | Done (1) |
| November 2019 | Italy to France | Finland | Done (1) |
| April 2020 | France to Italy | Finland | Cancelled |
| November 2020 | Finland to Italy | France | Rescheduled (oct 2021) if possible or remote activities (1) (2) (3) |
| February 2021 | Italy to Finland | France | Remote activities (2) |
| April 2021 | Italy and France to Finland - final event | | Rescheduled (dec 2021) if possible or remote activities (1) (2) (3) |

(1) Activities as usual for transnational meetings in presence: conferences, fieldtrips and labs.
 (2) Practical activities for each school in its country if possible, mixed with online conferences and virtual meetings to share the experiences with the other partners.
 (3) Realization of virtual fieldtrips available for everyone and every time in remote working



Swabian Alb UNESCO Global Geopark, Germany

Promoting the Sustainable Development Goals during a time of crisis



Location of the Geocache concerning SDG 6 at the Hüle in Zainingen.

Photo by Elisa Maier.

The COVID19 pandemic was and still is a time of global crisis. As the pandemic moved across state and territory boundaries, the crisis showed humanity that collaboration is essential for dealing with challenges, consequently people cooperated on diverse levels. Locally, many supported the elderly by doing their shopping or through self-quarantining. Regionally, hospital staff worked long hours to save as many as possible, and globally, scientists shared their research to develop a vaccine in record time.

Similarly, other crises such as climate change, biodiversity loss, hunger and poverty can only be mastered together. This has long been known and led to the 17 Sustainable Development Goals in the UN's 2030 Agenda. While the different SDGs are meant to provide guidance to people worldwide in their struggle for sustainable development, these goals often seem scientific,

theoretical, or even ordinary. Thus, based on the idea from a steering group within the county of Reutlingen, the office of the Swabian Alb Geopark developed an SDG-Geocache project to illustrate the relevance of each of the 17 SDGs to the local population. This project was then implemented by and within the county of Reutlingen. However, the concept was developed in a way that it can be used in other regions.

The SDG-Geocaches differ from regular geocaches, as the individual caches are clearly visible within the landscape. Thus, everyone who passes a cache can stop and access it, solve the riddle and enter their names in the log book. Each of the 17 geocaches covers one of the SDGs and is located in an area relevant to the respective SDG.

The geocache for SDG 6 (Clean Water and Sanitation), for example, is located at a volcanic vent, which retains rainwater, rapidly infiltrating the surrounding limestone. In the past, people settled around these volcanic regions and used the rain water. However, the water quality was poor leading to high rates of child-mortality. This is illustrated via the cache, as one has to take out a tube filled with water, sand, silt and clay, which is disturbed on removing the tube. Thus, one needs to wait for the sediment to settle before reading the numbers to open the log-book. This shows that it takes time to obtain clean water. It further illustrates that the SDGs are neither theoretical nor ordinary as access to clean water was not available in the Swabian Alb a few generations ago. Today, it is a human right but on a global scale much has to be done in order to achieve this goal. The SDG-Geocache project raises awareness of these challenges in a playful way by engaging as many people as possible.



The riddle connected with SDG 6.

Photo by Elisa Maier.

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Rokua UNESCO Global Geopark, Finland

Geoheritage, culture and sustainable communities in rural areas in Finland, Iceland and Norway

A three-years educational project between three Nordic Geoparks



Gea Norvegica UNESCO Global Geopark, Norway

Gea Norvegica Geopark takes part in the biggest ocean cleanup project in Norwegian history

Nordplus Askola Autumn 2021
“The Finnish and Icelandic students exploring a ca. 8000 years old stone-age dwelling site in Vaala, RUGGp during the exchange in September 2021”.



In autumn 2020, just in the middle of the covid crisis, a common Nordplus-funded school project was initiated between Rokua UNESCO Global Geopark (RUGGp) in Finland, Trollfjell UNESCO Global Geopark (TUGGp) in Norway together with Katla UNESCO Global Geopark (KUGGp) and Vatnajökull National Park (VNP) in Iceland. The main participants in the project include three upper secondary schools from the three UGGP’s.

The idea is to have one-week exchanges between the schools and the territories. The first two exchanges took place remotely, the third exchange in September 2021 took place partially remotely as the Icelandic group travelled to RUGGp and Norwegians participated remotely. The coordinator of the project is Vaala Upper Secondary School located in RUGGp.

The main goal of the project is to strengthen students’ knowledge and awareness about geoheritage, culture and sustainable communities in rural areas in the three countries. The project studies natural processes and development of the landscapes and human cultures in the framework of six of the United Nations’ Sustainable Development Goals (SDG’s): Goal 6 (Clean Water and Sanitation), Goal 7 (Affordable and Clean Energy), Goal 8 (Decent Work and

Economic Growth), Goal 12 (Responsible Consumption and Production), Goal 13 (Climate Action) and Goal 14 (Life Below Water).

The four territories with their unique geoheritage offer comprehensive and concrete learning environments to study the SDGs. Understanding the functioning of Earth’s natural processes is a prerequisite for students to be able to understand the role of human activities in phenomena like climate change and the responsible use of natural resources. Simultaneously, the students improve their knowledge about the uniqueness of their home regions which enhances positive attitudes towards their home and Nordic environments.

The four parks strengthen the project’s expertise and support the schools in learning and in achieving their pedagogical aims. The parks’ experts contribute to field activities by preparing visits, planning methods and learning environments and analysing results together with the teachers and students. Their work with wide networks of institutions and professionals results in fruitful cooperation opportunities for the schools.

The project connects schools which are actively using Geoparks in their teaching and share the same values as the Geoparks. RUGGp and KUGGp have already applied the Geopark School Concept in their territories, for example, the Vaala Upper Secondary School. During this project, an international network of Geopark-oriented schools will be created to support the sharing of common materials, methods and experiences on Geopark-themed teaching. The network, hopefully, will also support international cooperation between schools and geoparks in the future.

Information and project’s outcomes: <https://geoheritage.fas.is/>

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Nordplus Rokua Autumn 2021
“Students studying a kettle lake in Rokua, RUGGp during the exchange in September 2021”.



Nordplus Saraisniemi Autumn 2021
“Students familiarizing with a local museum in Säräisniemi village, RUGGp during the exchange in September 2021”.

Typical marine litter along the coast of Oslo Fjord.



Plastic litter occurs along rivers, lakes and eventually ends up along the entire Norwegian coast. It can only be described as a major environmental problem for our country.

When the pandemic struck with a new wave in the spring of 2021 and working from home became mandatory in Norway, we in Gea Norvegica used the time to think outside the box. We have previously worked in dealing with marine littering for several years with funding from the Norwegian Environment Agency, cleaning beaches with school students from the Geopark. We wanted to progress this engagement and therefore delivered an invitation to tender to the Norwegian Retailers’ Environment Fund (NREF). NREF is Norway’s largest private environmental fund, which receives 0.5 Norwegian kroner for every plastic bag sold by its member retailers Norway. NREF provide funds for projects along the entire coast with the goal of cleaning 40% of the surfaces of Norway’s and Svalbard’s coasts by the end of 2023, and it is with great pleasure we can announce that Gea Norvegica UGGp will take part in this work.

Our part in this huge project is to clean 40% of the coastline of three of our municipalities. In total 97 locations of varying size and an expected 30,000 kg of waste materials. In order to carry this out we will employ two new professional coastal cleaners who will work full time, together with two existing employees with broad experience from previous work on the coast. The coastal area in the Geopark consists of steep slopes and numerous islands, so most of the cleaning areas will therefore require the

use of a boat to transport the workers and the litter.

The Geopark will involve school children and volunteers in litter picking in safe and suitable locations. This is a great educational opportunity for “hands on” learning about environmental issues, experiencing what it feels like to make a difference, and at the same time incorporating curriculum goals of sustainability. The project also increases our visibility as several media channels want to document our work.

The project in Gea Norvegica UGGp will kick-off in March 2022 and it will be possible to follow every development on our social media channels e.g. Facebook, Instagram (geoparkenrydder) and www.geoparkenrydder.no

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The amount of litter picked by a school class in one day.



Harz Braunschweiger Land Ostfalen UNESCO Global Geopark, Germany

Sustainable Development Goals (SDGs) in Geoparks:

SDG 6 Clean Water and Sanitation



A small waterfall on the River Lutter near Königslutter am Elm.

The occurrences of water in the Harz Braunschweiger Land Ostfalen UGGp are extremely diverse, including springs, rivers, moors, lakes and dams. Water is undoubtedly one of the most important natural resources in our Geopark.

UGGps see themselves as model areas for sustainable development in which the topic of “water” is of central importance. The UN have defined “Clean Water and Sanitation” as SDG-Goal 6. Specifically, universal and fair access to safe and affordable drinking water is to be achieved for everyone by 2030. There is also a need to improve water quality by reducing pollution, avoiding the introduction of hazardous chemicals and significantly increasing water treatment worldwide. Ecosystems connected to water must be protected or restored, including mountains, forests, wetlands, rivers, aquifers and lakes. In order to achieve these goals, the participation of local communities must be increased.

In Europe, the European Water Framework Directive (EU-WFD) applies, which intends to standardize the legal framework for the water policy of the European Union and to align its corresponding policy increasingly towards sustainable and environmentally friendly water use. All EU member states are obliged to bring their water bodies to good ecological and chemical conditions by 2027 at the latest. Groundwater must be available in sufficient quantity and of good quality. In addition,

the WFD prescribes information, consultation and the active participation of the public.

So, here is our action plan «Resource Water»:

1.) Networking: Participants as partners and members in the Geopark’s network

The water supply companies, in particular, are important partners in our network. For example, the Harz Waterworks currently supplies around two million people and industrial companies in around 70 cities, municipalities and water associations. These then transport the drinking water to the consumer who receives high-quality drinking water. Most of the water comes from the reservoirs of the Harz. Regional suppliers such as the Weddel-Lehre-Water-Association who integrate local sources into the water supply and take care of the treatment of the wastewater.

2.) Participation: Organize meetings and events

We aim to inform and involve the population by organizing and participating in events on the topic of water. In May 2019, for example, the Geopark was a partner of the Water Week, in which around 7,300 people took part in 40 events.

3.) Education: Develop and implement educational programmes

As part of our sustainable development education programme, we have developed special water events. Here, children of different ages are given lectures about the subject of “water as a resource and habitat” in a playful way. The geoguides team of our Geopark are provided with further specific training activities.

For 2021, “Water: A Source of Life” will be the main theme of our event programme.

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SDG goals 4, 6 and 17 are integrated in Harz Braunschweiger Land Ostfalen UGGp’s action plan Resource Water.

Learning through play: Geopark water action with children near Erkerode.



Reykjanes UNESCO Global Geopark Iceland

Aiming for the cleanest shoreline in Iceland



Students at Njarðvík Elementary school cleaning their adopted area of the shoreline.

Over the years, the ocean waves have brought and scattered an enormous amount of litter onto our shores. This marine debris which includes beverage containers, disposable packaging, fishing gear and other material, is frequently blown further inland by the wind. If nothing is done, the coast and our natural environment will be filled with debris from the sea. Coastlines polluted with marine debris are harmful to all marine life and clearing the coastline is important to ensure the sustainability of the marine environment. Iceland is no exception. The high energy and mainly rocky coastline that surrounds much of Reykjanes Geopark is difficult to navigate and clean, but that does not stop us from cleaning the coastline. This year, a project was launched which sets itself the lofty goal of cleaning up the coastline and getting companies, schools, and institutions to adopt coastal areas for litter picking. Reykjanes Geopark and the Blue Army started a collaboration with the goal of making the Geopark’s coastline the cleanest in Iceland. The Blue Army is a local Non-Governmental Organization for environmental protection that focuses on the fight against plastic pollution in the sea through litter picking, encouragement and raising aware-

ness of the problem. The clean-up partnership is not only about cleaning beaches but also about documenting cleaning projects and keeping records of the areas and amounts of marine debris collected. In this way, we can monitor the state of the coastline which will help us plan future clean-ups. Additionally, this will also help us build momentum within the local community and the government to take this matter seriously. It has been challenging to mobilize participants for clean-ups due to the Covid-19 pandemic and restrictions on gatherings in Iceland. Nevertheless, we have managed to keep the project going and approximately 15 metric tons of litter was removed from about 22 km of the coastline in 2021. We aim to maintain this good and important co-operation project and make the coastline of Reykjanes Geopark the cleanest in the country. Cleaning up the rubbish from our shores only solves the problem in part because the sea is still full of debris that will be washed ashore in the future with its associated environmental impact. We all need to work together to solve this problem and prevent more rubbish from ending up in the sea.

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Icelandic Coastguard helicopter picking up the collected marine debris at Húshólmi Geosite.



TERRA.vita UNESCO Global Geopark, Germany Putting people representing local intangible cultural heritage in the limelight

According to UNESCO, cultural heritage does not only include monuments and collections of objects, but also traditional handcrafts and intangible traditions such as social practices, rituals, oral traditions, performing arts, festive events, and knowledge and practices concerning nature and the universe.

TERRA.vita has created a database of people in the Geopark area, who practice intangible cultural heritage activities that characterize the region. These people or, in some cases, associations and the cultural heritage they represent are now presented in profiles on TERRA.vita's website (<https://www.geopark-terravita.de/de/immaterielles-kulturerbe>). Gradually, the information will be also provided in English. The profiles are accompanied by short videos in which the people practice their craft and demonstrate their understanding of intangible cultural heritage. The locations of the peoples' workshops or of the festive events are located on an interactive map of the Geopark.

Information boxes provide material on whether and when the cultural heritage was entered on the federal list or on the UNESCO's list of the Intangible Cultural Heritage of Humanity. Examples for federal UNESCO cultural heritages practiced in the TERRA.vita area are the cultivation of orchards or the Kneipp spa culture. Organ craftsmanship and music, indigo dyeing ("Blaudruck") as well as falconry, which are practiced within the borders of the Geopark's area, are listed on the UNESCO's Representative List of the Intangible Cultural Heritage of Humanity.

Furthermore, the website presents many local handcrafts with a geological background such as the still successful clinker brick factories and the last remaining pottery workshops ("Pottbäcker"), both using clay and claystones from different geological ages. Also, the plaggen agriculture, which resulted in the formation of the plaggen soils in the Middle Ages. The miner's song "Steigerlied" was recorded by the "Glückauf" Anthrazit Ibbenbüren



e.V. Music Association and can be listened to on TERRA.vita's website.

"Plattdüütsch", known as the Low German, is a West Germanic language variety spoken mainly in Northern Germany and in the northeastern part of the Netherlands. In the TERRA.vita area, there is a large variety of Low German dialects spoken. Therefore, a section of the website deals with the Low German language and also shows a music video in which Bernd Niehenke, also one of the last remaining potters in the region, sings a song in "Plattdüütsch". To preserve this linguistic cultural heritage, a CD with his songs is currently being recorded.

To further support its intangible cultural heritage, TERRA.vita supported, together with the Osnabrücker-Land-Kultur e.V. association and the Municipality of Bad Essen, the local painter Reinhard Klink. He is known for creating etchings of local landmarks or festivals. For the 100th anniversary of the discovery of the Dinosaur Tracks Bad Essen-Barkhausen, he created the etching "The dinosaur tracks – lasting tracks in the Nature Park and Geopark TERRA.vita". The etching is produced in 25 individual copies.

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The Kneipp spa culture is recognized as an intangible cultural heritage on the federal list. It can be experienced on TERRA.vita's hiking track "TERRA.track Kneipp to go" in Bad Iburg.

Photo by Natur- und Geopark TERRA.vita.



Apuan Alps UNESCO Global Geopark, Italy Acta apuana, a scientific journal as an effective tool to provide knowledge of the Apuan Alps

During the pandemic, the Apuan Alps UGGp continued to develop research activities for promoting a better knowledge of the area.

The results of these studies were collected and published in Acta apuana, the scientific journal of the Geopark. Beginning in 2002, the journal has included articles resulting from studies carried out by the Geopark staff as well as the results of scientific research projects on the Apuan Alps area by experts from universities and research institutions.

Acta apuana deals with a vast range of natural and cultural topics, ranging from botany and zoology to archaeology and architecture, but has always given priority to studies and research on geology due to its relevance for the Apuan Alps. Each issue contains articles with an educational slant to draw an increasingly wider audience to natural and environmental topics. The articles are written in Italian, with abstracts in English.

The last issue, Acta apuana, volume XVI-XVII, was presented at the Geopark Farm in July 2021 and is dedicated to the memory of Maria Ansaldo, a botanist from the University of Pisa with an extensive knowledge of the Apuan Alps. She studied the interaction between flora and bedrock and strongly supported the Geopark since its initial participation in the network.

On this occasion, an arboretum which included an educational trail in honour of Maria Ansaldo, was inaugurated for the genetic conservation of the silver fir (*Abies alba*) in the Apuan Alps.

The issue contains several articles. The first two contributions provide an analysis of the effects of climate on the maritime slopes of the Apuan Alps, which is useful for hydrological risk prevention, and



The image on the book cover of the last issue of Acta apuana shows a *Pinguicula mariae* Casper in its rocky calcareous environment. This is an Apuan endemic plant, whose specific name is a tribute to the scientific work of Maria Ansaldo (1959-2013).

a hydrogeological and isotopic geochemical overview of the karst aquifers and springs in the Apuan Alps and their vulnerability to both pollution and climate change. Another two contributions deal with issues regarding the ongoing climate change, looking at the reconstruction of the subboreal palaeoenvironment of the Campocatino glacial basin and an analysis of global and local causes of the floral decline in the wetlands of the Apuan Alps.

The botanical articles included in this issue focus on the in-situ conservation project of the very rare orchid

Herminium monorchis population, an analytical key for the identification of the Apuan species of Sphagnum (peat mosses) and the inventory of the samples studied by Maria Ansaldo preserved in the Botanic Museum (Pisa University).

In addition, zoological research projects are presented in three articles dealing respectively with the Apuan mountain butterflies *Parnassius* and *Erebia* collected in the 1800s, the sympatric occurrence of the Alpine chough *Pyrrhocorax graculus* and Red-billed chough *Pyrrhocorax pyrrhocorax* and their interaction with the Apuan landscape and the monitoring that documented the return of the wolf in the Geopark area.

The Apuan Alps UGGp is working to make its scientific journal Acta apuana increasingly effective as an essential tool to raise the awareness of the local community about its natural heritage.

Acta apuana issues are all available in a printed or digital version (www.actapuana.it).

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Audience attending the presentation of the Acta apuana, volume XVI-XVII, at the Geopark Farm in Bosa di Careggine.



Arboretum Ansaldo for the genetic conservation of silver fir equipped with a didactic path. In the insert, a protected specimen of *Abies alba*.

Reinhard Klink created the etching "The dinosaur tracks – lasting tracks in the Nature Park and Geopark TERRA.vita" to celebrate the 100th anniversary of the discovery of the Dinosaur Tracks Bad Essen-Barkhausen. The etching leaves space for one's own interpretation.



Katla UNESCO Global Geopark, Iceland Student research project in Katla Geopark's Geoschool - Víkurskóli



A group of students measuring the beach in front of Vík. During the summer the beach advanced and a tidal flat formed in front of the beach.

Katla Geopark and one of the Geopark's Geoschools, Víkurskóli School in the town of Vík, started a joint research project in January 2021. The research project consists of seasonal monitoring of the coastline in front of Vík, by measuring beach profiles with a GPS, looking at the grain size of the sand and observing the morphology of the beach. The research is carried out by the students at the school, but teachers from the school and a geologist from the Geopark are on hand to guide them through their research. Six beach profiles have been established which will be measured four times per year, in the fall, during winter, in the spring and late summer. Along with the measurements, the students will also learn about coastal areas, what are the causes for accretion or erosion on beaches, the effect of storms and climate change on coastal areas and the history of the coast near Vík. Students from the 3rd grade to the 10th grade participate in the research project, but the students in 3rd and 4th grade conduct their own research on the grain size of the beach sand, why some rocks are different than others, and why and what kind of litter occurs on the beach. The aim of the project is not only to educate the students about their surroundings and what shapes it, but also to give the students a chance to get to

know research methods and to obtain experience of conducting research on a high level, something that hopefully will serve them well in the future. So far, the students have measured the profiles three times, and hopefully the project will continue for the foreseeable future. With these measurements the students will be able to tell if the beach is growing or receding, together with obtaining a better idea of the energy state of the beach and of changes in its morphology. That information is very important, as the coastline near Vík has been receding rapidly over the last few decades. In 2011 the first step was made to preserve the coastline by building a "sand collector" on the beach and a second collector was built in 2018. These two sand collectors have stabilized parts of the beach, but monitoring needs to continue to confirm the sustainability of the stabilization process. A report on the student's measurement will be published annually and the research that the students carry out and their results will hopefully be able to help the municipality and the agencies involved in coastal management in Iceland, in their future efforts to halt the erosion of the coastline in front of Vík.

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Students, measuring the beach in early September, receiving help in using the GPS. Lyme grass covers the beach ridge and was originally planted to stop wind driven sand transport from the beach.



Students measuring the beach during a cold January day. The Reynisdrangar sea stacks can be seen in the background along with the 2011 sand collector.



Muskau Arch UNESCO Global Geopark, Germany & Poland The new geosite map and geosite sponsorship programme

Employees of the municipal building yard undertake the more elaborate services required in the maintenance of the coal outcrop. Photo by Head Office.



The Tertiary and Quaternary deposits in Muskau Arch Geopark preserve evidence of the Earth's recent history. Characteristic geosites include formations of Pleistocene loose rocks that form only slightly distinctive features in the landscape or were modified and covered by soil and vegetation.

With the update of the geosite map, compiled in 1999-2001, the Geopark has for the first time recorded the special characteristics of geosites in areas with unconsolidated rocks and large glacial-tectonic deformation. The result is a three-stage model that summarises and describes the value and maintenance of these sites for the presentation by the Geopark, during revalidations and for its ten-yearly revalidation as a National Geotope®. In addition to 140 official first-category geosites, the map records second-category and other geosites that are of minor importance but outstandingly suitable for certain purposes.

A sponsorship programme was launched in 2019 in order to accomplish the maintenance of the most important geosites. The Geopark approached and succeeded in winning the cooperation of already committed working groups, associations and individuals to take over the required maintenance. In the meantime, six sponsorship contracts have been concluded, which precisely define the scope of necessary measures derived from the information in the geotope map, together with a time frame for achieving and approving the completion of the recommended measures.

The maintenance of the lignite outcrop in the Felixsee municipality is considered a special challenge. It is located along the «Geology Tour», a cycle route crossing



Members of the «Ice Age Village» Working Group renewing frame racks for the information boards. Photo by Rüdiger Mönch.

about a dozen giesers. Giesers are morphological features that are particularly characteristic of the Muskau Arch Geopark and almost unique in the world. They are formed by surface oxidation of steeply dipping coal seams forming elongated valleys without drainage. In 2004, an artificial outcrop about 25m wide and 5m deep was created in a typical gieser on the "Geology Tour".

Unconsolidated rock material is strongly exposed to erosion - rain and frost as well as vegetation cause constant erosion and rearrangement of the rock fragments. As a result, surface exposures that are subject to destruction and landslides are restored annually. Most recently, in 2015 and 2019, the profile of that geotope, which was exposed to the elements in the intervening years, was restored at great expense. Attempts to protect the outcrop failed due to technical problems. In the end, the sponsorship programme was the deciding factor, not only to secure the maintenance itself, but also to gain professional support to ensure the technically and substantively demanding implementation for conservation. Since 2019, the geotope has been «refreshed» twice a year by a single person using only sensitive equipment, while the professional supervisor coordinates larger maintenance measures with the help of the municipality's building yard. In close coordination of the work, the continuous and needs-based maintenance of the outcrop is thus ensured.

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Information Panel about the largest erratic boulder (The Devils Boulder) in the Muskau Arch UGGP together with the boulder cleaned of mosses and lichens following the maintenance measures by the municipality of Trzebiel. Photo by the municipality Trzebiel.

Naturtejo UNESCO Global Geopark, Portugal

Project for groundwater resources characterization in the Vila Velha do Rodão syncline



to vary between moderate to high and the water, which is naturally hyposaline, is expected to be of high quality.

The study is being developed by a team from the Geology Department of the Science Faculty of the University of Lisbon and D. Luiz Institute. It is the subject of a master's thesis and has the collaboration and support of the Naturtejo Geopark.

For the hydrogeological characterization of the aquifers, a first sampling campaign was carried out in June of 2021 (dry period), in which water samples were collected from springs and boreholes located along the crests. During the sampling, the physical-chemical parameters were measured in situ, and samples were taken for chemical (major elements) and isotopic analyses ($\delta^{18}O$ and δ^2H). The chemical and isotopic study will allow the identification of the recharge area, the groundwater flow, and the evaluation of the groundwater quality. Climatic analysis (precipitation, temperature, evapotranspiration), together with topographic data, soils, and the degree of fracturing and weathering of the rocks will make it possible to estimate the infiltration and the recharge rates of the aquifers.

In line with the United Nations 2030 Sustainable Development Goals (SDGs), this study has as its main objective to support the management of the sustained exploitation of groundwater resources in the Municipality of Vila Velha de Rodão. The definition of the hydrogeological conceptual model of the quartzite crests will allow the estimation of the available resources and assure the maintenance of the groundwater quality.

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The project team sampling the "O Nascente", a spring that supplies the village of Foz do Cobre.

Photo by the authors.



The Ródão syncline at Portas de Ródão Nature Monument, River Tejo valley.

Photo by the authors.

Groundwater is a vital natural resource and of undeniable economic and social value in any region. With the effects of climate change, which in some regions is already causing longer periods of drought and intensifying desertification, it is important to research sustainable and efficient ways to supply communities with good quality water.

Foreseeing the need for self-sufficiency in water supply during periods of scarce rainfall, the municipality of Vila Velha de Ródão, located within the area of Naturtejo Geopark, requested a study to characterize the groundwater resources of the region, specifically in the area of the Vila Velha de Ródão syncline. This syncline is formed by rocks, ranging in age from the early Ordovician to the Silurian, which outcrop in the fold limbs as two quartzite NW-SE trending Appalachian-type crests that characterize the geomorphology of the region between the Tejo (south) and Ocreza (north) rivers.

The quartzite crests form a fractured aquifer, in which water circulates through the discontinuities in the rock formations, as recorded in other regions of Portugal, where this type of aquifer is economically exploited. The groundwater supply is expected

Example of one of the sampled public fountains, in the village of Vilas Ruivas.

Photo by the authors.



Trollfjell UNESCO Global Geopark, Norway

Rock hard risk reduction in Torghatten



A worker using a pinch point bar to remove loose rocks from the rock face.

Mount Torghatten, pierced by a sea cave, is an important monument in Trollfjell UNESCO Global Geopark. The famous "hole in the mountain" has attracted a worldwide audience for centuries. During the past six weeks, workers have been cleaning the hole to make it safe for the increasing number of tourists.

Weathering

The major risk hazard in Torghatten includes rockfalls from the sidewalls and ceiling caused by frost weathering. As freezing water expands, pressure changes lead to widened cracks in the bedrock creating loose rocks in the cave walls and ceiling.

Rockfalls are very common especially in spring-time, during ice melting. Visiting the hole in Torghatten at this time of the year is not recommended and could be dangerous.

High hanging, high quality work

This is the first time we see risk reduction work of this scale in Torghatten. Local authorities, the consultancy firm Nordconsult and Norwegian Geotechnical Institute have examined the area over



Mount Torghatten pierced by a prominent sea cave.

years and hired the rock support company Stetind Entreprenør AS to execute the controlled cleaning of the most exposed areas.

We met the three workers from Stetind Entreprenør AS, Tomas Ottemo, Pål Jenssen and Øystein Åsbakk, as they were packing their equipment after six weeks of work.

During this time, they have been dangling 100 metres above ground, removing 50-100 cubic meters of rocks and securing areas with potentially loose rocks.

This heavy work required high quality security equipment, good physical conditions, professional knowledge, and the right tools. The workers' best friend was the pinch point bar. This tool was used to both loosen and remove rocks. To loosen the biggest boulders, they used air cushions placed in the cracks and inflated to expand; just like the processes of frost weathering.

In some places, instead of removing the rocks, they used 3-metre bolts and glue to attach the rocks to the bedrock. To maintain an untouched look, they camouflaged the bolts with spray paint in the same color as the bedrock.

While standing outside the hole in the rainy weather, we could observe smaller rocks falling from the freshly cleaned sidewalls. Mr. Ottemo was pleased with the rainy weather forecast as this would help to wash down the loose remains from the cleaning.

Further facilitation

To improve the further public safety, Sherpa-stairs will be built in order to lead the visitors away from the most unstable areas. An additional plan is to guide the traffic in one direction. In that way it is possible to reduce the total number of people passing through exposed areas. Another important reason for developing the trail, is to control the movement of visitors, protecting and securing the areas where one wishes to avoid wear and tear.

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Visitor safety will be improved by replacing the existing wooded staircase inside the cave with a less slippery metal stairway.



The European Geoparks Network today



The Network consists of 88 Geoparks in 26 European countries (February 2022)
www.europeangeoparks.org



| | | | |
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| 45 Massif des Bauges Geopark | FRANCE | 92 Buzău Land | ROMANIA |
| 46 Apuan Alps Geopark | ITALY | 93 Salpausselkä | FINLAND |
| 47 Villuercas-Ibores-Jara Geopark | SPAIN | 94 Kefalonia-Ithaca | GREECE |

Black Country
UNESCO Global Geopark

The Black Country UNESCO Global Geopark, UK Moorcroft Wood Local Nature Reserve: geoconservation and post-industrial restoration within the Black Country UGGp



Aerial photograph of Moorcroft Wood LNR, taken in 2016, with the site boundary shown in blue.

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Slope angle map of Moorcroft Wood LNR, which matches almost exactly with Figure 2. This indicates a lack of reprofiling or geotechnical engineering on-site, unlike that seen at other Black Country geosites including Saltwells Local Nature Reserve.

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Moorcroft Wood Local Nature Reserve (LNR) in Moxley, Walsall is one of the 40 geosites within the Black Country UNESCO Global Geopark. It is also one of six sites studied in detail for my dissertation (MSc Applied Environmental Geology, Cardiff University). The Black Country is an area of extensive industrial heritage, post-industrial restoration, and urbanisation; all of which are present at Moorcroft Wood. The site today is bounded by canals, housing, and industrial land.

The bedrock below Moorcroft Wood LNR consists of Carboniferous Middle Coal Measures (mudstone, siltstone, sandstone, with coal, ironstone, and fire-clay); overlain by Anglian glaciofluvial and glaciolacustrine deposits (clay, silt, and sand) which fill "Moxley Palaeovalley", a buried channel margin. Superficial deposits, extracted via sand pits, were used in brick-making and iron foundry moulding. However, their 10-20m thickness meant that coal and ironstone could only be mined underground, via shafts. Both were taken to local ironworks for use in pig iron manufacture.

By the 1760s, Moxley had coal mining, primitive blast furnaces, and a canal network. By 1806, iron

smelting was done on-site in Moorcroft Furnace. In 1830, Moxley Ironworks and Murby Brickworks were founded and made various products using Moorcroft Wood's raw materials. By 1890 there were abandoned "old shafts", "shafts" still in use, numbered pits (for coal mining), and a large "sand pit". Moorcroft furnace, Murby's Brickworks, and Moorcroft Ironworks had all been demolished.

By 1904, there was no industrial activity within Moorcroft Wood. Mining had become too expensive, because previous mining and faulting had caused ground instability and risked flooding or fires. The abandoned industrial land was bought and used to build a new isolation hospital. One year later, Moorcroft Wood became a pioneering urban planting contract of the Midlands Reafforesting Association. "Made ground" at the surface was mostly slag (an iron-rich waste material, optimal for plant growth) and so covered by 60,000 trees to create a convalescence garden for the hospital. This re-vegetation did not, however, include any re-landscaping.

By 1938, historic mining had caused the sand pit and surrounding coal mining pits to subside. This formed Moorcroft Pool and Long Meadow Pool, around which large pieces of slag were left in-situ as examples of industrial heritage. Other subsidence-induced ponds and water-logged ground formed by 1965. Moorcroft Wood was only made officially accessible to the general public in 1981, once the hospital no longer used the site. Footpaths and a car park were constructed by 1993; and the site was made a LNR in 1996 due to its exemplary urban forestry. Aside from the large pieces of slag, the only on-site evidence of Moorcroft Wood's industrial history is its unnatural topography and made ground where "normal" soil would be expected.

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Historic Ordnance Survey map of Moorcroft Wood LNR from 1890, with the site boundary shown in blue.

© Crown Copyright and Landmark Information Group Limited (2020). All rights reserved. (1890).

Djerdap UNESCO Global Geopark Serbia Restoring and managing ecological corridors in mountains as green infrastructure and educational activities with pupils



The exhibition in front of the Public Enterprise Djerdap National Park.

The Djerdap UNESCO Global Geopark, situated within the Djerdap National Park, is one of the pilot areas of the project ConnectGREEN within the second phase of the Danube Transnational Programme. The planned developments for the infrastructure of the Danube-Carpathian region threaten to disrupt the game trails of large carnivores and increase the fragmentation of their habitats. Through the ConnectGREEN project, partners from different countries and various fields of activity joined forces to increase the capacity, identification and management of ecological corridors and to reduce the conflict between infrastructure development and wildlife conservation. Maintaining or restoring ecological corridors will secure a viable population of large carnivores in the Carpathians and maintain one of the largest biodiversity hotspots and functioning ecosystems on the continent. The main objective of the ConnectGREEN project (2018 - 2021) is to maintain and improve the ecological connectivity between

natural habitats, especially between Natura 2000 sites and other protected areas of transnational relevance in the Carpathian ecoregion in the Czech Republic, Hungary, Romania, Slovakia, Serbia and the Ukraine. One of the final activities within the project is the inauguration of an open-air exhibition of photographs in front of the Djerdap UGGp's Visitor Centre. The educational game «Djerdap Adventure» is one of the products arising from cooperation during the ConnectGREEN project. During Children's Week, held in Serbia from 4 - 10 October, a series of interesting educational workshops were organized in pre-school and school institutions within the territory of the Djerdap UGGp in which pupils researched and learned about Djerdap through the educational game. In addition, an educational class was held on the topic of birds where pupils had the opportunity to go out into nature and observe birds.

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A workshops during Children's Week presenting o the children's game «Djerdap Adventure» on the completion of the Connect Green project.



Children's Week in Djerdap Geopark.



Maestrazgo UNESCO Global Geopark, Spain The Lime Kiln Route: Recovery of mining heritage and traditional uses of mineral resources



The Lime Kiln Route promotes the link between Mining Heritage and Natural and Cultural heritage within the Geopark.

© C. Lacaba.

The new Route was the course of a fieldtrip during the Maestrazgo UGGp EGN Week 2021.

© L. Mampel.

The legacy of the territory's industrial heritage linked to mining and the geology of the area is disappearing. For this reason, these historical activities should be the subject of attention. Quicklime has been used in construction work from the earliest times. As a raw material, calcite (CaCO₃) from limestone and dolostone must be treated for industrial uses by burning it in a lime kiln to obtain quicklime (calcium oxide). The raw material is not scarce because the Maestrazgo UGGp has approximately 1,200 km² covered by carbonate rocks deposited in sedimentary basins during the Mesozoic.

The Maestrazgo UGGp has numerous relics of lime production, and it is possible to view some traditional lime kilns, in very different states of preservation, as part of our mining heritage. With the aim of restoring and displaying this legacy and engaging with other important components of the

natural and cultural heritage such as the traditional uses of the mineral resources, Maestrazgo UGGp developed The Lime Kilns Route in the surroundings of La Cañada de Verich town.

The route begins in the town centre, near a geosite information panel about the "Upper Jurassic succession". This geosite is documented by the Spanish Geological Survey (IB037) and is of important stratigraphical and palaeontological interest. This is a site where various fossils of marine invertebrates have been studied, including different species of ammonites, belemnites, and brachiopods. Through a circular path of 5 km, this route takes the visitor to five lime kilns and facilitates a visit to the restored 8 m in diameter and 9 m in height artificial "Ice House" from the XVI century which is included in the local Route of the "Ice Houses and Cold Vaults".

Additionally, the municipality has another geosite of important mineralogical interest (La Cañada de Verich Open Pit Mine), documented by the Government of Aragon. At the beginning of the 20th century, mining became very important in this town, especially the mining of clays intended to make materials used in construction, such as extruded clinker tiles.

Another of the treasures in this superb medieval town is the restored traditional olive oil mill, which now houses a very interesting museum space that explains the process of making olive oil and the history of its production.

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Technical visit to the traditional olive oil mill.
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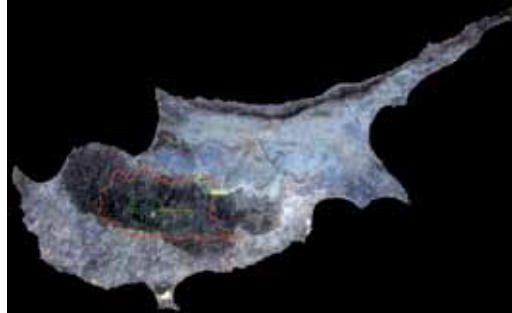


Troodos UNESCO Global Geopark, Cyprus

The Geoconservation Project along the Maroullena Riverbed: A great example of progress during a time of crisis



Map of the Troodos UNESCO Global Geopark with the location of the Maroullena River and Geosite 3.



The Maroullena River is located at the north central edge of the Troodos Ophiolite Complex (TOC), along which, together with its exquisite natural features, a Venetian Bridge is found as well as one of the most significant geosites (Geosite 3) of the Troodos UGGp. This spectacular exposure of the Lower Pillow Lavas, provides a classic reference locality for the study of these volcanic rocks. A lower unit of hyaloclastites and an upper unit of pillow lavas, are cut by swarms of near vertical dykes, which are the natural recorders of the submarine volcanic activity that occurred on the ocean seafloor approximately 92 million years ago. At this locality the visitors can experience the excitement of walking on the seafloor of an ancient ocean without the use of submarine vehicles.

In 2015, the Community Council of the Kalo Chorio Oreinis village, in their effort to promote the exceptional natural beauty of the area, created the 4.7 km long "Pikrovrisi tis Merikas" nature trail. The trail which starts from the Venetian Bridge, passes through the Maroullena Gorge along wooden steps with railings and other small-scale environmentally friendly structures, such as a wooden bridge and wooden sidewalks, and finally ends at the picnic site called "Merika". Along the riverbed valley the hikers can walk near small lakes, which are the natural habitat of the endemic water snake subspecies "*Natrix-Natrix cypriaca*", as well as a significant number of endemic plants and bird species that live, nest and reproduce in the area justifying its inclusion within Natura 2000 EU network.

The repeated flooding events during previous years completely destroyed all the small-scale



The destroyed old wooden structures. Photo by the Geological Survey Department.

wooden structures within the riverbed, provoking a heartbreaking image in one of the Geopark's most impressive nature trails.

Since 2020, a huge effort was made by the Local Community Council in collaboration with the Troodos UGGp to restore the trail along the riverbed. The new structures include several tens of metres of elevated wooden sidewalk along the riverbed and a 14-metre-long metal framed bridge with a wooden floor and railings, supported on two concrete bases on either side of the river banks that are clad with local rocks. Furthermore, in order to enhance the geotouristic offer provided by the nature trail, a new view point with a platform will be constructed on top of the river slope opposite the geosite, that will be reached by visitors from the riverbed via a number of wooden steps with railings.

The geoconservation project was undertaken during a period of crisis due to the minimal number of visitors. It will be completed by the end of the year, thereby strengthening the communities geotouristic product and significantly increasing the number of visitors in the future.

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General view of Geosite 3. Photo by the Geological Survey Department.



Arouca UNESCO Global Geopark, Portugal

516 Arouca – Pedestrian Suspension Bridge: a new addition to the Geopark's infrastructure



516 Arouca spans the Paiva River Gorge in the Arouca UGGp. Photo Arouca Municipality.

On 2 May 2021, the day of the Arouca Municipal Holiday, the 516 Arouca - Pedestrian Suspension Bridge was inaugurated. This prominent structure constructed in the Paiva Valley, provides spectacular views of two geosites in the Arouca UNESCO Global Geopark (UGGp), Portugal – «Paiva Gorge» and «Aguieiras Waterfall», and the famous «Paiva Walkways». This bridge is a significant component of the Geopark's provision for educational and touristic visits, with a special focus on geology. Views from the bridge contribute to an understanding of the Earth's dynamics, particularly with respect to the rock cycle and formation of the landscape, and its connection with biodiversity and the history of humans in Arouca UGGp.

Hanging 175 metres above the Paiva River and with a 1.20m wide surface the bridge is named "516 Arouca" for its of 516 metres span. It has the capacity to support 1800 people simultaneously and is the largest suspension pedestrian bridge, of this type, in the world. The opening of "516 Arouca" was carefully prepared, taking into account the values of a territory classified as a UGGp and its membership of the Natura 2000 Network. The policies and strategies aimed at promoting responsible and sustainable tourism benefited from the experience acquired in managing the Paiva Walkways in order to avoid the risk of excessive tourist pressure and its impacts. Thus, an online booking system was implemented, with controlled limits and timetables in which visits are always accompanied by guides

who, in addition to interpreting the infrastructure and the landscape, play a role in raising awareness of sustainable behaviour and practices. Additionally, to control the flow and quality of visits, "516 Arouca" employs a team of supervisors, responsible for the proper functioning of the infrastructure and to support for visitors and guides. Both teams, guides and supervisors, have previously received training about Arouca UGGp's values and heritage (from a holistic point of view), as well as first aid and managing panic/stress situations.

At the time of its opening, given the characteristics of this new tourist attraction in Arouca UGGp, the media coverage exceeded all expectations, resulting in "516 Arouca" making the news in several international communication channels. Alongside the media, the demand was immediate. Inaugurated during the pandemic and considering that the tourism sector is one of the most affected by this public emergency, this new infrastructure, with approximately 90,000 visitors in 6 months is proving to be a tourist attraction at the local, regional, national and even international level. This year, the "516 Arouca" was already winner of a «World Travel Award» as «Europe's Leading Tourist Attraction Development Project 2021».

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Bakony–Balaton UNESCO Global Geopark, Hungary

New, interactive exhibition on the diverse volcanic heritage



The iconic columnar basalt rock face of Hegystű.

Photo by Barnabás Korbély.

The Geopark has an internationally significant and unique volcanic heritage. In the Bakony–Balaton Uplands Volcanic Field about 50 volcanoes were active in the period from 8–2.3 million years ago. Thanks to their relatively young age, the recent landforms clearly show that this landscape was «born in fire». As the volcanoes erupted in a wet, marshy environment, phreatomagmatic volcanism was typical. Due to the interaction between magma and water, eruptions were at first usually explosive. Maars, tuff rings, lava lakes and, in the last phase of volcanic activity, cinder cones were formed in the marshland. The loose Pannonian sediments around the craters were eroded away by weathering processes, resulting in the formation of the characteristic shaped remnant hills (their contours can be seen in the logo of our Geopark).

Hegystű Geological Visitor Site near Monoszló village is an important geotourism destination. The spectacular columnar basalt (or more precisely, basanite) rock faces, exposed by quarrying until the 1960s, and the beautiful panorama attract tens of thousands of visitors every year. Significant improvements were made at this site in the frame of the Interreg Danube GeoTour project. In Issue 16 of the European Geoparks Magazine, we provided a brief introduction to the volcanic trails, one of them, the evocatively named “Route of Fire”, starts at this site and lures hikers into the world of the once raging volcanoes. The visitor site’s exhibition has also been thoroughly revamped, with a state-of-the-art multisensory exhibit on the processes of volcanism. Other topics of Earth science are also covered, including tectonic movements



Enjoying the panorama on a bench.

Photo by Barnabás Korbély.



Learning about the earthquakes in the Pannonian Basin.

Photo by Barnabás Korbély.

and earthquakes (e. g. a touch screen shows where and when earthquakes have occurred in the Pannonian Basin). Networking, a very important keyword in the world of Geoparks, is also part of the exhibition. Not only do we present our project partners from the Czech Republic to Serbia, but we also have a video of a 3D volcano installation and, in a separated movie room, another short film on Fagradalsfjall eruption from Reykjanes UNESCO Global Geopark, Iceland. Because Geoparks are not just about rocks, but also about the people who live there, the exhibition features the traditional viticulture of the region, based on volcanic soils, and some of the Geopark products that are sustainably produced by our partners.

In the framework of “Hidden Treasures in Balaton Uplands National Park” project, new interpretive panels (in Hungarian, English and German) and a playground for children were installed, and our visitors are now pampered outside with new benches – so this is an ideal place for learning, relaxing and hiking!

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Beaujolais UNESCO Global Geopark, France

Geological times step by step



An information panel on the Montmelas Geological Trail.



The children’s parents installing a panel on the geological trail.

The duration of the age of the dinosaurs, or even the time since the last ice age are very abstract measurements on our human timescale. The vast interval of time represented by the geological history of the Earth is as difficult for children to appreciate as it is for adults.

In the Montmelas village school, within the Beaujolais UNESCO Global Geopark, the educational approach was to teach about geological time by creating a nature trail in which time is represented by the distance travelled.

Montmelas school children provide the UNESCO Global Geopark evaluators with a guided tour of the geological trail.



The trail project is based on a network of six trails already created by school children in the same area for themselves as well as for the general public. In all, the six routes provide six different angles of approach to the Montmelas environment (fauna, flora, poetry, landscape, etc.). The geological route is superimposed on the present nature trail.

The objective of the Montmelas Geological Trail is to raise awareness of geological time through walking. The trail is designed as a time scale where one metre travelled corresponds to four million years, over a distance of approximately 1.4 km. Ten information panels mark the key moments in the geological history of the Earth and in the Beaujolais, such as the emergence of life, the appearance of the first animals or the formation of the Alps. Thus, school children and visitors walk relatively longer distances between Precambrian events (formation of the Earth, the Moon, birth of tectonic plates, etc.), hundreds of meters apart, than between panels representing the last 500 million years with panels just a few meters apart. Strolling along the path then allows us to determine our position in the chronological sequence of eras in the history of planet Earth.

In parallel with the panels representing the major stages in the history of the Earth and living things, four panels provide information about the rocks encountered on the route, in this case a sandstone, a dolerite, a microgranite, as well as a micaschist. The geodiversity presented along the Montmelas Geological Trail provides an example of each of the major rock types (igneous, metamorphic and sedimentary).

The childrens’ introduction to learning about geological concepts, and geological time in particular, began with the creation of a time line in which a wire stretched in the classroom, symbolizes the history of the Earth. It is enriched during the school year by the addition of geological events, in the form of images, which the pupils have chosen for the geological trail.

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Beigua UNESCO Global Geopark, Italy First steps on the path of mountain therapy

One of our main missions is to bring people closer to nature, but sometimes it seems like an impossible challenge especially if you lack the grounding and skills to fully enjoy the mountains.

However, we don't give up on impossible challenges. So, we experimented with a pilot project involving inclusion initiatives which helped us to develop new skills and lay the foundations for a more articulated and complex planning of activities for future use.

We started in January with Federico, a teenager with autism spectrum disorders. In collaboration with his family and in coordination with the teacher who supports him, we brought the Beigua Geopark to Federico's home through a series of on-line meetings with our Guides. His passion for animals was the starting point to develop a means of reciprocal knowledge, to stimulate involvement and participation and to deal with other themes linked to the Geopark. We worked together on the agri-food chains, a topic Federico is studying at school. Thanks to the Geopark Guides he had the chance to experience, through videos, pictures and tales, the real life of farmers involving breeding and milk processing. We parted with the promise to meet one day in person in the Geopark and share the experiences we have been talking about on a screen over a period of months.

Then we met Leila, a little girl with motor disabilities and chronic illnesses that limit her engagement in community life. Just for her we organized a day as a Beigua Junior Geoparker in Sassello, with a workshop on animal tracks and a short hike in the Deiva Forest to find signs of their presence. Leila was so enthusiastic that she asked for more, so we planned a longer excursion. Together with the local branch of the National Mountain Association we took a Joelette, a specially modified wheelchair that allows the transport of people with disabilities or reduced mobility, and accompanied Leila and her family on one of the panoramic trails across



the Geopark, in places normally inaccessible to a traditional wheelchair. A dream coming true for the girl and her family.

These were extraordinary experiences, which enriched us as people and as nature professionals, and gave us many ideas to develop proposals for mountain therapy. Beigua Geopark's future will become more and more inclusive.

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**On line
activities about
Beigua Geopark
with Federico.**



Styrian Eisenwurzen UNESCO Global Geopark, Austria Progress in a time of crisis: Revitalizing Nothklamm and the theme trail "GeoPath"

**Partners in
the GeoVillage
Gams: Herbert
Traisch
(Chairman of
the Culture
and Tourism
Association
Gams), Mayor
Bernhard Moser
(Municipality
Landl), Doz.
Mag. Dr.
Alexander
Lukeneder
(Natural History
Museum
Vienna), Oliver
Gulas-Wöhri
(CEO Nature
and Geopark).
© NUP
Eisenwurzen**



Spring 2021 was used enthusiastically for important renovation work in the GeoVillage Gams situated in the middle of the Nature and Geopark Styrian Eisenwurzen. Thus, once again parts of the footbridge in the Nothklamm were renovated. An important step to guarantee a breathtaking and safe experience.

**Presentation of
the Nature and
Geopark Archive
by CEO Oliver
Gulas-Wöhri
(centre) to the
caretakers of
the community
library Anna
Pribil (left) and
Maria Pretschuh
(right). © Heinz
Peterherr.**

At the same time, the content of the «GeoPath» theme trail was updated and brought up to the latest standards. Now 15 stations on an entertaining circuit convey exciting geological highlights from the GeoDorf Gams and the only UNESCO Global Geopark in Styria. In the GeoDorf you can find different fossil and dinosaur tracks, exciting stories about our Earth history and the special Kraus Cave. It is important not to reveal too much at this stage. The aim of all those involved is to raise awareness locally and at the same time protect the geology. The Nature and Geopark Styrian Eisenwurzen and the Natural History Museum Vienna are responsible for the content of the new GeoPath. In cooperation with the municipality of Landl as well as the culture and tourism association



of Gams, further awareness raising measures are to be promoted in the coming years. Thanks go to all of those involved in the current revitalization of the GeoPath.

The Nature and Geopark Archive was deposited in the community library Gams

The Styrian Eisenwurzen Nature Park has also retained the UNESCO Global Geopark designation since 2015 and thus actively shapes the topics of geological protection, research, education, sustainable tourism and regional development for the four nature and geopark communities. Together with regional partners and excursion destinations, knowledge is imparted and the protection of geological features, called geotopes, is preserved. This is also the case in the GeoVillage Gams, which has now been extended with the addition of a building block. The GeoVillage is rich in research and works related to geology. In order to preserve this literature, research results and regional history, a nature and geopark archive was designed as a supplement to the Gams community library in the elementary school. This was presented to the library, for this purpose, by the Chief Executive Officer (CEO) Oliver Gulas-Wöhri. Many thanks are due to Mayor Bernhard Moser and the municipality of Landl for their support, to Joinery Tramberger for the design of the extension and to all who donated literature. Thanks also to Anna Pribil and Maria Pretschuh for their support. The archive aims to grow together with the community library in the future and collect knowledge from the nature and geopark region.

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**A panoramic
trail in Beigua
Geopark with
Leila on the
Joelette.**

Causses du Quercy UNESCO Global Geopark, France

Contemporary art, know-how and geology in the Causses du Quercy Geopark



The team of builders with the inhabitants and children of Gréalou.

Located at Gréalou, Pech Laglaire is a hill with three dolmens built nearly 5,000 years ago, one of which is included in the UNESCO World Heritage List as part of the «Saint James Way in France». This karstic pastoral area was used since the Neolithic period by sheep breeders who came to graze their flocks of sheep. It is a major natural environment within the Geopark, composed of dry grasslands which provide reservoirs of remarkable biodiversity. The Super-Cayrou refuge artwork has been installed in this environment.

Super-Cayrou is the result of a meeting between the Geopark and the association « Derrière Le Hublot », which develops artistic and cultural projects in the region. This is the first work of art-refuge built as part of the « Fenêtres sur le paysage » (Windows on the Landscape) project. This project aims to develop other works along the GR65 long-distance hiking trail, which is the most frequented section of the St James Way in France.

Composed of two caselle tents (dry stone huts typical of the limestone causses) and a large esplanade

to contemplate the landscape, Super-Cayrou is constructed entirely of limestone, the local source of dry stone. It is a work of the present, based on ancient know-how linked to dry stone and which the Geopark, with a network of partner craftsmen and associations, is trying to perpetuate. Super-Cayrou invites you to contemplate the landscapes, the cliffs and the starry sky of the Quercy limestone plateaus, to sleep in the middle of nature in a work of art, to take a break during your itinerary on the St James Way.

Super-Cayrou was designed by « Encore Heureux » (Still Happy), a group of architects and artists, together with the inhabitants and the commune of Gréalou and many local participants. Meetings were organized to facilitate the participation of the inhabitants in this project. The work was undertaken locally. Vincent Caussanel, a craftsman-builder specialising in dry stone and a Geopark partner, coordinated and carried out the work, and the stones came from a small quarry located nearby. The quarry was opened only for this project and closed once the stones had been extracted. This experimental initiative made it possible to supply the site with local stone while limiting the impact on the environment. No concrete, no metal, only natural and local materials were used in a project that respects the environment. The construction work was able to take place in the spring of 2020 despite the restrictions linked to the health crisis.

Guided tours are offered every summer by the Geopark and the Tourist Office and Heritage Service of Grand Figeac.

Another project is underway in the south of the Geopark and should be completed in 2022.

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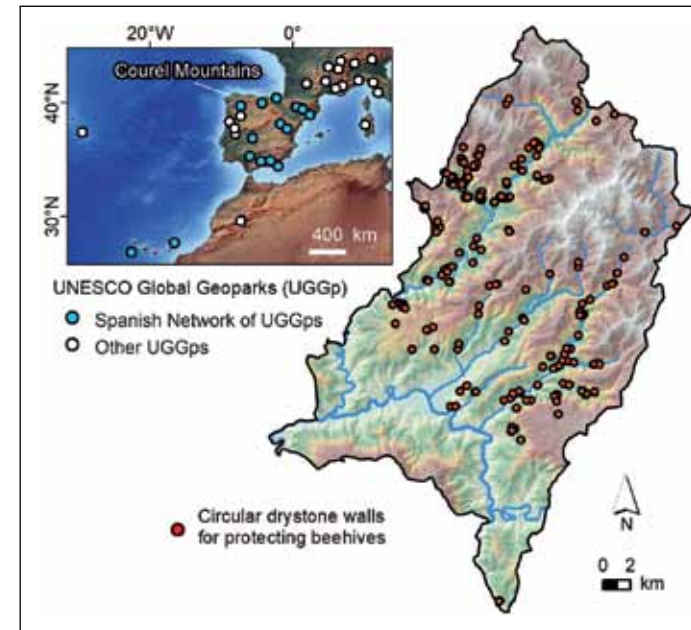


The two dry stone huts of the Super-Cayrou with mountain bikers taking a break.



Courel Mountains UNESCO Global Geopark, Spain

Drystone walling for harmony between brown bears and local honey producers



Courel Mountains UNESCO UGGp showing the distribution of stonewalls constructed for protecting beehives.

Circular drystone walls constructed around beehives to prevent attacks by bears.



part of the structural relief associated with a large recumbent fold that is the flagship of the Geopark. These slopes are covered by heather (*Ericaceae*) and chestnut trees (*Castanea sativa*), whose flowers are pollinated by the bees during the creation of the tasty honey.

Courel Mountains UGGp promotes honey as a homegrown product linked to the local geology and the Art of Drystone Walling, Knowledge and Techniques, which is listed in the Intangible Cultural Heritage of Humanity by UNESCO. The circular stonewalls enable the coexistence between the local people and the population of and bears which is increasing in the Courel Mountains thanks to the partnership between the Brown Bear Foundation and the local communities. The partnership has collaborated, with the help of workers and volunteers, in the restoration of the circular drystone walls. These structures were then promoted along hiking routes and other touristic programmes, as well as activities for students. Tourism offices and an ethnographic museum display the honey-related heritage and the production of honey by local beekeepers and young entrepreneurs. Honey pots show the logo of the Geopark. Local producers continue using traditional circular structures for producing honey safely, living in harmony with the brown bear, whose occurrence is a great incentive for visiting the Courel Mountains.

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Honey from the Courel Mountains UGGp.

Estrela UNESCO Global Geopark, Portugal GUIA (GUIDE)– Interactive User Guide Applied to Tourism in the Estrela Geopark



Magma UNESCO Global Geopark, Norway Visit the Mines Project in Magma Geopark



The GUIA (GUIDE)– Interactive User's Guide.

The Interactive User Guide Applied to Tourism in the Estrela Geopark (GUIA), was publicly launched on the 27th of September, and is an initiative of the Estrela UNESCO Global Geopark, with funding from Tourism of Portugal, and technological implementation from Primelayer.

The GUIA is an interactive tourist information system that intends to be used as an instrument for the management, promotion and enhancement of tourism in Serra da Estrela, improving it as a tourist destination and giving added value to its products. Its use allows visitors to build itineraries according to their interests. This tool aims to centralize and standardize, in a single platform, the information regarding tourism provision in the territory of the Estrela UGGp. It provides visitors with a planning tool for their visit, through a web platform and Mobile Application, promoting tourism communication, accelerating the digital transition of informative support and tourism management in the nine municipalities that are part of this Geopark.

The database that feeds this system (web platform and app) has all the tourism resources, local events of interest, hotel information, as well as weather forecasts and other environmental conditions, allowing for more assertive decision making. As mentioned, the user has access to all the information in the database, is able to build the itinerary according to their interests, and can export it to various formats or check and edit it through the app, in online or offline mode.

As an important note, in the case of offline access to information, this may not be the most updated, since the database will be fed in real time, namely in regard to the weather forecast. The user can also suggest new itineraries, events and places of interest, which will be subject to validation by the Estrela Geopark staff, encouraging greater interactivity with the GUIA.

This tool, due to several features, represents an important step in the valorisation of tourism in Serra da Estrela. On the one hand, because of the effort of centralization and standardization of all the information regarding the tourism provision and services, dispersed until now through different channels, the tool delivers a more complete and quality experience for the visitor. On the other, by emphasizing the richness of resources and possibilities that the Estrela Geopark can offer its visitors.

The web platform is already online, with the launch of the app expected by the end of 2021. This will be an important gateway to the territory of this UNESCO Global Geopark, allowing a bigger and better communication for tourism, both in Portuguese and in English.

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The entrance to Ankerhus mines.

There is a long history of mining for ilmenite (titanium iron-oxide) in Rogaland, one of Magma Geopark's two Counties. The first mines were opened in 1785, near Koldal about 6 kilometres east of Egersund, one of the five municipalities in the Geopark.

Ilmenite contains both iron and titanium, and iron was extracted from 3000 tons of ore removed over a period of 11 years. There were, however, problems with the smelting process and mining ceased in 1796. Mining started again in 1861 and a railway was built to transport the ore 7 km to the coast. Wagons filled with ore extended down to the sea from an elevation of 118 m. The empty wagons were pulled back uphill by horses. Mining ceased at this site in 1881 and was concentrated further east in Rogaland. The ore is developed in a narrow, east-west zone near the boundary between anorthosite and gneisses and occurs in ilmenite-rich lenses.

The county Rogaland was first mapped and described in the 1740's in the publication "Stavanger County detailed description" by the County Governor of Rogaland, Bendix De Fine (1696-1746). This publication also included the mines at Heggdal, also



Magma UGGp's interpretation panels at the Ankerhus mines.



Svannesviken, where the first shipment of ore occurred in 1863 during the second mining period.

known as Ankerhusgruve, which were in operation from 1785 to 1790. The mining license was held by Moss Ironworks, who exported all the ore to Eastern Norway during this first period of mining. In 1791 Moss Ironworks had eight active mines in the Egersund district, with a value of 4400 Norwegian Krona (about 400 Euro). The ore was transported to the coast on sledges in the wintertime, crossing Lake Kydlandsvann and Lake Smievann, via Grødem, through Lake Svåvannet to Nålaugvika Bay. We assume that most of the workers were local farmers who were trained by experienced miners from the eastern part of Norway.

In Magma Geopark, thanks to the cooperation with the Environmental Department (Miljødirektoratet), we have now valorised all the most important mines located in the Geopark's, five municipalities, securing, and opening them to the public, adding the Geopark's interpretation panels which connect the cultural and geological heritage.

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Geology workshop on the Fort's esplanade.

Photo by V. Thiebaut.

Massif des Bauges UNESCO Global Geopark, France

Geology and climbing, dynamic partners during the National Geology Days in France



The National Geology Days, which have existed for three years, provide an opportunity to initiate new partnerships. The Fort de la Batterie, located in the town of Marthods, at the north-eastern tip of the Massif des Bauges UGGp, provides a fantastic view of the Mont Blanc massif and the boundary between the external crystalline massifs and the subalpine chains. The Fort is a small former military base, which has been patiently restored by the members of this dynamic association that manages the site. The Fort's Association recently worked to install a geological toposcope to present its fantastic geological landscape as part of the enhanced welcome afforded to members of the public. Despite the covid pandemic, the Association also hosted one of the sessions of our geopartner network working together with the local committee of the Mountain and Climbing French Federation (FFME), another of the Geopark's partners, in a joint initiative to link geology with climbing. At the foot of the Fort, an enormous isolated block provides a pleasant place in the forest, to help children discover climbing. On the day organized by the Fort Association children and their families were introduced at this previ-

ously unrecognized climbing site, to climbing routes and climbing equipment. Various playful workshops involving slack lines, zip lines and climbing routes for different levels were held throughout the day. A welcome was also assured by the members of the Association during visits to the Fort. Pancakes and other dishes were prepared in a convivial setting. The Geopark's staff were also present and held a geological workshop on the Fort's esplanade. This involved interpreting landscapes, a 3D geological model of the Bauges Massif and an exhibition of selected rock types. The workshop provided an occasion to present the geology of the area together with the spirit and activities of Massif des Bauges UGGp to new members of the public.

The plunging view of the glacier valleys (1000 m vertically above the city of Ugine) was an occasion to describe the former extent of glaciers and traces left by their retreat. This special geology day took place during our EGN Week and included other special geological events. On the previous day and over the weekend a one day cycling tour was organized to discover the area's landscape and heritage, another event involved visiting the waterfall and cave at the in Faverges-Seythenex geosite. A good weekend during which the Geopark's partners admirably fulfilled their commitments to share their knowledge of the territory. The Fort's Association is now involved in sharing a place in the mountain which aims to be appreciated by and inspire a wide public. This can be extended, on a neighbouring site, to appreciating the glacial history, the sky at night and orchards designed for conserving old fruit tree varieties.

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Climbing for children.

Photo by V. Thiebaut.



Toposcope about the Mont Blanc landscape.
Photo by C. Lansigu.



North Pennines AONB UNESCO Global Geopark, UK

A landscape for everyone



Outing with Carlisle Youth Zone for the John Muir Award.

People are an essential part of any Geopark, as residents, contributors, communities and visitors. But who are those people? In the North Pennines Area of Outstanding Natural Beauty (AONB) and UNESCO Global Geopark, like many other rural landscapes, the people who visit the area and get involved in Geopark activities are usually not fully representative of the wider population. But Geoparks should be for everyone. For a range of reasons, some parts of society are not getting the benefits of these special places.

This is not a new issue. The need and demand for change, so that different groups of people have access, are included and feel ownership of these landscapes, has been known for decades and the actions to make this happen are not innovative or exceptional. But slowly, together, progress is being made.

Examples of this progress in the North Pennines include a range of initiatives involving different groups of people, different organizations and different approaches. Some of the work involves building relationships with individuals who can identify issues and share their own lived experience. Sometimes organizations that are already embedded within communities are the best way to connect. An action research group was formed, made up of representatives with a wide range of experiences from the Geopark and surrounding area who can help

on this journey. The Geopark team have worked with a variety of groups, including refugee groups, youth organizations, visually impaired groups, transgender groups and faith communities to offer them opportunities and find out what makes participating more challenging for them and what can be done to support their involvement. Steps for change include working with the North East Autism Society, making staff more aware of issues affecting people with autism and adapting our approaches to be more inclusive, such as providing high-quality information for families to make an informed visit. Disadvantaged young people are engaging with the Geopark through organizations such as The Prince's Trust and Cumbria Development Education Centre to help build their connection with nature and develop their skills. This includes site visits, practical tasks, creative activities and training.

All this aims to help a wider range of people to feel at home in the North Pennines AONB and UNESCO Global Geopark. This involves changing the way staff work and plan projects to be more inclusive. It involves challenging assumptions and asking difficult questions. These are small steps and it will be a long journey, but this should be a landscape for everyone.

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Activities with Ubuntu Multicultural Centre.



Filmmaking project with Jack Drum Arts.

Odsherred UNESCO Global Geopark, Denmark Holiday house business leads to Geopark funding of local initiatives



The corona pandemic hit hard. But having to face international travel bans, citizens all over the world had to exploit the possibilities of domestic travelling, thereby initiating a new wave of staycation trends.

In Geopark Odsherred (Denmark) this meant a profound increase in the renting out of holiday houses. This was more pronounced than in any other region in Denmark because Odsherred is the municipality in Denmark with the most holiday houses, approximately 25,000.

As one of three divisions in the Geopark Foundation, the company Feriepartner rents out approximately 400 houses. Obviously, this results in a large turnover for the Geopark. Resource management of the large 2020 turnover materialized in financial sharing, allowing the Geopark to award DKK 375,000 (c. 50,000 €) to a diverse array of activities and projects.

"This is a typical example of the geopark concept's ability to create new possibilities and stimulate economic growth. Even during a global crisis, the Geopark's attachment to the local area ensures an understanding of the renewed awareness of what nature and landscape can provide in terms of resilience and welfare", quoting the Geopark Director Morten Egeskov, who continues: "This will

only be the case in 2020 and 2021. We already see the world opening again, and therefore we need to make the most of it, while we can. Next year, we are back to more normal conditions, and therefore have to attract people in new ways; hopefully through new initiatives, financed by the holiday house renting turnover".

The € 50,000 financed 19 new project initiatives, including the world's first Sustainable Development Goals 2030 (SDG) sculpture park, a graphic novel on the reclaiming of the Lammefjord, providing waders for seaweed safaris and the establishment of close-to-town shelters for recreational use – to name a few.

The largest single grant of € 10,000, was given to the Lammefjord Historical Society, which is in the process of raising funds to finance a new museum on one of Europe's largest land reclaiming initiatives, which celebrates its 150th anniversary in 2023. "It is a great pleasure to be able to co-finance such a project, given the fact that the reclaiming of the old fjord has meant so much to the Geopark area and its development", director Morten Egeskov said, following the announcement of the list of recipients.

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The Audebo pumping station, constructed almost 150 years ago, is still working today and regulates the canal system around the Lammefjord area, an area of approximately 15,000 acres.



Ore of the Alps UNESCO Global Geopark, Austria Exploring Nature's Hidden Biodiversity in the Ore of the Alps Geopark



A Field Researcher collecting biological samples on top of the "Übergossene Alm" (covered mountain glacier) in the Hochkönig mountain range.

© Basecamp Research.

In July 2021, Basecamp Research, an environmental research company based in the UK, partnered with the Ore of the Alps UGGp to study the unexplored microbial biodiversity within one of Austria's vast natural landscapes. Basecamp Research specialises in the discovery of novel environmental microbes from biodiversity hotspots all over the world, with the ultimate aim of improving our understanding of the hidden biodiversity and using this to develop new and sustainable products for the global economy.

To conduct this study, the field researchers first collected small soil samples from many different habitats around the Ore of the Alps UGGp. This included exploring the vast array of beautiful environments within the Geopark, such as the stunning glaciers, magnificent forests and rivers that cover the landscape. The research team conducted all sampling non-invasively and on foot, to ensure that they did not interfere with the magnificent natural ecosystem. After sample collection, the field researchers extracted the DNA from microorganisms in the soil, and then used computational analysis to identify previously unrecorded microbes!

Basecamp Research were assisted in their research by Horst Ibetsberger, the Scientific Director of the Ore of the Alps UGG. Horst Ibetsberger assisted the field researchers by helping to identify sample sites,



Going the extra mile to collect samples in the Ore of the Alps UGGp.

© Basecamp Research

involving the research team in the Geopark's 'Together for Our Future' programme and providing the team with a warm Austrian welcome! The 'Together for our Future' programme will show people how we combine investigation with science to understand the true power and complexity of nature so that we may better protect it in the future. As soon as the results of the research work are available, they will be presented virtually in the Geopark schools as well as in the Austrian Geopark Forum and in the presence of representatives of the provincial government of Salzburg by Nadine Greenhalgh's Basecamp Research team and Horst Ibetsberger. All the stakeholders of the Geopark are really proud to be partnering the research team to learn more about the unexplored biodiversity in the soils beneath our feet!

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The team from left to right: Nadine Greenhalgh, Bupe Mwambingu, (Basecamp Research) and Horst Ibetsberger (Ore of the Alps UGGp).

© Horst Ibetsberger.



Pollino UNESCO Global Geopark, Italy

The discovery of the Bifurto Abyss at the Venice Film Festival



At the 78th Venice International Film Festival - Biennale Cinema 2021, the movie "Il Buco" (The Hole) won the Special Jury Prize. The film, written and directed by Michelangelo Frammartino, was filmed entirely in the area of Pollino UNESCO Global Geopark with the collaboration and support of the Geopark Authority.

The film shows the history of the discovery of the "Abisso del Bifurto" (Bifurto Abyss), a vertical cave, that is an important geosite in the Geopark. With a depth of 683 m from ground level, the cave, at the time of its exploration in 1961 was the second-deepest in the world.

The abyss, located in the municipality of Cerchiara di Calabria, is an extraordinary example of karst processes. Now it occupies the fortieth place in the ranking of the deepest caves in the world and, according to speleologists, it is one of the most difficult caves in the whole of Southern Italy. In fact, the director's idea for the film was, thanks to a research project on karst cavities in the Geopark area, organized by the Geopark in collaboration with the University of Calabria and the local speleological association "Gruppo Speleologico Sparviere".

The film's narrative recreates the caving expedition in August 1961 when a team of speleologists from Turin plumbed the depths of the cave, juxtaposed with everyday rural life in the Calabrian region. In fact, in one scene, the villagers sit in the



The movie poster.

town square and watch a communal television outdoors, that depicts the building of the Pirelli Tower in Milan, a national symbol of the country's postwar economic miracle.

In the same way in the mountains the life of the shepherds seems to flow without ever engaging with the activity of the speleological group. The movie, a coproduction from Italy, France and Germany, was filmed directly in the cave, so it allows us to see closely how the speleologists who first went into the abyss collaborated.

During the filming there was close cooperation between the Geopark team and the film crew, to avoid damage to the natural environment that could have arisen from the crew climbing with their equipment in the park's highland and descending into the depths of the abyss.

Moreover, the collaboration of the local speleological associations, as well as the participation of local nonprofessional actors was of fundamental importance for the completion of the film.

Nevertheless, the film is not only about the depths, but - with an engaging play of contrasts - it shows also the extraordinary landscapes of the park, thanks to the work and expertise of the director of photography, the master Renato Berta.

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On the red carpet at the 78th Venice International Film Festival.



Vikos-Aoos UNESCO Global Geopark, Greece

"A Greek Geopark for all": Towards an inclusive and accessible interpretation of Vikos-Aoos UNESCO Global Geopark through the project "Listen-Touch-Feel"



The 3D printed model of Noutsos-Kokkoris Bridge for visually impaired people.

The notion of cultural accessibility has a central role in integrated heritage management policies and especially in the management of UNESCO nominated sites. Within this framework the Zagori Ecomuseum implemented the educational pilot project "Listen-Touch-Feel", aimed at engaging people with special needs, especially the visually impaired, with the natural and cultural heritage in the Vikos-Aoos UNESCO Global Geopark.

Zagori Ecomuseum, one of the major socially driven and local development social enterprises in the Epirus region, operates, in compliance with UNESCO's cultural policies, by implementing awareness raising and capacity building community-led programmes in the cultural landscape of Zagori including the Vikos-Aoos Geopark.

The main idea was to design an innovative programme for a sensitive and socially marginalized group such as the visually impaired, by combining technological with interactive visual methods such as 3D printing technology and soundscape walks. More specifically, traditional historic stone bridges, cultural landmarks in the Geopark were scaled down to 3D printed models along with their surrounding landscape, such as the Noutsos-Kokkoris Bridge built in 1750, for interpretation by touch and recorded soundscapes.

The programme's originality lies in the enhanced personal experience of an educational walk in the in-situ monuments of the Geopark, with interactive



Walking on the Noutsos-Kokkoris bridge with visually impaired people.

methods that improve the spatial perception of visually impaired people through touch and hearing.

Methodology

The interpretive walks combine personal experience with a 3D representation of the route's geomorphology and an audio description with audio stimuli which is designed for small groups.

The project was implemented in three stages.

Stage_1, Capacity Building and Training

Information seminars were held online to inform the wider public regarding the new technological possibilities for visually impaired people to access cultural landscapes and products at all educational levels by using programmes from open-source or commercial technologies and bodies.

Stage_2. On-site implementation

The groups took part in explanatory walks in nature within the cultural landscape of the Geopark, including an interpretive sound recorded tour on a path that is part of the area's natural and cultural heritage. Apart from the personal landscape experience through the interpretive walks, the 3D depiction of the stone bridges and the route's geomorphology enabled contact with the monuments and the landscape through touch, as is done with works of art.

Stage_3.

In the final part of the project, all the routes were accompanied by an audio description (narration of the visual content) and audio stimuli from the soundscape collection, to create a virtual enhanced tour.

The soundscape walk experience

The project utilized the soundscape methodology as a tool to enhance the lack of vision in blind people through acoustics. Even more, the groups were encouraged to experiment in finding solutions to create ecologically balanced soundscapes in which the human community and its sound environment are in harmony, according to the principles of acoustic ecology.

The expected result was the dissemination of technological possibilities for the services of visually impaired people, with as much participation as possible from beneficiaries such as directly concerned blind people, trainers, and educators.

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Noutsos-Kokkoris bridge details of the 3D printing model.

Villuercas-Ibores-Jara UNESCO Global Geopark, Spain

La Vuelta reaches the Villuercas Peak



Cyclists ascending the Villuercas Peak.

In 2021, the organization of La Vuelta, one of the most important multi-stage bicycle races in the world calendar, together with the Giro d'Italia and the Tour de France, decided that one of its stages included reaching the top of Villuercas Peak.

Television enables the race to be followed by lovers of cycling and nature tourism. Among its stages, the cyclists arriving at the top of a mountain are the ones that attract the most followers in a television show recording the landscapes, the excitement of the race and the spectators on the road sides. The media expressed admiration for the scenery and the difficulty of the stage. It could not be otherwise since the last fifteen kilometres of ascent, a military track assigned for use in the Geopark, had been adapted as a mountain road and as a component of the Geopark's geological itinerary during the previous year.

The itinerary used for geotourism interpretation has three branches with interpretation panels. It is also an example of a diversified itinerary with a dozen observation points that combine geological stops together with cultural and natural breaks. The route includes palaeontological sites, protected

forests, Appalachian geomorphology, hermitages, snow pits, pilgrimage paths to Guadalupe, faults in Cambrian rocks and other curiosities such as the 13th century hydraulic works, the birthplace of several rivers or a place for touching "the sands of Rhaic Ocean beaches". The views to the north and south reveal the distant valleys of the Tagus and Guadiana rivers.

The Geopark management staff approached the issue of the finishing stage with the view of protecting the route from the impact of large numbers of spectators with the opportunity for an unprecedented level for tourism promotion. Consequently, informative and promotional activities were devised that took into account the Geopark's conservation principles and objectives.

These activities included circulating information and promoting awareness on social networks, campaigns with some local and regional cycling clubs, an award for participants in awareness activities consisting of cycling jerseys with a special Geopark design, providing information about the Geopark for the TV commentators during the broadcast and, finally, the on-site monitoring on the day of the stage.

Among the results we can count the following. Negative impacts on Villuercas Peak and the Geopark's facilities (panels and signage) were zero. The public withdrew in an orderly fashion taking their own waste so that a subsequent cleaning campaign was unnecessary. The impact on tourism has been considerable, with a large increase of the number of visitors. In conclusion, a good experience in promoting the Villuercas-Ibores-Jara UNESCO Global Geopark.

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The cycling jersey awarded to participants in awareness activities.

TV commentators and cyclist leaders with the Geopark's mascot Geopaca.



Vis Archipelago UNESCO Global Geopark, Croatia

The Baby Boat Programme in the Vis Archipelago Geopark



The gajeta falkuša 'Baby boat' - preserving an essential component of the territory's maritime heritage.

Photo by J. Maravić

The Maritime heritage Association Ars Halieutica (Komiža) and UNESCO Geopark Vis Archipelago plan to collaborate in the education programme for children the „Baby Boat Programme“ developed by Ars Halieutica during last 20 years. On 6 December 2000, St. Nicholas Day, Komiža witnessed the launching of small "gajeta falkuša" built according to the design of Dr. Velimir Salamon. This boat was constructed as part of the UNESCO Programme, initiated by Mr. Thedo Fruithof from Amsterdam, the Secretary of the European Maritime Heritage Congress.

The Baby Boat Show Workshop presents experiencing the boat to various audiences, but primarily to children. Within the workshop the ancient man-boat relationship is presented through the shipwright's, the mariner's, the painter's, sculptor's, poet's, musician's views of the boat – in essence the perception of the ship as a living being. According to the «do touch» principle the experience of living with the sea is presented through stimulating all the senses of the children and other participants in the workshop. In the atmosphere of the Adriatic environment, the children are encouraged to build the "gajeta falkuša" Baby boat. The boat, reduced to a childrens' sized boat, enables the children to row and sail with Baby Boats, to build the boat from paper or wooden kits and boat models. In the Baby Boat Show Workshop children also watch the documentary and other educational

films on living with the sea etc., to listen to music and poetry in the local dialect and songs about the sea and the boat.

The workshop starts with the show «Ala falka!» performed by professional actors and musicians. To avoid the necessity of using translation the show is performed in mime. The actors gather the group of children and lead them to the scene where the history of man and his boat will be presented encouraging them to participate actively in the events.

The actor presents the similarity in shape and structure between the boat and the living creatures. The keel corresponds with the backbone, the frames with the ribs, the plating with the skin, the rudder with the will and the sails with wings.

The building of the Baby Boat begins. The Baby Boat is the authentic traditional boat reduced in size to fit the childrens' size. The children join in and build the boats under the supervision of mentors.

The children lift the completed structure and carry it to the sea where the Baby Boat is moored. The Baby Boat is assembled with an explanation of the role of the various components of the structure. Here the children are welcomed aboard the boats to experience rowing, paddling and sailing the boats that they have learned to build in the following "Navigation Workshop"

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Knitting nets - preserving a component of the maritime heritage.

Photo by M. Petrić.



Traditional fishing tools - preserving the implements used in the maritime heritage.

Photo by M. Petrić.

Hațeg Country UNESCO Global Geopark, Romania Education and networking as pillars for progress in Hațeg Country UGGp

In Hațeg Geopark the covid crisis could be described as a succession of restrictions and periods of relaxation. During restrictions, we focused mainly on developing on-line training courses, conferences and workshops. Relaxation intervals allowed us to organize field research, summer schools and public events. In both cases educational activities and networking played major roles in our strategy. Several key factors supported our approach: the educational network (Edu-Geopark), associated with the University of Bucharest programmes, partnerships with other UNESCO or aspiring geoparks, involvement of the Geopark's volunteers and Kulturweit UNESCO volunteers and the financial support of different programmes.

The main results could be summarised as follows: new Science School programme and Edu-Geopark workshops; CIVIS Open-Lab project and international course; ReCoN-nect – a H2020 national project; INTER – ASPA Summer School; Erasmus+ Geotur project, Youth exchange with Hong Kong and Origens UGGps, The Bee superhero – a land-art and education project. Some of these are presented below.

The Science School is a new programme of the Edu-Geopark Network. The programme which started in spring comprises a series of on-line presentations and debates focussed on the results of research in different geoparks on geology, dinosaurs, butterflies, history, etc. The main target groups are secondary school students and teachers from Hațeg Geopark but other schools have been invited to join.

The CIVIS Open-Lab project and course are the Geopark's initiatives in the frame of the European



The European Researchers' Night celebration in Hațeg UGGp (poster)

project is developed by a consortium of universities, research institutes, associations and three UNESCO or aspiring geoparks. All partners were involved in public awareness, community talks, and events. On September 24th and 25th the geoparks organized events in rural areas in order to celebrate the European Researchers' Night.

Geotur is an Erasmus+ project implemented by a partnership of European Geoparks and other associations. Educational support materials and a training platform have been developed in order to validate and recognise new competencies in geological tourism. For more details see: <https://geotur.gruposubbetica.com/>

The attempt to deal with the pandemic situation confronted us with many challenges. Focusing on education allowed the Geopark to progress in community involvement and to better use the existing resources, to develop new programmes and partnerships, to promote geoparks as territories of resilience and to create a base for the national geoparks network.

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Civic University formed by the alliance of eight higher education institutions across Europe. Science for Resilience: Research for local sustainable development projects is implemented in partnership with professors and students from different disciplines. The project correlates research activities with local communities' issues and opens a dialogue between academics, students, Geopark volunteers and local people. Implementing the UNESCO Geoparks Programme in Romania is the new international course offered to CIVIS students every semester.

ReCoN-nect - The Green Deal: Research communication to Communities



Idrija UNESCO Global Geopark, Slovenia The School Network of the Idrija UNESCO Global Geopark



Learning about geology in the workshop Geology in Everyday Life.

Photo by Mojca Gorjup Kavčič.

Learning in nature through one's own experience is the most effective way of learning. This is the principle adopted by the Idrija UNESCO Global Geopark which for many years has been successful in connecting all the surrounding elementary schools by organizing a thematic day of education for the Idrija Geopark School Network.

Each year, together with Idrija Geopark, one school prepares an interesting one-day programme for seventh graders – with various workshops, lectures, and presentations. Local experts are also invited to participate, which ensures a high standard for all educational activities. Students as well as teachers have an opportunity to learn about the diverse natural and cultural heritage within various areas of the Geopark, which can also serve as a good team-building exercise.

The activities of the Idrija Geopark School Network have been taking place since 2013. In 2021 – as in previous years – we prepared a wide range of

activities for all seventh-graders from the regions of Idrija and Cerklje. The programme included a workshop titled Geology in Everyday Life, which allowed students to learn about various aspects of geology. The second part of the programme is designed to broaden the knowledge of the natural and cultural heritage of the Idrija region. Students learn about the region's rich heritage by using TeachOUT, Idrija Geopark's educational app, in order to independently explore the town of Idrija. They visited the Idrija Visitor Centre and attended the Written in the Rocks interactive exhibition to learn about the region's origins and its rich geological past. They also attended exhibitions on the more than 500-year-long history of Idrija in the Idrija Municipal Museum and ventured into the underworld of the second largest mercury mine in the world.

This year, the thematic day of education was attended by over 180 students from the regions of Idrija and Cerklje. It should be noted that the programme was prepared and delivered by 13 geologist researchers from different institutions (the Department of Geology from the Faculty of Natural Sciences and Engineering of the University of Ljubljana, the Geological Survey of Slovenia, the Slovenian Museum of Natural History, and the Institute of the Republic of Slovenia for Nature Conservation) who are part of the Division for the Promotion of Geological Sciences of the Slovene Geological Association, along with teachers from all participating schools and the team of the Idrija UNESCO Global Geopark.

In recent years, the connections between the Idrija Geopark and local educational institutions built a strong foundation that will serve as a basis for future educational activities. Despite the changes brought on by progress in the field of education, our principal goal remains the same – to bring the natural and cultural heritage of the Idrija Geopark closer to people of all generations.

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Learning about the rich geological heritage at the Idrija UNESCO Global Geopark Visitor Centre.

Photo by Bojan Tavčar.



Photo by Nina Erjavec.



Vulkaneifel UNESCO Global Geopark, Germany

The new educational trail about wild bees in Vulkaneifel UGGp

Bee pollination is important both ecologically and commercially, and the decline in wild bees due to the intensification of agriculture, loss and destruction of habitats, as well as vulnerability to climate change has been increasingly problematic in recent years.

The Vulkanhof, a goat farm in Gillenfeld, together with the Nature Conservation Authority, Climate Change Management, and Vulkaneifel Nature and UNESCO Global Geopark installed a new educational trail about wild bees and the benefits of traditional sustainable farming. Four info panels provide details about the life cycle as well as methods of protecting wild bees and show how traditional farming, grazing sheep, and orchards contribute to a diverse, species-rich cultural landscape.

The poor, dry pastures on volcanic soil used for sheep grazing are, through a rich supply of pollen and nectar, an essential part of the habitat that ensures the diversity of wild bee species. Unlike honeybees, wild bees only fly a few hundred metres between their nests and their food source. Pollen- and nectar-donating areas are also important in the development of new habitats. Increasing the connectivity between more of these areas reduces the bee's problem of distances between food supply and minimises the possibility of a food shortage. Around half of all native wild bee species build their nests, more or less, in the ground. A multitude of areas are inhabited: From flat areas with little or no vegetation to steep walls and natural verges.



The wild bees educational trail.

Photo by Dr. Hendrik Albrecht.

A home for bees in cavities, medullary stems, and rotten wood

About a fifth of all native wild bees build nests in existing cavities. In nature, such cavities are often created by the feeding tunnels of other insects, e.g. beetle larvae, which bore tunnels into rotten or dead wood. Even though these natural habitats are diminishing, the distribution of wild bee species is often widespread. One possible reason for this is that the required nature of these cavities is not very specific. Artificial nesting aids such as bamboo tubes, reed stalks, or drilled hardwood are gladly accepted by mason, scissor, resin, and mask bees. Some of the corresponding species also use non-natural hollow spaces, such as holes drilled in window frames. In addition to wild bees, sphecoid wasps and other wasp species also use these cavities.

All these diverse and structurally-rich habitats can be found in the vicinity of the Vulkanhof and are still cultivated

by the farmers. The Vulkanhof Farm is acknowledged as «Lernort Bauernhof,» an extracurricular learning opportunity in farms and vineyards for students of all grades and school levels at general education schools throughout the state of Rhineland-Palatinate. This new trail is a great additional tool to foster Education for Sustainable Development.

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Comparison between different species of wild bees and the western honeybee.

Photo by Dr Hendrik Albrecht.



Wild bees collecting pollen from flowers.

Photo by Dr. Hendrik Albrecht.



Educational seminar for primary school teachers in Sitia UGGp.

Sitia UNESCO Global Geopark, Greece

A survey in Sitia's primary schools of Sitia concerning Environmental Education and the use of the Geopark as an educational tool

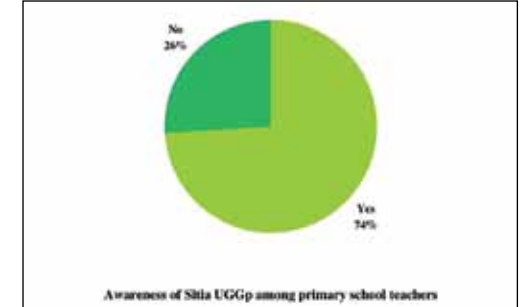


UNESCO Global Geoparks (UGGPs) are a modern approach for the protection and sustainable development of a geographical area. According to their regulatory framework UGGPs, develop and implement educational activities for all ages to spread awareness about our geological, natural, cultural, and intangible heritage. Environmental Education (EE) is a form of education that, instead of focusing on specific issues, aims to create environmentally responsible citizens who are capable and well informed to be active in responding to local or global environmental issues.

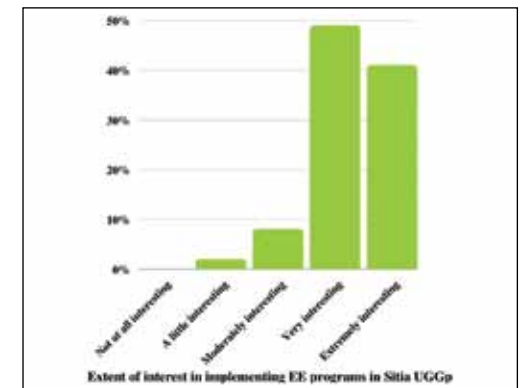
In 2018, a survey at a postgraduate level in the Hellenic Open University was conducted. It investigated the views and attitudes of teachers serving in Sitia's primary schools concerning EE and the prospects of using Sitia UGGp as a tool for education and implementing EE programmes in the framework of the UN's seventeen Sustainable Development Goals. All 13 primary schools in the province participated, and 98 (78%) teachers out of 125 answered a questionnaire for this purpose.

The main conclusion confirmed that the majority (74%) of teachers in the primary schools are aware of Sitia UGGp. The general attitude of teachers towards EE is positive, as 26% of the participants regarded it as a preferred school programme, 90% of the teachers were interested in implementing EE programmes in Sitia UGGp, and 10% stated that "Geoparks and sustainability" should be one of the most important components of EE. However, only 15% of the respondents were aware of the Geopark's educational programmes, and only 3% had implemented an EE programme related to Sitia UGGp formally through the Head of School Programmes.

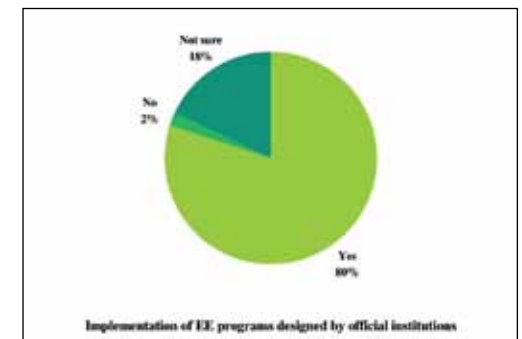
Moreover, 92% of the participants agreed that outdoor spaces, such as Geoparks, were considered positive elements for EE and 80% of the respondents were willing to implement EE programmes designed by official institutes for Sitia UGGp. Conversely, 39% of the teachers would take the initiative to design and implement an EE programme related to Sitia UGGp. Another remarkable discovery is that 96% of the sample argued that



Teacher awareness of Sitia UGGp.



The degree of interest in implementing EE programmes in Sitia UGGp.



Implementation of EE programmes designed by official institutions.

establishing an Environmental Education Centre on the boundaries of the Geopark would be crucial for further improvement of the educational provision.

Such surveys could establish the basis for the cooperation of the Geopark with the local educational community and provide a guideline for its further development and the effective planning of the implementation of EE programmes associated with multiple benefits for participating students in formal education. Geoparks can transform people into ambassadors for the environment and society.

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Luberon UNESCO Global Geopark, France

The Lub'ambule: the Luberon UNESCO Global Geopark, gets closer to its inhabitants!



The Luberon Regional Nature Park – UNESCO Global Geopark, preserves and promotes the natural and cultural richness of its territory. In order to introduce its activities to the area's residents, it recently created a new mobile stand to meet its inhabitants: the Lub'ambule. This project has been supported financially by the Region and by the elected representatives.

The Lub'ambule is a tool developed to inform residents and visitors about actions in the park. It aims to raise awareness of the value of the natural, cultural, geological and landscape heritages of the Luberon and of the need to preserve them.

Custom-built by a local company, incorporating local materials (especially Luberon ochres), the Lub'ambule is a refitted trailer that travels all year around to key events such as markets, celebrations of the environment, thematic days, etc. Since June 2021, the Lub'ambule, driven by the park's agents, participated

in about fifteen events in different municipalities in the Geopark. Several topics were presented such as: biodiversity, climate change, culture, agriculture, sustainable food, societies, education, art, etc.

Documentation, communication media and the proposed activities enable the Lub'ambule to be a real asset. It creates and maintains a bond with the park's inhabitants as key players in the preservation and valorization of their territory.

The Lub'ambule is also a meeting place. Discussions about specific topics concerning the Luberon Geopark territory such as climate change, biodiversity, geology, local food, geotourism and culture, enable the population to better understand their land and to be aware about the Luberon's main challenges. It's also a place to talk about the renewal of the Luberon Park's Charter, the territory's strategic project for the period 2024-2039

These discussions can lead to individual and collective initiatives about sustainable development. The residents can then participate actively in the current and future development of their territory. The Lub'ambule is a space for dialogue and interaction where everyone is free to share their values, cultures and traditions.

As the Luberon faces climate change it is essential that the park works collectively to maintain the quality of life and the richness of the Luberon's heritages. The Lub'ambule is a symbolic tool, representing the Luberon Regional Nature Park and the UNESCO Global Geopark Network's values. Thus, the park aims to be more visible with a presence at the territory's main events in order to answer questions from citizens.

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Discussion with residents in front of the Lub'ambule.



Grevena-Kozani UNESCO Global Geopark, Greece

A Billion Years of Geoheritage within the Geopark Grevena-Kozani



The Earth's Mantle (Jurassic oceanic lithosphere) meeting the heavens of Valia Kalda. The unique geochemistry of the basement peridotite creates globally-rare ultramafic soils that host an exceptional endemic ecology.

The Palaeontological I Museum contains an evolutionary series of mammoths, mastodons, and early elephants dating from the Pliocene to Recent times. The tusks shown are the longest (5.06m) ever excavated in the world.

Grevena-Kozani is a Geopark of with a billion years of geodiversity. It is:

- The site of crucial observations which altered the paradigm of geologic thought and spurred the development of plate-tectonic theory
- A geoheritage park within a historic region
- An environment shaped by tectonics, by eons of time, and by its inhabitants.

The Geopark straddles the 40th parallel between meridian east 21° - 22°. The territory has an area of 2,486 km² and hosts a population of 30,696 with 60% of the residents living in traditional villages.

As the topographic elevation within our Geopark ranges from ~380m to ~2400 m, the altitudinal vegetation zones ascend from Mediterranean, to *Fagetalia* forests, to subalpine and high Alpine zones. The ancient wilderness areas of Grevena-Kozani co-exist with our modern era. The thick forests and steep mountain streams are home to the largest numbers of bears in southern Europe. The geological diversity ranges from ultramafic-rich to ultra-acidic terrains. The diversity of soils derived from these rock types, some of which include toxic elements, supports an agricultural heritage thousands of years in age that has survived to the present day.

The geological base map includes the oldest rocks together with some of the youngest rock formations in Greece. A Precambrian fragment of the Amazonian Craton is preserved from the time when ancient plates merged to form the supercontinent of Pangaea. The rifting and the breakup of Pangaea, associated with contemporaneous acidic and mafic intrusions, marked the birth of the European and African continents. Sediments that filled the rifted basin are among the earliest of the Tethyan seaway. The basement rocks of the Tethys Ocean are represented by the ophiolitic rocks of



the Vourinos and Pindos Mountain ranges. The Vourinos Ophiolite preserves a complete sequence of Tethyan Oceanic lithosphere. Localities where the relationship between ophiolites and their birth at mid ocean ridges was recognized are included in the Geopark's geosites. The Geopark includes a critical belt displaying the "collision" of the Tethyan oceanic lithosphere with the European continental crust.

The subsurface movements of the colliding European and African tectonic plates shaped the geomorphology of today's Geopark, creating the Pindos Mountains. During the ice ages, glaciers scoured the mountain peaks and peri-glacial melting created five "cataclysmic" canyons. Today our water flows in rivers that date from the Pliocene lined by remnants of Pleistocene forests.

The Geopark's most-famous fossils include elephants ranging in age from Pliocene to recent times. Mammoths with the longest recognized tusks (5.02m) are preserved in our paleontological museum. Palaeolithic and Neolithic stone tools record the presence of the early human inhabitants who co-existed with the elephants. Habitation sites from Hellenistic to Roman times are dispersed across the landscape. Alexander the Great travelled the ancient road between the Macedonian capital and the Epirote Dodoni. In the age of Byzantium, monasteries were constructed on the crests of ancient tectonic plate boundaries of Grevena-Kozani.

This Geopark is coordinated by the governor of West Macedonia and managed by the Regional Development Agency of West Macedonia. Its stakeholders include townships, agricultural unions and mining concerns. Geowonders Greece is a cooperative union working with the Geopark's sponsors to coordinate activities, tourism products and educational and media events, and is active in involving the Geopark in the EGN GEOFood and Mining Group projects.

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Portitsa Gorge. A "cataclysmic" canyon spanned by a stone bridge dating to ~1730 CE. The host rock is a Cretaceous rudist reef limestone.

Thuringia Inselsberg – Drei Gleichen UNESCO Global Geopark, Germany

Pangaea – On the trail of the supercontinent in the middle of Thuringia



The Aschenbergstein at GeoRoute 8: the best view from Bad Tabarz to the Grosser Inselsberg mountain (916.5 m above sea level) - the highest peak in the Geopark.

Photo by Stephan Brauner.

The UNESCO Global Geopark Thuringia Inselsberg - Drei Gleichen includes parts of two different landscape areas in the Thuringian Forest and the Thuringian Basin. The name of the Geopark refers to its highest elevation, the Grosser Inselsberg, 916.5 m above sea level, and a trio of medieval castles in the Thuringian Basin, which are also called «Drei Gleichen».

The Geopark has 72,000 inhabitants, an area of 725 km² and is located in the middle of Thuringia and Germany. It contains a small part of the former supercontinent Pangaea. A great variety of rocks and fossils can be found both in the low mountains of the Thuringian Forest (Inselsberg region) and in the relatively flat, in parts hilly, landscape in the Drei Gleichen area. As a result, from the formation of Pangaea in the Carboniferous Era to its disintegration in the Jurassic Era 100 million years of Earth's history can be easily discovered. This is why the Geopark logo features the outline of the supercontinent and the motto of the Geopark called "Pangaea – On the trail of the supercontinent in the middle of Thuringia".

The Geopark is organized as a Municipal Working Group (Kommunale Arbeitsgemeinschaft, KAG), which in Germany represents a specific, legal form of cooperation between municipalities. The top-level decision making body of the Geopark is the Municipal Working Group itself, which is composed of the mayors from all member municipalities. The KAG has, since its foundation, entrusted the management tasks to the e.t.a. Sachverständigenbüro Reyer through a service contract.

The development of the Geopark began in 2002 and we will be celebrating its 20th anniversary in 2022.



Photo by Peter Rohde.

Along the Saurian Discovery Trail (GeoRoute 6): life-sized model of the Thuringian dinosaur *Liliensternus liliensterni* near the globally unique tetrapod fossil site Bromacker between Georgenthal and Tambach Dietharz.

One of its highlights is the ancient tetrapod fossil site Bromacker between Georgenthal and Tambach-Dietharz. This site, with fossils of early terrestrial vertebrates (tetrapods) from the Lower Permian Epoch about 290 million years ago, is an internationally important geosite. The trace fossils together with the body fossils of these so-called primeval saurians are uniquely preserved at this site. On the Saurian Discovery Trail, one of the Geopark's 17 GeoRoutes, you can get up close to the saurians.

The Badlands in the Thuringian Castle Country Drei Gleichen can be explored via various GeoRoutes. The three castle hills of Wachsenburg, Burg Gleichen and Mühlburg are built from the colourful approximately 220 million-year-old Upper Triassic rocks. Red and green-grey clay and marl rocks occur on the southern slopes that are almost devoid of vegetation, and define the landscape below the castles.

In six tourist caves and tourist mines of the Geopark, visitors get an insight into the fascinating 1,000 years mining history of the Thuringian Forest and the management of the finite natural resources of the region.

The Geopark has an enormous biodiversity: Almost the entire area of the Geopark is protected as a landscape conservation area and there are also many nature reserves, which provide a home for numerous endangered species.

The cultural heritage is of great importance. It ranges from many archaeological sites, numerous medieval buildings to famous personalities associated with the territory. Johann Wolfgang von Goethe, who visited numerous surface and underground mines in the Geopark as a Councilor of Mines, and Johann Sebastian Bach are world-famous. The latter worked temporarily in Ohrdruf and the cradle of the musician's family lies in Wechmar.

Keeping to its motto of Pangaea as an all-embracing continent the Geopark would like to contribute with its activities to the strengthening of the global community and to the dismantling of borders between the peoples of the world.

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National Geosite Badlands: Colourful Upper Triassic rocks below the medieval Castle Gleichen with a view towards the Wachsenburg castle.

Photo by Stephan Brauner.



1. The Bovbjerg Profile is of high international geological value showing a cross sections through an entire series of glacial landscapes from depressions to terminal moraines, outwash plains and island hills. On top of the cliff you find Bovbjerg Lighthouse - a very popular place to visit for more than 60,000 guests annually. It is being run by only three staff and an impressive 150 volunteers.

© Chibal Film/
Geopark Vestjylland

2. The Oddesund Tower is a Geopark Visitor Centre with an exhibition of the geology, cultural history, biology of the Geosite Oddesund also holds exhibitions of contemporary art. The site also provides visitors with information about UNESCO Global Geoparks and the Vestjylland Geopark. Information is found both in the tower and neighbouring World War II bunkers.

© Henrik Vinther
Krogh / Geopark
Vestjylland

Vestjylland UNESCO Global Geopark, Denmark

An Ice Age Landscape Created by Ice, water, wind and Man

Vestjylland Geopark with an area of 4,759 km² and a population in 2021 of 99,077 includes the Lemvig, Struer and Holstebro municipalities, the region of Central Denmark and parts of the North Sea and Limfjord.

The fascinating landscape in Geopark West Jutland shaped by ice, wind, water and man laid the foundation for human existence over the past 9,000 years. Here you can experience a combination of geology, cultural heritage and nature. Whether you are hiking, biking, horseback riding or at sea or you are looking for exciting food experiences with local foods, the Geopark has something to offer.

Geology

Enormous ice sheets have sculpted the impressive ice age landscapes that form the core of Geopark West Jutland. These landscapes mark the final period when the Earth was in a deep freeze and when the Scandinavian Ice Sheet extended from the mountains of Norway reaching its maximum extent 21–23,000 years ago at the Main Stationary Line – the terminal moraine that forms the backbone of the Geopark's landscape. In addition, the Geopark has limestone layers that are millions of years old and other landforms formed by rivers, coastal processes and the powerful westerly winds after the end of the ice age.

Cultural history

The development of the landscape has greatly influenced the way people have settled and made a living in the area through time. The many barrows and remnants of the Ancient Road show how conditions here were favourable for growing crops and for trade between the West Coast and the interior parts of the country. Later, meadows along the fiords and rivers became important for raising and exporting steers. The West Coast and the Limfjord are rich in stories of shipwrecks along the "Iron Coast", fishing, ferry services, the growth of market towns and the struggle to protect life and property from coastal erosion and drifting sand.



1



2



Location of the Vestjylland UGGP.

Natural values

The natural heritage of the Geopark includes beaches, dunes and bays along the North Sea and in the Limfjord. It is here where you also find the largest heathland plantation in Denmark – Klosterheden. This is where beavers were reintroduced to Denmark in 1999. The Geopark also has 13 international nature protection areas and 5 nature- and wildlife reserves together with the Nature Park Nissum Fjord, where you can experience huge flocks of migratory birds during spring and autumn. Storåen is among the best fishing waters in the country. A network of paths, trails and special sites provide access to great experiences.

Development activities

Geopark Vestjylland is working in close collaboration with local community organizations, municipalities, government institutions and commercial partners to develop new visitor sites and recreational geotrails, attractions and guided tours following the criteria for geotourism. This involves creating digital Geopark corners, information panels, printed maps and folders as well as a comprehensive Geopark app. School materials and educational programmes are also a key focal activities which are being developed in cooperation with local schools and a teacher's training institution.

Management structure

The Geopark is registered as a self-governing institution with a Board of Trustees, an Advisory Scientific Committee, a partnership and a volunteer programme – all supported by a secretariat with two permanent staff members.

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Photo by Mikkel Jezequel, Alopex Media.
© Geopark Vestjylland/Alopex Media.

3. The Husby-Klitplantage Premium Hiking Route. A 15 km long hiking route through the spectacular landscape on the West Coast with vegetated dunes and heather has been certified as a Premium Hiking Trail by the German Hiking Institute.

Saimaa UNESCO Global Geopark, Finland

Discover the hidden treasures of Lake Saimaa!



Saimaa UGGp is located in Southeastern Finland. The Geopark has a surface area of 6,063 km² and a population of 180,647 in the towns and municipalities. In 2017 156,215 people lived permanently inside the Geopark.

Saimaa's rocks originated in an ancient seabed around 1.9 billion years ago when the marine sediments were folded and metamorphosed creating gneisses during a phase of mountain-building. The youngest part of the bedrock, the rapakivi granites, crystallized around 1.65 billion years ago. The Vyborg Massif, which extends to the southern shores of Saimaa, is considered worldwide as the type area for rapakivi granite.

Nowadays the mountain ranges have been eroded and the base of the mountains can be seen as a mosaic landscape shaped by the continental ice sheet during the Weichselian Ice Age. The First and Second Salpausselkä ice-marginal formations deposited around 12,300 -11,600 years ago are some of the glacier's most visible features. During the period following the last ice age, the development of lake Saimaa has been affected by southeastern tilting of the land due to asymmetrical uplift. This has shaped Saimaa's shoreline, outlet channels and direction of water flow, which can be seen, for example, as ancient shorelines at various elevations.

Over the many phases of its history, the Saimaa area has developed a particular natural environment. Saimaa inherited some endangered species that became isolated in the area after the ice age, such as the Saimaa ringed seal. The Saimaa Seal Archipelago has applied for recognition as a UNESCO World Heritage Site. If this is successful, it will increase the region's visibility and provide opportunities for cooperation internationally and



Kolmiköytinen rock painting - whispers from the prehistoric past.
Photo by Arto Hämäläinen.

nationally.

The lakes and eskers in the Saimaa UGGp have been used as travel routes since ancient times. Stone-Age people left their mark on the area in the form of paintings on Saimaa's rocky scarps. Fine soils which are good for growing crops have accumulated in the valleys to the southeast of the First Salpausselkä. The hilly drumlin terrain in the north of the Saimaa Geopark area has also been used for farming. Many of the area's churches and graveyards are built

on eskers and deltas. Geology provides a strong cultural foundation in the Saimaa Geopark area.

Saimaa UGGp has sites that are part of the Natura 2000 and are included in national conservation programmes. The area also contains some private nature reserves and nature conservation areas established by government decree. Natural monuments and geologically important areas and sites are also protected. Finland has extensive so-called "every man's right" that allows hiking, berry picking, and other activities in the natural environment.

The Saimaa Geopark Association Board consists of members from municipalities, regional councils, and entrepreneur associations. The Geopark staff coordinate the entire Saimaa Geopark, produce necessary material, apply for project funding, and act as a link between the area and international activities. The association's budget consists of membership fees paid by the member municipalities. Entrepreneurs can apply to the association for the right to use the Saimaa Geopark Partner logo. Saimaa UGGp already has 97 partner members.

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Saimaa is a lake with thousands of islands.
Photo by HeidiKristiinaVisuals.

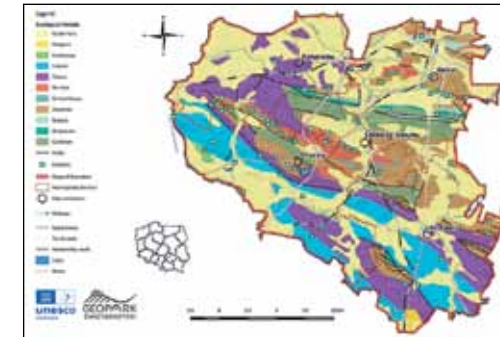


View from the Lietvesi road, one of the scenic sites of Saimaa Geopark.

Photo by Timo Hämäläinen.

The Holy Cross Mountains UNESCO Global Geopark, Poland

Geotourism - a journey through the history of the Earth and Man



Geological map of the Holy Cross Mountain UGGp.

The Świętokrzyski (Holy Cross Mts.) UGGp, located in the southeast of Poland, in the western part of the Świętokrzyskie (Holy Cross) Mountains, is characterized by exceptional natural and cultural features. The geological history of the area – the lowest and at the same time the most remarkable region in Poland, is responsible for the morphology, climate, biodiversity and the development of settlements and the economy of this region. The area became a member of the UNESCO Global Geoparks on 21 April 2021.

The Geopark, with an area of 526 km² and a population of 252,744 inhabitants contains five communities: Kielce, Chęciny, Morawica, Nowiny, and Piekoszów. Its borders coincide with the administrative boundaries of these units of local government.

Geologically, the Holy Cross Mountains, including the Geopark, are situated within the Trans-European Suture Zone (TESZ), the most prominent geological structure in Central Europe. The Świętokrzyskie Mountains region is the only segment within the TESZ where sedimentary rocks from all geological periods from Cambrian to the Quaternary are exposed. Therefore, scientific studies in this region are of fundamental significance for the understanding and reconstruction of the geological history of the European continent. The most important geomorphological characteristics of the Geopark area are a product of the area's structural geology. The lithological diversity is reflected in the surface topography. It also has a significant influence on the nature of the surface water and groundwater, the soils, the natural vegetation and man's use of the land.



Kowala geosite - outcrops of Devonian, Carboniferous and Permian deposits in an active quarry.

The documented history of man's presence in the Geopark area dates back about 60,000 years to an epoch called the Pleistocene. Remains of Neanderthal camps are described from the most beautiful cave in Poland - Paradise Cave, located in the central part of the Geopark. Further events in human activity are recorded in more than 200 archaeological sites dating back to the Stone Age, sacred and secular architecture as well as numerous remains of copper and iron mining dating back to the Middle Ages.

The Holy Cross Mts. UGGp is managed by an association of communes. Local government representatives elect the Geopark management board. The Association of Municipalities Geopark Świętokrzyski cooperates with many bodies and organizations from the scientific community, local government, tourism, education, and business sectors. Local partnership is implemented by fulfilling projects related to the protection and conservation of valuable geological, natural, and cultural sites, as well as geotourism, and education. Examples of activities include cooperation with local tour operators and hotels to promote the Geopark's provision for tourists. Educational projects, an important component of the Geopark's activity, are implemented in cooperation with local schools and non-governmental organizations. The Geoeducation Centre in Kielce functions as the main educational and information centre in the Geopark. Here guided tours, geological workshops, and popular science shows for children, adolescents, and adults are organized

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The Geoeducation Centre at Wietrzna Nature Reserve in Kielce.



Educational activity in the Geoeducation Centre in Kielce.

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