Geoparks & Oceans
Insular & Coastal UNESCO Global Geoparks

Geoparks

Source: UNESCO Chair on Geoparks and the sustainable development of insular and coastal areas, University of the Aegean

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Coastal Geoparks

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Source: UNESCO Chair on Geoparks and the sustainable development of insular and coastal areas, University of the Aegean

Insular & Coastal UNESCO Global Geoparks

United Nations Decade of Ocean Science for Sustainable Development

The Global Geoparks Network, in collaboration with UNESCO, celebrates the World Oceans Day and encourages all UNESCO Global Geoparks management bodies, partners and stakeholders to join the campaign to raise awareness of the challenges the oceans are facing and inspire actions to protect them and their biodiversity and to use marine and water resources sustainably.

The oceans cover over 70% of the Earth’s surface and have been associated with human development since ancient times. Today marine life and biodiversity in the oceans are threatened by many human activities like overfishing, pollution, and plastic waste which ends up disturbing the ecosystem, the measures that they need to take for dealing with pollution and how to achieve a balance between human activities and sustainability. Geoparks raise awareness of the challenges the oceans are facing and inspire actions to protect them and their biodiversity and to use marine and water resources sustainably.

The marine environment is one of the important parts of some UNESCO Global Geoparks. More than 30% of UNESCO Global Geoparks have a maritime component and many of them, despite being located in continental areas, are the guardians of the evolution of former oceans. Activities in Geoparks contribute significantly to SDG 14 (Life Below Water) and to other SDGs, such as SDG 12 (Responsible Consumption and Production), SDG 6 (Clean Water and sanitation) and SDG 13 (Climate Action). The marine environment is fully included in the UNESCO Global Geoparks guidelines for the sustainable use of Earth’s natural resources.

Geoparks are working towards achieving clean oceans and protecting their biodiversity and geodiversity. They are concerned about how they can interact with the oceans without disturbing the ecosystem, the measures that they need to take for dealing with pollution and how to achieve a balance between human activities and sustainability. Geoparks maintain and promote traditional activities like fishing and implement various good practices which are in line with the United Nations Decade of Ocean Science for Sustainable Development. In collaboration with UNESCO, the Global Geoparks Network presents some of the good examples of activities and good practices in the following video:

https://globalgeoparksnetwork.org/wp-content/uploads/2022/05/WorldOceansDay4.mp4

We invite you to explore some coastal, insular and continental UNESCO Global Geoparks and their activities which are connected with the Oceans. We also invite you to join forces, to organize activities, to raise awareness of positive initiatives through networking, to build bridges and, find solutions that give hope to younger generations.
Aso UGGp, Japan - Asia
How Volcaniclastic Deposits Are Transported to the Sea

Tateno Gorge. The ocean is a place where various materials are deposited and strata are created. One of the materials that form the strata and continue to mark the history of the earth is the production of “volcaniclastics”, fragments of volcanic rocks produced by volcanoes.

Let’s take a look at Aso UNESCO Global Geopark (UGGP) as an example of how volcaniclastic deposits are transported to the sea. Aso UGGp is characterized by its location in a huge caldera, located in the centre of Kyushu Island in Japan. Caldera, large volcanic craters produced by major volcanic eruptions, sometimes form lakes such as the Toya-Usu UGGp and Lake Toya-Usu UGGp. In Aso, however, the lake disappeared when the caldera wall broke creating a gorge due to fault movement. The River Shirakawa flows through the “Tateno Gorge” into the Ariake Sea. Therefore, environmental changes in the Ariake Sea are largely determined by the condition of the Shirakawa river and the rate of the sediment production.

The Ariake Sea is characterized by huge tidal flats and a rich ecosystem which includes the “Mudskipper (Boleophthalmus pectinirstris)”. In recent years, however, it has been pointed out that the sand supply has been decreasing and the surface layer has become muddy. Yokose et al. (2015) studied environmental changes in the Ariake Sea over the past 100 years based on sediments, and found that the muddiness of the seafloor surface observed in the Ariake Sea can be interpreted as the result of a change in the sediment supply from rivers. It is clear from this case that even if we are located inland, we cannot be divorced from preserving the oceans.

Aso UGGp has been actively addressing this issue by participating in the exhibition of the 4th Asia-Pacific Water Summit held in Kumamoto City on April 23-24, 2022, making presentations to the Prime Minister of Tuvalu and the Mayor of Kumamoto about the water cycle produced by Aso, and holding discussions with students from the Youth Water Forum Kyushu. What has been particularly well received is our perspective on global issues and our awareness of the geological time scale. We will continue to leverage this strength and our network to address ocean issues.

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Aso Caldera.
Azores UGGp, Portugal - Europe

Nine islands – One Geopark in the centre of the Atlantic Ocean

In the middle of the Atlantic Ocean, the Azores is an archipelago composed of nine islands and several islets, all of volcanic origin. Nine islands – One Geopark is the motto of our UNESCO Global Geopark, involving a network of 121 geosites spread over the islands and the surrounding sea floor. These geosites have conservation strategies protecting the geodiversity which tells the story of the birth of our islands. The natural and cultural aspects associated with the archipelago are enriched by submarine areas of high relevance for scientific, educational and geotourism purposes. Of the 121 geosites, the four submarine areas include the internationally significant Mid-Atlantic Ridge and associated hydrothermal fields. In addition to this unique submarine geological heritage, the significant geostrategic role of the Azores as a centre for the sailing and shipping traffic between the 15th and the 17th centuries is an important component of the cultural heritage. This heritage is protected by five Archaeological Submarine Parks that protect shipwrecks from different eras and origins. These important educational and scientific tools provide tourists with opportunities for diving. The many geotouristic activities that connect the Azores to the surrounding ocean include whale-watching, swimming with sharks and giant manta rays (ijamantas) and volcanic bathing areas. The geomorphological interpretation of the coast can be accessed through many of our partners. Besides promoting these sites, it is important that we consider the preservation of the marine environment and conservation of its biodiversity. The geosite Fajã Lávica da Vila do Corvo, a lava delta located in the Biosphere Reserve of Corvo Island, the smallest island in the archipelago is a good example of marine conservation. The frontal area of this lava delta is characterized by the occurrence of several coastal lava flows. These are clearly visible underwater and constitute the famous “Ca- neiros” do Corvo. Caneiros dos Meros (Dusky grouper, Epinephelus marginatus), the only voluntary reserve in the Azores was created through the joint efforts of fishermen, divers and other contributors, who in protecting this unique environment, created an opportunity for scientific research and geotourism in the presence of gigantic groupers. Many activities promoted by Azores Geopark and its partners are concerned with coastal cleaning and interpreting the unique biodiversity associated with the coastal habitat. The Atlantic Ocean is the Azorean’s backyard, an endangered backyard loaded with a natural and cultural richness that Azores Geopark is committed to protect.

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Basque Coast UGGp, Spain - Europe

More than 100 volunteers participated in litter picking organized by the Basque Coast UNESCO Global Geopark

1,500 kilos of waste were collected and a total of 32 big boxes were filled

Within the framework of the European Geoparks Week, the Basque Coast Geopark organized a litter picking event along the cliffs of the Deba-Zumaia Biotope, in the Basque Country.

To do this, volunteers from all over the territory came to Geoparkea. Groups of volunteers who participated in this event approached the cliffs from the East and from the West and filled a total of 32 large bags that were later removed by helicopter. In total, 1,500 kilos of waste were removed in ninety minutes.

The objective of this activity was to raise awareness about the environmental value of the area and to achieve the active involvement of the public through volunteering. For this reason, the Basque Coast Geopark invited citizens to participate actively in the cleanup. The main goal is to make people aware of the need to care for our natural heritage.

This was not the only activity in the Basque Coast Geopark aimed at raising creating people’s awareness in the natural environment. In addition, the Geopark organized a discussion at Itzurun Beach, in Zumaia, to emphasize the problem of coastal litter carried by the waves and tides. Organizations that work in waste management participated in this colloquium. Taking into account the positive response to the cleanup, the objective of the talk was to highlight the problem of waste in the marine environment.

There was also time to propose solutions, among other issues. The activities carried out were discussed and the current legislation was analyzed. Each guest speaker explained what is being developed in their field of action and its effectiveness was debated.

The problem is complex and requires a collective response. We must continue to work to preserve our natural, geological and cultural heritage and that is the commitment of the Basque Coast Geopark.

Leire Barriuso - geogarapen@geogarapen.com
Coastal erosion rates within the Cliffs of Fundy Geopark are among the highest in Atlantic Canada. In Five Islands Provincial Park, 10 metres of red sandstones and mudstones, which underlie the campground and some trails, slid away over two weeks in April 2021. Average coastal erosion rates in many parts of Minas Basin are greater than 0.5 metres/year, threatening Highway 2 and other coastal roads. The tidal currents created by the high tides funnel driftwood from coastal erosion, ocean debris and garbage into coves and harbours and onto beaches. In accordance with this year’s theme for World Oceans Day, Revitalization. Collective Action for the Oceans, the Cliffs of Fundy Geopark is partnering with the Advocate Harbour school to clean up waste that has accumulated along the beach in Cape Chignecto Provincial Park. The types and quantities of garbage collected will be tallied and submitted to the Great Canadian Shoreline Cleanup, a citizen science initiative to document the ocean waste that accumulates on Canadian shores. This is just one small piece of a larger effort to realize the goal of revitalization for our World’s oceans, and the Cliffs of Fundy UNESCO Global Geopark is pleased to be part of this process.

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The nature of coastal environments.
Evidence for sea-level change at Sgwd Clun Gwyn geosite.

Fossil soil with in situ Stigmaria roots is overlain by a thin carbonaceous mudstone, an upward coarsening sandstone and a mudstone. The sequence is interpreted as the product of a marine transgression and the creation of a transgressive sand body in which a rise in sea level and the flooding of the soil surface was followed by the shoreline setting of the shoreline sands and the deposition of the overlying offshore marine muds. At the Sgwd Cluvaid geosite the Twelve Foot Sandstone sequence is interpreted as the product of marine regression and the creation of a regressive sand body which formed in response to a fall in sea level. The regressive surface produced by erosional scour is overlain by upward coarsening and upward shoaling shoreface and barrier sands terminating with a back barrier soil horizon with Stigmaria logs. A quartz pebble sand with braochipod fragments defines a flooding event when, due to sea level rise, high energy surf and breaker zones scoured and eroded the low energy back barrier soil deposits. The scouring event was followed by the deposition of offshore deeper water marine muds.

The author is indebted to visits to both geosites with Dr. Gareth George and to the account of the Headwaters of the River Neath in his book on The Geology of South Wales: A Field Guide published in 2008.

Dr. Tony Ramsay - tonhel@btinternet.com

In Fforest Fawr UNESCO Global Geopark the Carboniferous Namurian Stage (Marron Group) sequence comprises a succession of interbedded sandstones, pebbly sandstones and mudstones. These accumulated as sediments on coastal plains, shallow shelf sea lagoons and bays which fringed the southern margin of a landmass, the Wales-Brabant Massif, between approximately 326 and 313 million years ago. Sand (sandstone) was deposited close to the shore and on coastal plains. Mudstones (mudstone) were deposited in restricted lagoons and more open sea conditions to the south.

During Namurian times the area of the Geopark lay close to the equator in what is currently most of northern Europe. Then warm shallow seas were fringed by dense swampy, tropical forests. However, at this time much of the southern Gondwana Supercontinent was subjected to glaciation. In the Geopark the waxing and waning of the southern hemisphere ice sheet during interglacial and glacial intervals is reflected in the Namurian sequence by the migration of shoreline deposits in response to changes in sea level. At the Sgwd Clun Gwyn geosite a hummocky
Itoigawa UGGp, Japan - Asia
Reconnecting with Our Sea for the Future
Sea Appreciation Project 2022

Suited along the Sea of Japan, Itoigawa UNESCO Global Geopark tells the story of this sea’s formation and expansion, beginning roughly 20 million years ago. Since prehistoric times, the sea has played a central role in Itoigawa’s economic and cultural development.

To join the celebration of the United Nations Decade of Ocean Science (Ocean Decade), as well as the Sea to Summit Race to be held in Itoigawa and the Joetsu Region this July organized by outdoor goods manufacturers Mont-bell, Itoigawa UNESCO Global Geopark is planning the following events and activities as part of the Sea Appreciation Project 2022. This aims to help reconnect local people with the sea and better understand the issues faced by our world’s seas and oceans.

**Planned Projects**

1. **Sea Art Exhibition with Marine Friends Project**
   Itoigawa Geopark will collaborate with the Marine Friends Project, a local organization raising awareness about ocean conservation issues, to hold an exhibition of artwork made by a local artist with marine litter collected from local beaches. The exhibition will be held at Fossa Magna Museum from July 1st until August 31st.

2. **Marine Litter Art Workshop**
   Workshops will be held to teach local residents how to make artwork using the marine litter which washes up along the shores of Itoigawa Geopark. These workshops will be held at a local elementary school and also as part of the Sea Art Exhibition.

3. **GeoKayaking at Benten-Iwa Rock**
   Itoigawa Geopark is cooperating with a local marine sports organization to hold sea kayaking events at Benten-Iwa Rock, one of the Geopark’s most popular sites. These events will combine marine sports with geoheritage interpretation.

4. **Zero Marine Litter Event**
   Events are planned at beaches throughout the Geopark to remove marine litter and use the beaches for beach yoga and other activities. Through these activities, participants will learn about the value of keeping our oceans and beaches clean.

5. **Marine Seminar**
   A series of four public lectures will be held to raise awareness of issues related to our seas and oceans.

Through these events and more, we hope to reinvigorate our community’s connection with the sea and reinforce our shared commitment to protecting our oceans and beaches.

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Izu Peninsula UGGp, Japan - Asia
Take the SDGs train, save the ocean: A running gallery for connecting partners

This statement shows that the terrestrial and marine environments are interlinked. The Izu Peninsula Geopark and Tourism Bureau launched the Sustainable Development Goals (SDGs) Train Project to showcase this linkage to the public, especially the region’s teenagers.

In Izu Peninsula, many parties including the local governments, NGOs, a farmers’ association, diving and kayaking guides, and even a supermarket are undertaking various initiatives to achieve the SDGs. For instance, the citizens of a town located in the upstream area of the Geopark regularly organize educational, training, and river clean-up activities to raise awareness in children of SDG 6 (Clean Water). A farmers’ association, located midstream, is diligently working to reduce the use of pesticides and chemical fertilizers and the production of plastic rubbish. In estuaries, diving instructors by removing submerged foreign objects to revitalize corals and seaweed beds contribute to SDG 14 (Life under Water). Despite their significant efforts, unfortunately, these groups are yet to have opportunities to meet and get to know each other. No tangible partnership has emerged, despite some individuals being aware of the importance of ecological connectivity between regions. The Geopark Bureau’s Project is an attempt to initiate their collaboration through a series of roundtables. In this project, a symbolic train crosses the peninsula. We introduce the programmes of each group using three to five posters hung on the side of the train. Each suit of posters contains key phrases that link a specific programme with another programme. The poster sequence is meticulously designed to create a coherent learning context for the passengers: the ecological linkage between the innermost peninsular areas and its touristic beaches, the importance of a concerted effort to mitigate negative impacts on the marine environment, and the need for systemic thinking.

The mobile museum that physically connects the northern and southern parts of the peninsula, embodies the core tenet of the SDGs, namely, partnership.

Using a train to showcase SDGs has another significance. Although the Izu Peninsula is highly motorised, the passengers on local trains are mainly teenagers who do not possess driving licences. Therefore, this mobile exhibition provides a golden opportunity for the council to deliver its message to the local youth. It is our invitation to get on the bandwagon to jointly tackle marine environmental issues.

Effective marine environment protection requires holistic measures and collaboration among citizens. We will continue to serve as a focal point to spearhead efforts that prioritise marine safety in this region.

Izu Peninsula UNESCO Global Geopark
Tsuji Suyuki - info@uozupenorg

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Local geoguides regularly clean up the beaches.

“A poster showing the deterioration of the marine environment hung on the side of the train.”

“The statement shows that the terrestrial and marine environments are interlinked.”

“Through these events and more, we hope to reinvigorate our community’s connection with the sea.”

“Itoigawa UNESCO Global Geopark tells the story of this sea’s formation and expansion.”

“Through these events and more, we hope to reinvigorate our community’s connection with the sea.”

**A running gallery for connecting partners**

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**Izu Peninsula UGGp, Japan - Asia**

**Take the SDGs train, save the ocean:**

- A running gallery for connecting partners
- Local geoguides regularly clean up the beaches.
Monitoring Underwater Geological Heritage

On the occasion of the preparation of the Application to become a Geopark, the first inventory of geosites was drawn up thanks to an agreement between the Geopark and the Spanish Geological Survey. This inventory of geological heritage determined the location of 80 geosites within the Geopark. Thirteen which are located under the waters of the Atlantic Ocean include dikes, caves, lava deltas, submerged volcanic cones, mushroom-shaped structures, lava tunnels or sandy bottoms contribute to the Geopark’s geodiversity which can be explored by snorkeling and scuba diving.

Following the completion of the inventory, the Geopark has monitored the state of conservation of the 67 terrestrial geosites, on an annual basis. Thanks to this procedure, problems were detected concerning the state of conservation of these geosites which were related to human activity and also to natural processes such as coastal erosion etc. Subsequently action could be taken to try to resolve these conservation problems.

Unfortunately, the beautiful seabed contains a large amount of garbage. The work of an underwater photographer is very important in monitoring tasks.

In 2022 when some of these sites were visited. However, auditing of all the marine geosites was concluded in 2022. The team that carried out these tasks included several divers who recorded the data in a template and documented issues such as the presence of garbage, the maintenance of the integrity of the geosite, conservation status of the fauna, anthropic threats, natural threats, proposed corrective measures involving access control, cleaning, surveillance, etc. This working group also involved a photographer who took quality photographs that will be used in creating a travelling exhibition of the “Underwater treasures of the Geopark”.

By way of conclusion, we dare to say that this underwater geosite monitoring initiative can be considered as an example of good practice in protecting the geodiversity and biodiversity of the ocean, since it enables the early detection of problems, the search for solutions and the execution of actions that can correct these conservation problems.

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The geological history, ancient history and the present of Lesvos Island UNESCO Global Geopark are totally connected with the marine environment. Lesvos is located in the North-eastern Aegean Sea and it is one of the biggest islands in the Mediterranean Sea. The sea and nature have been an eternal inspiration to its inhabitants, who have created art and culture and are, in using maritime resources, focusing on sustainable development in harmony with the marine and coastal ecosystem.

In western Lesvos the Lesvos Petrified Forest, which is designated as a protected «Natural Monument», is one of the finest and the most beautiful monuments of our geological heritage worldwide. Its creation was the product of intense volcanic activity during the Early Miocene which covered and fossilized trees in their natural growth positions and preserved the remains of a subtropical ecosystem.

The Museum has also created the Nissiopi Marine Petrified Forest Park, the first fossil marine park in Greece where visitors can enjoy guided tours in a glass bottomed boat. They can tour the sea area around the Nissiopi islet, learn about the important fossil sites, view the benthic fauna in the seagrass meadows and spectacular volcanic, tectonic and coastal geosites of the Marine Park. The Museum also provides educational programmes for school and university students. Various guided tours and activities are also designed to raise awareness about the importance of the fossils, the need to protect them but also the current effects of global climate change. These activities aim to motivate and inspire local people and visitors, especially children and young people.

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In the marine zone of the Petrified Forest systematic researches carried out by the Natural History Museum of the Lesvos Petrified Forest initiates a conservation programme for their protection. The fossils which are in immediate danger of destruction were retrieved from the sea, carefully cleaned of salt and marine organisms, preserved and displayed in the exhibition room of the Museum.

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Mt. Apoi UGGp, Japan - Asia

Underwater Images Before and After a Red Tide


Red Tide Event in 2021

At the end of September 2021, a widespread red tide event, which decimated marine life, occurred along the Pacific Ocean coastline of eastern Hokkaido, where the Geopark is located. According to research institutes in Hokkaido, the species of the genus Karenia (Karenia mikimotoi and K. selliformis), a marine dinoflagellate, was detected in parts of the red tide plankton. Along the Samani coastline, many dead sea urchins and sea whelks were discovered, and it is predicted that some marine life will take approximately 7-10 years to fully recover, creating a very grave situation (2021 Samani Area Marine Vision News). Mt. Apoi Geopark continues to report updated information.

Images Before the Red Tide

A local Hidaka kelp fisherman once said, “kelp grows due to photosynthesis under the rolling waves, creating its own marine ecosystem.” In order to better understand these words, we took underwater footage in 2019 and held a movie screening for the local community. This started an open dialogue between locals who knew about kelp fishing and those who did not, and those who knew little about the ocean floor topography, sediment, and marine life. We heard many voices that day, including locals that hope the abundant ocean life will continue for many years to come. We hope to continue to educate and inform our community about the importance of the ocean’s ecosystems.

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Muroto UGGp, Japan - Asia

Sustainable Fishery and Local Development in Muroto UNESCO Global Geopark

Muroto UNESCO Global Geopark which covers the whole administrative area of Muroto City, Kochi Prefecture in Shikoku Island is located in southwest Japan. Since the Muroto Peninsula faces the Pacific Ocean, local residents have lived in harmony with the ocean and accepted its blessings.

Fixed-net fishery, a local traditional industry has established Muroto’s economic base. The historical record shows that it started in the late 1700s and thrived in the middle of the 1800s. The western part of Muroto Peninsula has a very unique underwater topography: only 2 to 3km away from the land, and suddenly falls to depths of 700 to 1000-metres. Therefore, a very steep cliff has formed in the ocean. Thanks to the underwater topography, nutrient rich deep-sea water upwells to the surface and provides a rich fishing ground very close to the land.

A large fixed-net, approximately 500-metres long and 90-metres wide, is set on the ocean. Three fishing boats are used to hold the big fishing net with a wide mesh designed to avoid catching young fish and to ensure environmental sustainability. This is why the fishery has thrived in Muroto since the 1700s and still maintains rich fishing grounds. Today, there are four fishing ports engaging in fixed-net fishing in Muroto. Locals at each port usually say that they work very hard to maintain the fishery for the town’s sustainable development.

A local fisherman, Mr. Takuya MATSUI started his geo-cruise tour in 2018 by using his own fishing boat (max. capacity: 12). He takes tourists on a cruise with passengers to the area where the fixed-net is set and explains how local residents utilize the local natural environment for the sustainable management of the fishery. He also works to conserve Muroto’s rich marine ecosystem and biodiversity. Muroto UGGp collaborates with him to organize a special class on the marine ecosystem at a local high school. This involves photographing the deep-sea world environment with an underwater drone and streaming a live video to the high school class. Several deep-sea animals were caught on the video and Mr. Matsui explains about these animals and Muroto’s rich marine ecosystem. The videos recorded by the underwater drone sometimes find illegally dumped garbage in the ocean. Mr. Matsui uploads those videos on his YouTube channel and shows us this urgent issue which we should deal with to protect the ocean environment which is literally the basis of our lives in Muroto (https://www.youtube.com/watch?v=ubCrde5b40I). Muroto UGGp works with him to hold events and school classes on the natural environment protection to raise awareness in the local inhabitants.

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Kelp at Fuyushima district in Samani, Hokkaido

Fish caught by fixed-net.

On a fishing boat.

The Geo-cruise tour.

The live-streaming class at the high school.

Underwater footage, “Samani’s Kelp and Ocean Life” https://www.youtube.com/watch?v=sDvEscaQ0

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Tsubasa Ogasaara - tsubasa@muroto-geo.jp

Underwater footage, “Samani’s Kelp and Ocean Life” https://www.youtube.com/watch?v=sDvEscaQ0
**Oki Islands UGGp, Japan - Asia**

**Marine Environment Conservation - Initiatives to Continue for Future Generations**

The Oki Islands, located in the Sea of Japan, consist of four inhabited and around 180 uninhabited islands. Marine life and the fisheries industry are central to the way of life of the people. In consideration of this, the Geopark includes a marine area extending 1 km from the coastline.

Issues related to the marine environment, especially marine litter, have long been acknowledged as a problem by the residents and the local government, resulting in many coastal clean-up events. To commemorate the designation of the Oki Islands as a UNESCO Global Geopark (UGGp), the day of the designation (9th September) became known as “Geopark Day.” On that day, coastal and street clean-up events used to be held in numerous areas. However, due to the coronavirus pandemic, clean-up events used to be held in numerous areas. However, thanks to the cooperation of many people, the turtle was brought back to health in an aquarium, and in 2021 it was transported back to the Oki Islands and returned to the sea.

In August 2020, a loggerhead sea turtle was found washed ashore on one of the islands in a weakened state entangled in marine trash. Its right forelimb was tangled in trash, causing necrosis and making the removal of the limb necessary. This sea turtle was named “Ribu,” which is the Japanese transcription of the word “live.” Thanks to the cooperation of many people, the turtle was brought back to health in an aquarium, and in 2021 it was transported back to the Oki Islands and returned to the sea.

2021 marked the start of the United Nations Decade of Ocean Science for Sustainable Development. Consequently, the Japanese Geoparks Network (JGN) initiated activities, including a kick-off event held in the Oki Islands UGGp in November 2021. During the event, a Declaration of JGN Initiatives for the United Nations Decade of Ocean Science for Sustainable Development was made jointly by local high school students and the president of the JGN.

Following this, the Oki Islands plan to organise a youth symposium in 2023, and continue to work on passing on the introduced initiatives to future generations, and also other geoparks in the Global Geoparks Network through the JGN Working Group on Island and Coastal Areas, Water/Oceans.

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**San’in Kaigan UGGp, Japan - Asia**

**Diverse features of geology, topography, climate and people’s lives related to the formation of the Sea of Japan**

Extending widely from Kyoto Prefecture (Kyoto City) to Hyogo Prefecture (Toyooka City, Kami Town, and Shirihonsen Town), to Tottori Prefecture (Iwami Town and Tottori City) and largely overlapping with San’in Kaigan National Park, the San’in Kaigan Geopark lies about 120 km east-west from the eastern boundary of Kyoto City to the western boundary of Tottori City. With an area 2,458.44 km², the Geopark is a little larger than the Tokyo metropolitan area.

The Geopark’s diverse geological features and topography are associated with the history of the Sea of Japan from its formation approximately 28 - 18 million years ago to the present day. In the Geopark you can experience events in the geological heritage, lives, culture and history of the people.

One of the outstanding characteristics of the San’in Kaigan Geopark is that it contains many valuable geological and geomorphological features. These include igneous rocks and geological formations, formally a part of the Eurasian continent, and features related to the formation of the Sea of Japan. The diverse coastal terrains, such as the ria coast and sand dunes formed in response to sea-level change and tectonic movements in the Sea of Japan.

Since ancient times, people have inhabited the Geopark area, and we can still observe the culture and history that they developed within its diverse natural surroundings. Making the best of these advantages, the San’in Kaigan Geopark is conducting activities that will lead to the conservation of the natural heritage and regional revitalization through local geotourism.

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Uradome Kaigan Coast (Iwami Town)

Tottori Sand Dunes (Tottori City)
Southern Canyons Pathways
UGGp, Brazil - S. America
From the top of the mountains to the bottom of the ocean

The UNESCO Global Geopark Southern Canyons Pathways (GGSCP) is located in southern Brazil. It comprises seven counties in the states of Rio Grande do Sul and Santa Catarina and covers an area of 2,830.8 km². The GGSCP is part of the Serra Geral plateau and its topography is formed by a long and meandering escarpment that defines two zones: the plateau and the coastal plain, with a 1,000 m difference in altitude, in which less than 50 km separates the plateau from the sea. A vigorous process of erosion has been working over time, sculpting successions of deep and beautiful canyons, filled with waterfalls and natural pools. Its geological history is related to the complete break-up of the Gondwana Supercontinent resulting in the uplift of the east-side of the newly-created South American Continent and the creation of the Serra Geral Formation. This escarpment presents the most expressive geotope as Geopoints that tell the story of the GGSCP with the magnificent occurrence of the Brazilin pine tree (Araucaria angustifolia). Moreover, the local fauna is also very rich, including endangered species such as the cougar (Puma concolor). However, the GGSCP’s connection with the ocean is the characteristic that makes this Geopark truly special and a unique place in the world. Its coastal zone completes the diversity and exuberance of this territory, including lagoon complexes interacting with dunefields, sandy beaches, and an estuarine zone, where an important artisanal fishery community is located. From the cliffs at the coast of the Atlantic Ocean it is possible to appreciate the presence of marine species, such as the resident populations of Labeled bottlenose dolphins (Tursiops truncatus gephysus) and the southern right whales (Eubalaena australis) during its calving season. The beautiful seascape also includes the rocky island of the Wildlife Refuge of Ilha dos Lobos (WRIL) (Fig. 2) during its calving season. The beautiful seascape also includes the rocky island of the Wildlife Refuge of Ilha dos Lobos (WRIL) (Fig. 2) during its calving season. The beautiful seascape also includes the rocky island of the Wildlife Refuge of Ilha dos Lobos (WRIL) (Fig. 2) during its calving season.

Figure 1. Fortaleza Canyons, one of the most visited areas of the UNESCO Global Geopark Southern Canyons Pathways.
Photo by Priscila Venturini Gombi.

Figure 2. Southern right whale in front of the mountains of the UNESCO Global Geopark Southern Canyons Pathways.
Photo by Rodrigo Bilecino.

Swabian Alb UGGp, Germany - Europe
Traces of the Jurassic Sea and its many inhabitants

Today’s landscape of the Swabian Alb is far from the ocean. However, in the Swabian Alb Geopark, one experiences the former Jurassic seafloor. The entire escarpment of the Swabian Alb was formed 201-145 million years ago, when a tropical sea covered most of today’s Central Europe. This marine ecosystem was home to ammornithes, belemnitutes, echinoids, sponges and corals. The biodiversity of the past is visible throughout the Geopark. It can be experienced in museums and through the project “A Tour through Earth History”, which classifies specific geotopes as Geopoints that tell the story of the Swabian Alb. One Geopoint, the “Jurassic Window Gerhausen 2” (Fig. 1) is located within a quarry. Two signs explain in German and English what the visitor can see (Fig. 2). They contain a picture of the quarry wall where color-coding was used to illustrate the different structures. While it is easy to trained geoscientists and geologically interested laymen to identify the different structures, tourists and inhabitants often have trouble with this. Thus, by using a simple colour-scheme on a picture of the landscape, the Geopark tries to encourage people to engage with the landscape and learn more about its past. They can do this on a self-guided excursion, as the Geopoint within the quarry is open to the public throughout the year. This is a prerequisite for geotopes to become Geopoints. They have to be available to the public and need to have an adequate infrastructure, e.g. a proper trail. Furthermore, the community in which the Geopoint is located needs to support the project “A Tour through Earth History” to prevent inhabitants getting tired of tourists visiting the Geopoint.

On the quarry wall – and on the sign – one can identify reefs, and banked limestone. The reefs were built by different species of sponges and microbial mats and were home to mussels and brachiopods. One sponge, Spumellaria merkelis, was first identified in this quarry and now carries the name of its late owner, as the scientists of the University of Erlangen wanted to honour Mr. Merkel for supporting their research. His successor supports education and offered the Geopark to make this geotope available to the public by keeping the quarry wall intact for the next decade. The Geopoint shows that the Jurassic sea, like today’s oceans, was a place full of life. However, today we face the threat of biodiversity loss due to overfishing and pollution. Thus, looking into the past may show humanity that we only exist for a short moment in time and need to reflect on our actions to provide a future for other species but also for ourselves.

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Figure 1. Merkle quarry in Gerhausen, Swabian Alb Geopark, with reef structures and banked limestone.
Photo by Sandra Teuber.
Toya - Usu UGGp, Japan - Asia
Published information used to promote the aquatic environment and the need for the sustainable use of water resources in the Toya-Usu UNESCO Global Geopark

**Water Supports Life**
Toya-Usu UNESCO Global Geopark is located in Hokkaido, northern Japan. The rain falling on Toya Caldera waters the forests, becomes nutrient-rich, and flows into Lake Toya and Funka Bay via the lake’s in-and outflow rivers. The water in the lake and the sea evaporates, and returns falling as rain in the Toya Caldera. The water’s journey through the hydrological cycle brings various blessings to creatures and, enriches our daily lives.

A journey of life that returns to “mother water”
Roughly 40 rivers flow into Lake Toya. The foremost in- and outflow river, the Sobetsu river, is the spawning ground for cherry salmon. The life cycle of the cherry salmon is divided into fresh-water and marine stages in which salmon that have grown up in Lake Toya move from the freshwater to feeding grounds in the sea. The adult salmon rely on the scent of the Sobetsu river in their migration from the sea to their home river where they spawn.

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**Toyo - Usu UGGp, Japan - Asia**

Troodos UNESCO Global Geopark is the most convincing evidence for the pre-existence of an ancient ocean within the Mediterranean Sea above sea level. Consequently Cyprus serves as a geological model for the better understanding of the evolution of the oceans and our planet in general. Closely associated with the TOC are mineral deposits such as chromite, asbestos, massive sulphide deposits (Fig.5), ochre and amber, which have played a significant role through the centuries in the economic and social development of the island and also in Cyprus’s cultural and archaeological heritage. The sulphide deposits have contributed significantly to understanding of the processes in their genesis. Today the sulphide deposits which form in black smokers along the seafloor spreading centres of the Atlantic, Pacific and Indian Oceans are recognized as “Cyprus-type” deposits.

Visitors have an opportunity to discover in the forested Troodos Mountain an outstanding fragment of oceanic crust and the Earth’s upper mantle. The TOC formed approximately 92-82 million years ago in the depths of the Neotethys Ocean during the northward movement of the African plate towards the Eurasian plate in response to the opening of the South Atlantic Ocean. The stratigraphically complete well-preserved and well-exposed plutonic, intrusive, volcanic rocks (Fig.2) and chemical sediments were created in a supra-subduction zone up to 30 kilometres below the ocean seafloor spreading axis. Today, due to the subsequent collision of the two plates, it is located up to 2 kilometres

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**Photo by:** Naoki Iimura

**Figure 1.** Touristic Map of the Troodos UNESCO Global Geopark

**Figure 2.** The spectacular exposure of the Lower Pillow Lavas in the River Maroullena.

**Figure 3.** Sulphide deposits at the abandoned Alestos Mine.
Unzen UGGp, Japan - Asia

Unzen Volcanic Area UNESCO Global Geopark: Local Initiatives to Improve the Marine Environment

The Unzen Volcanic Area Geopark, with the Unzen Volcano at its centre and the Sea of Ariake along its eastern coast, is located on the Shimabara Peninsula. The lives of people in the Geopark have benefited considerably from the fertile land and the rich marine resources, and the fishery has been one of the main industries in this region. However, fish catches have declined during the last 50 years. In order to restore the fertility of the Sea of Ariake, the local fishery associations have undertaken various projects to improve the marine environment. These include protecting effluent purification measures and afforestation programmes to protect the quality of the ground water flowing into the sea.

In 2021, they launched new initiatives to improve the quality of the marine environment. Their actions include supporting effluent purification measures and afforestation programmes to protect the quality of the ground water flowing into the sea. Mari Takano – info@unzen-geopark.jp

The development of the RheiC Ocean is recorded in the rock succession of the Villuercas-Ibores-Jara UNESCO Global Geopark (a non-coastal Geopark), Extremadura, Spain. Initially sedimentation consisted mainly of fluvial and marginal marine deposits, with abundant Skolithos. Full marine conditions were developed during the deposition of the American Quartzite Formation, which is rich in sedimentary structures created by storms, tides and biological activity evidenced by abundant trace fossils, particularly Cruziana, Daedalus and Skolithos. The expansion of the RheiC Ocean gave rise to extensive platforms with fine-grained terrigenous sediments yielding a rich record of trilobites, brachiopods, graptolites and other fossils bearing witness to the Great Ordovician Biodiversification. At the end of the Ordovician, the area of the Geopark was located close to the South Pole, where global cooling, resulting in the formation of continental ice sheets, is represented in the Geopark by the occurrence of poorly sorted sediments of glacial origin (diamictites). This climatic change resulted in the extinction of approximately 60% of the Earth’s marine genera. Global warming and the disappearance of continental ice sheets during the Silurian Period and the associated rapid rise in sea level resulted in the deposition of distal platform anoxic black shale containing abundant planktic graptolites, followed by a regressive sequence consisting of alternations of shale and sandstone. Younger Palaeozoic rocks are not represented within the Geopark.

Uplift, folding and erosion of the rock succession that had been deposited in the RheiC Ocean resulted in the formation of the Geopark’s characteristic Appalachian relief, supported by the resistant Ar- moiuan Quartzite. This is the best example of one of the frameworks included in the list of Spanish geological frameworks of international significance. This impressive geological heritage, together with the related natural and cultural heritage, is used by the Geopark to explain to inhabitants and tourists the geological history of the territory, and by extension, of our planet: How that ocean closed and became a mountain range. How geological, physical and chemical processes return those sands and rocks to us. How life evolved and almost became extinct. How the formation of the relief determined the location of the villages in the territory. The way fossilized galleries become legends… All this and much more is explained through publications, workshops, games, training for companies, interpretation centres, panels on itineraries and geosites, etc.

Bringing the RheiC Ocean back to life, with all its stories, is also a way of making people aware of current problems such as climate change, loss of biodiversity and the destruction of heritage. This ocean has become an educational tool at all levels, a conservation measure and a driver of sustainable development for the Geopark.

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Unesco Global Geopark: The Rheic Ocean in the Villuercas - Ibores - Jara UNESCO Global Geopark:
An ancient sea at an altitude of 1,600 meters

Pref. Teodoro Palacios explaining the Cruziana trace fossil

The Ordovician sea

Graphic by Antonio Grojón illustrating an Ordovician marine environment

Sands of the RheiC Ocean.

Interpretive panel on the top of La Villuerca Peak.
What is a UNESCO Global Geopark?

UNESCO Global Geoparks are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development.

A UNESCO Global Geopark uses its geological heritage, in connection with all other aspects of the area’s natural and cultural heritage, to enhance awareness and understanding of key issues facing society, such as using our earth’s resources sustainably, mitigating the effects of climate change and reducing natural disasters-related risks.

By raising awareness of the importance of the area’s geological heritage in history and society today, UNESCO Global Geoparks give local people a sense of pride in their region and strengthen their identification with the area.

The creation of innovative local enterprises, new jobs and high quality training courses is stimulated as new sources of revenue are generated through geotourism, while the geological resources of the area are protected.

At present, there are 177 UNESCO Global Geoparks in 46 countries. All the UNESCO Global Geoparks are institutional members of the Global Geoparks Network.

Global Geoparks Network

The Global Geoparks Network (GGN) is a non-profit and a non-governmental organisation. It was initially founded in 2004 as an international partnership developed under the umbrella of UNESCO, and was officially registered as an association in 2014 subjecting to French law. The Global Geoparks Network is the official partner of UNESCO for the operation of the UNESCO Global Geoparks.

Networking and collaboration among Global Geoparks is an important component of the Global Geoparks Network. The four GGN Regional Geoparks Networks are the Asia Pacific Geoparks Network (APGN), the European Geoparks Network (EGN), the Latin America and Caribbean Geoparks Network (GeoLAC) and the African UNESCO Global Geoparks Network (AUGGN).

http://www.globalgeopark.org/
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<tr>
<td>26</td>
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How Geoparks can contribute to the decade of the Ocean?
Watch the video and find good practices from UNESCO Global Geoparks

https://globalgeoparksnetwork.org/wp-content/uploads/2022/05/WorldOceansDay4.mp4