MUROTO
UNESCO GLOBAL GEOPARK

Geo Travel Book

Preserve significant natural heritage. Pleasee contact to Muroto City to take rocks and flora and fauna in Muroto UNESCO Global Geopark area. Please also contact to Muroto Geopark Promotion Committee to do a research within the Geopark.

Muroto Geopark Promotion Committee
1810-2, Murotomisaki-cho, Muroto City, Kochi, JAPAN
TEL: 0887-22-5161(JPN code: 81)
Email: info@muroto-geo.jp
Web: http:///www.muroto-geo.jp/en/

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United Nations Educational, Scientific and Cultural Organization

Muroto UNESCO Global Geopark

MUROTO UNESCO GLOBAL GEOPARK

What is a Geopark?

A Geopark is a unified area where sites and landscapes of international geological significance are managed with a holistic soncept of protection, education and sustainable development.
A Geopark uses that heritage, in connection with all other aspects of that area's natural and cultural heritage, to enhance awareness and understanding of key issues facing society in the context of the dynamic planet we all live on.
In a Geopark, you can come in touch with nature, history and culture and discover the link between people and the earth.

Ocean, land and terraces of blessing

Marine Terraces (Hazeyama-Nishiyama Plateau)

MUROTO UNESCO GLOBAL GEOPARK

The collision of four tectonic plates created the Japanese Archipelago.
Their movements produce earthquakes and volcanic activity,
and give rise to complex geology.
Like the passing of the seasons, the snow and the rain,
the typhoons and changing weather, this process is remarkable.
And so are we and other animals and planets,
living our lives amongst this unstable nature.

Cape Muroto
Where new land emerges

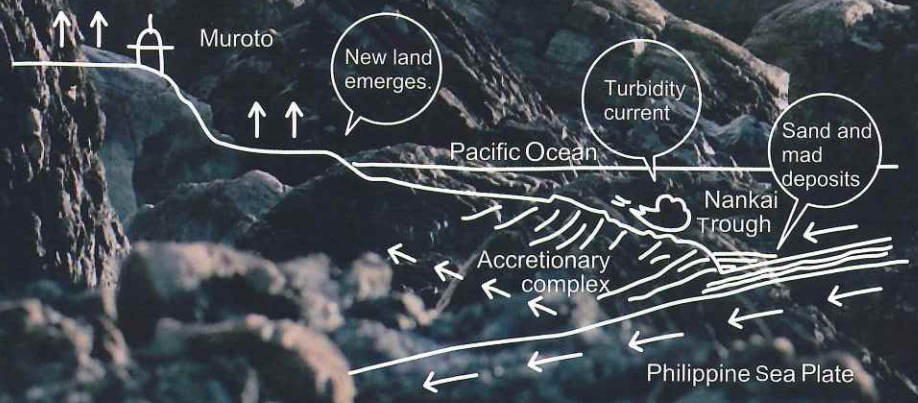
Here in Muroto you can see signs of the continuous uplift caused by plate movements.
You can see what it is to live together with nature, so powerful and flexible.
Amassed in Muroto: Memories of the earth, Memories of the people.

Please enjoy your time, and give pause to consider,
your future life on moving land.

Turbidites (Cape Muroto)

Three Words for an Enjoyable Geotravel

"Accretionary Complex"
"Rising Land"
"Active Margin"



Why are things from the deep ocean bottom now on land in Muroto?

Rock layers formed on the ocean floor, traces of ocean currents and animal movements that have turned to stone... these are evidence of what happened in the deep sea. But why are they on land now so that we can see them? In the ocean off Muroto lies a place where an oceanic plate collides with a continental plate. As the oceanic plate dives under the continental plate, the sediment on top of the oceanic plate is being scraped off and pushed up onto the continental plate, upon which Muroto sits. Over time the sediment rises up and eventually emerges out of the water.

Land made from the deep sea

A large part of the land of Muroto was formed in the depths of the Pacific Ocean around 50 million to 16 million years ago from layers of accumulated sediment. In a reoccurring process caused by plate movements, sediment atop the oceanic plate came to be carried to the Nankai Trough, where some of it was scrapped off and deposited on the continental plate to form accretionary complex. The accretionary complex that the land in Muroto belongs to is know as the Shimanto Belt, which was the first place in the world to provide on land verification of the movement of plates.

Rising Land

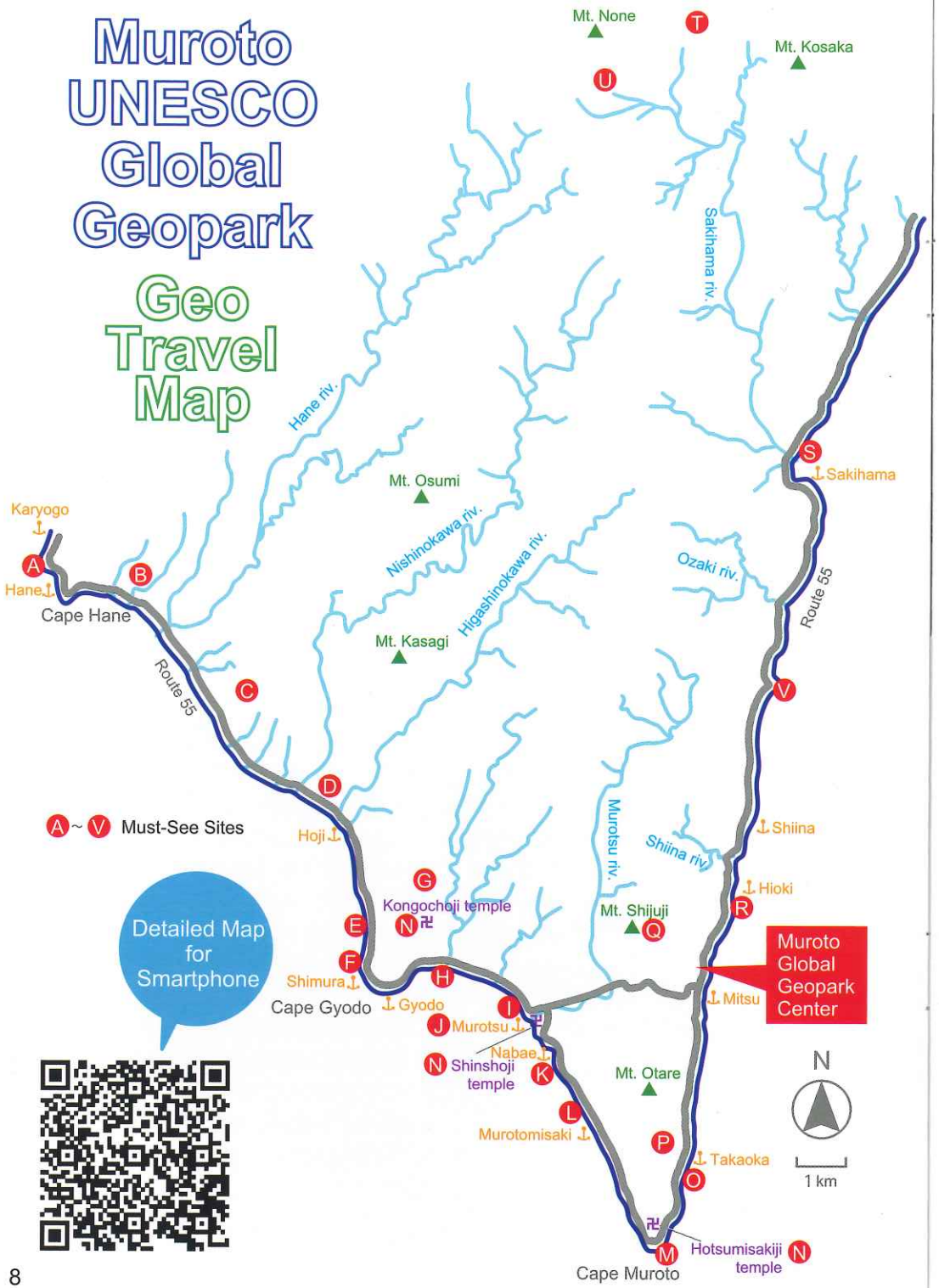
An accretionary wedge is not the only kind of formation produced by plate tectonics. As the oceanic plate continues to collide and push up against the continental plate, the land of Muroto constantly receives power. Throughout Muroto there are underwater cliffs, marine terraces and other representative geological features of uplifting that result from this process. The people of Muroto, living atop rising land, have skillfully made use of the special features of its geology and topography.

Living in the active margin

At the place where two tectonic plates collide, in most cases one plate will dive, or 'subduct', under another. These places are known as subduction zones. At these subduction zones, the force of the two plates colliding leads to deformation of the earth's crust and volcanic activity. Japan is situated at the point where four tectonic plates collide and is a country renowned for its numerous earthquakes and volcanoes. Japan's graceful sights and rich culture were born from its dramatically changing land, and continue to be stewarded by the Japanese people.

Muroto UNESCO Global Geopark

Geo Travel Map




Cape Muroto

All your journeis begin here...

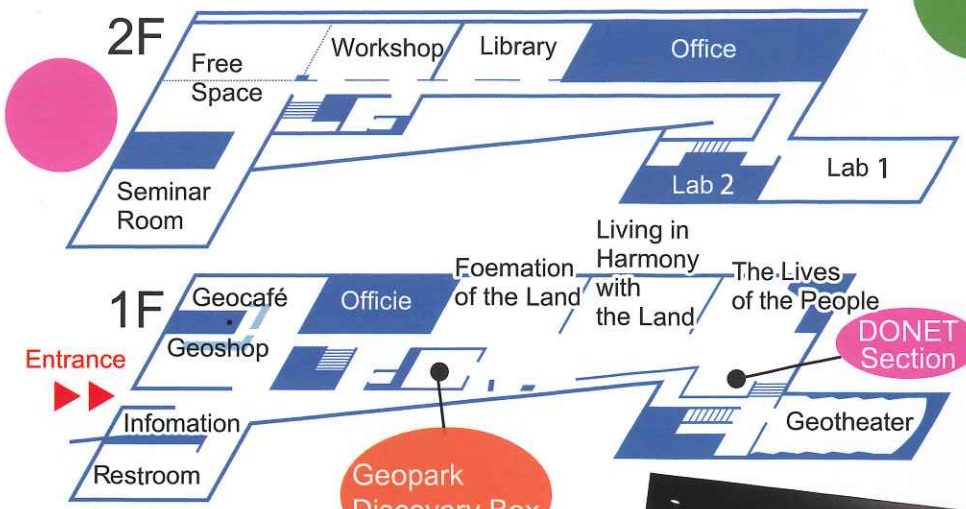
Muroto Global Geopark Center

Admission Free
9：00～17：00
tel：0887-23-1610
E-mail：info@muroto-geo.jp
Japanese country code: 81
1810-2, Murotomisaki-cho,
Muroto city, Kochi, Japan

Please come!

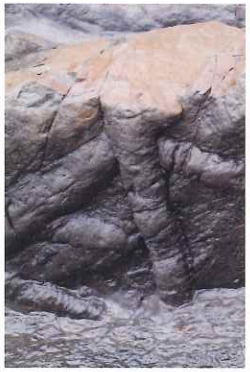
Dr. Magari
He is working on the research of the land formation and the lives of the people at Muroto Global Geopark Center.

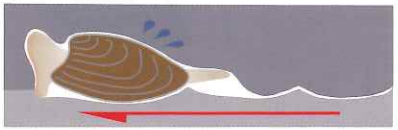
This center is a base site for fully enjoying the Muroto UNESCO Global Geopark. You can start your geo-travel from here to the field as a geo-traveler!



Muroto Global Geopark Center is a building that was renovated a junior high school that had closed down.

Cape Hane



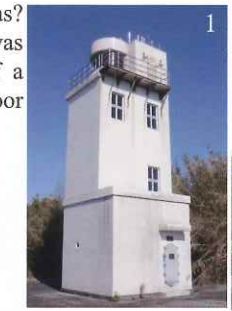


What do you think this ridged shape that looks like a fat earthworm is? It is a fossilized trace of animal movement left on the seafloor. So, what kind of animal do you think it was? And how do you think the trace was made? Actually it is a trace of a clam crawling on the seafloor surface.

Cape Hane is the western gateway to Muroto UNESCO Global Geopark. Once you enter Muroto from Nahari , you are at Cape Hane. Walk along the coast, the land formation will show you how it was like in the past.

Nobori Formation

You can find many fossils of shells and fossils of shark teeth at Nobori Formation in Hane! Because the fossil-rich land is a private area, please get permission beforehand.



1.There is a community called Nakayama on the westernmost marine terrace of Muroto Geopark. Here was also under the sea in the past. Cape Hane Lighthouse is built to keep eye on sailors on the tip of Nakayama community.

2. Fresh stream of Hanagawa River (near Ogishi). Since environment is conserved very clean, Hanegawa River water maintains good quality.

3. Kamigao Shrine, located in Ebisumachi town.

Kiragawa Town

Traditional architecture will show you how people of the land have lived here in harmony with the nature. The design of main houses is in diverse and it attracts visitors. Those beautiful architectures reflect history how people have lived in the town.

Preservation Society
of Kiragawa Old Street
Tel. & Fax: 0887-25-3670

Right roof tiles and left roof tiles

You can see that the roof tile of the main houses are aligned in different directions. This is because winds and rain hit this area from same direction.

Stone Walls, Ishiguro

The houses in Kiragawa are surrounded by stone walls. This style of wall, kown as "*Ishiguro*", protects houses from strong wind and rain. Each house has a different design of stone wall. Please look closely at the stone walls and find differences.

Roof Drainage Tiles

Kiragawa's style roof drainage tile is an architectural technology designed to cope with driving rain generated by typhoons. Please enjoy beautiful and intricately-crafted rooflines. There are also various designs of roof tiles, depends on the house.

Ondamatsuri Festival

(May 3rd)

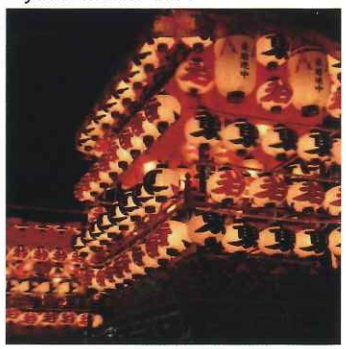
It is held once every 2 years, to pray for a good harvest. It is designated as a Significant Intangible Folk Cultural Asset by the national government. The annual round of rice planting and haevesting is dramatized in performance of 13 scenes on front shrine.

Binchotan charcoal

Ubame oak, the material used to make Tosa binchotan charcoal, grows naturally in the mountains of Kiragawa. This led to the prosperous binchotan charcoal culture in this area. At certain times, there are charcoal burning experiences on offer.

The "*Yado*" System

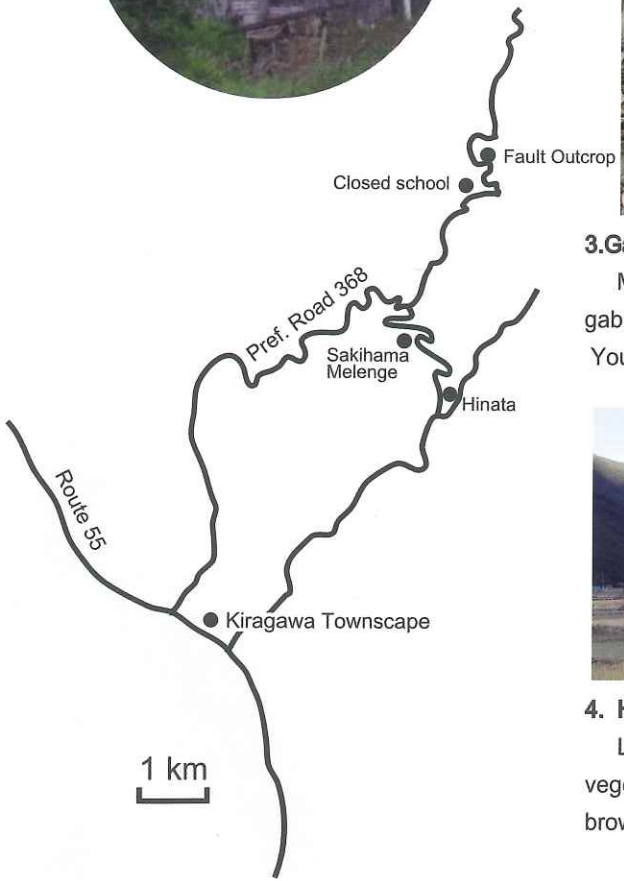
Kiragawa is located between Higashinokawa River and Nishinokawa River. The town is divided into 4 areas: *Uemachi (the Upper Town)*, *Higashimachi (the East Town)*, *Shitamachi (the Down Town)*, and *Nishimachi (the West Town)*. When a festival is held, each area parades its float. During the festival, these four areas are called "*yado*" means '*inn*'.



Mountain Area in Kiragawa

1. Life in the Mountain Area in the Past

Most of locals in Muroto lives in near coast line, but there used to be many communities in the mountain area. Locals have involved in the forest products industry there at that time.



2. Fault Outcrop in Chojano, Kiragawa.

The land of Muroto has been formed by plate movements. Visitors can observe traces of those movements on land today.

3.Gabboro found in Sakihama Mélenge

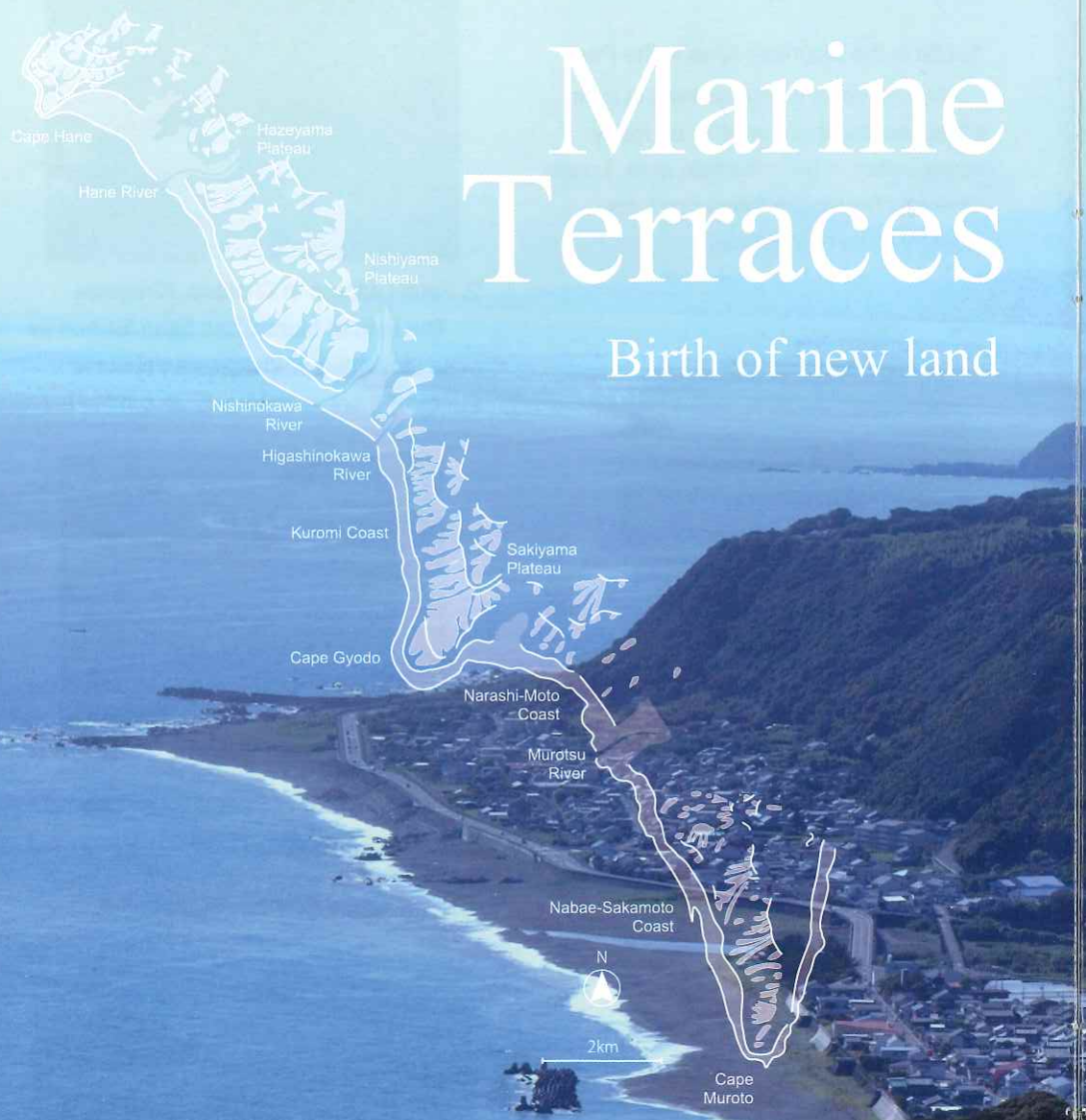
Mélenge is a body of mixed rocks including gabbro and basalt found in sand and mud. You will also find a same rocks in Sakihama.

4. Hinata Community

Locals produced several kinds of vegetables (potato, eggplant, etc.) and brown sugar lump.

Marine Terraces

Birth of new land



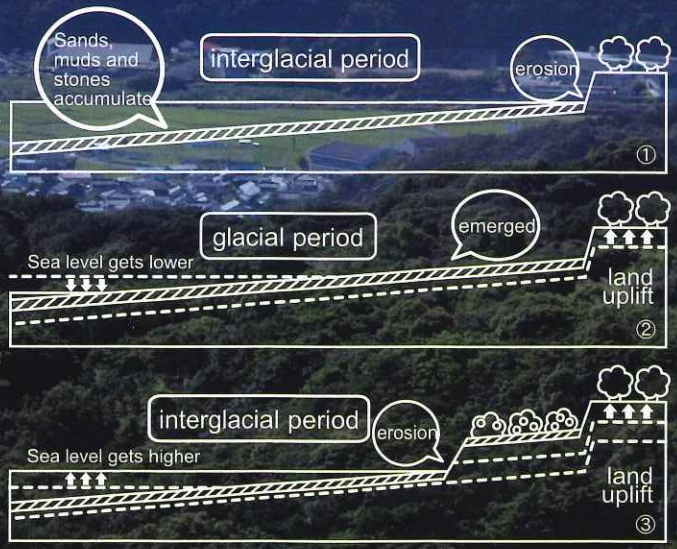
Flat land stretches out atop the mountains on the west side of Cape Muroto. These terraced hills formed by the sea are known as marine terraces. Crops grow well on marine terraces, taking advantage of ample drainage. For example, sweet potatoes and eggplants are harvested on flat part of the terrace and loquats are grown on the slopes.

Were the Marine Terrace Formed by the Sea?

Hazeyama-Nishiyama and Sakiyama Plateau have been formed by sea level change and earthquake uplifts.

Why are there marine terrace in Muroto?

At off Muroto, there is a trench called Nankai Trough. At Nankai Trough, oceanic plate and continental plate meet and huge earthquakes have been occurred about every 100 to 150 years. These huge earthquakes have pushed up (uplifted) the land.
Global climatic changes have caused sea level changes of approximately 100 m. During glacial periods, seawater decreases because water turns into ice or snow and accumulates on the land. On the other hand, during interglacial periods, seawater increases because ice and snow melts and flows into the ocean.
You can find weathered gravels on Hazeyama-Nishiyama and Sakiyama plateau. It is rounded by power of the waves when the flat land of the terrace was located near the sea surface. Because these stones are found on the top of the plateaus, we can know that the marine terraces used to be underwater.



① Sea level remains high during interglacial period.
Erosion continues at the same depth.

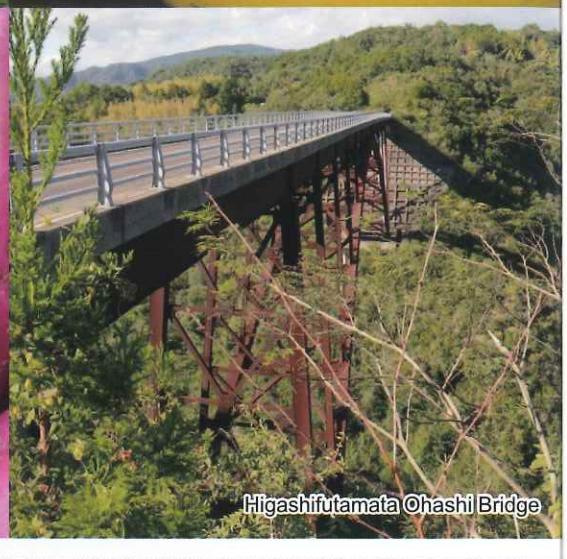
② Sea level falls when the earth's temperature is getting low.
Erosion at the same depth does not take place.

③ Sea level remains high when the earth gets warm again.

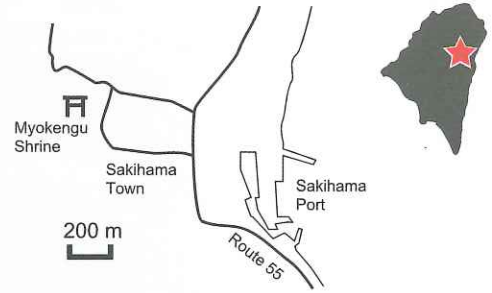
Flat land formed by the ocean

Buntan citrus orange: Muroto has plenty kinds of citrus fruits

Sweet potato on the Nishiyama Plateau

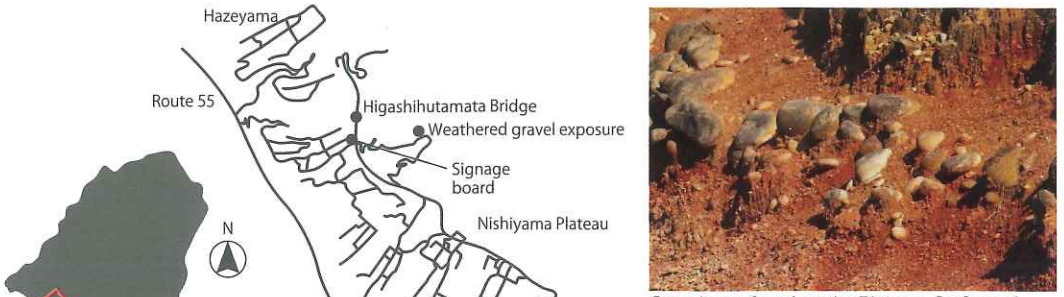


Higashifutamata Ohashi Bridge



Merine Terrace in Sakihama

Sakihama Myokengu Shrine was built on a small hill which is also a merrine terrace.



Gravels are found on the Plateau. Surface of rocks changed its colors and vulnerable because of weathering.

Hazeyama-Nishiyama Plateau

Hazeyama-Nishiyama Plateau locates on the top of the terrace at west side of Nishinokawa river of Kiragawa. Crops such as sweet potatoes, watermelons and eggplants are grown at the plateau. The eggplants in particular are a delicacy, and are grown with deep seawater.

Sakiyama Plateau

Sakiyama Plateau expands on the top of terrace at north side of Cape Gyodo. Sakiyama is a tea cultivation area. The National Muroto Youth Outdoor Learning Center and No.26 temple (Kongochoji Temple) of Shikoku 88 Temples Pilgrimage are located on this plateau. You can try tea picking at the National Muroto Youth Outdoor Learning Center.

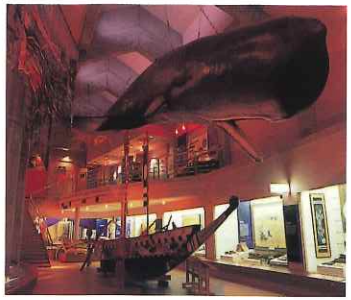
Whale Culture

The Ukitsu, Murotsu, Tsuro areas, located around Murotsu Port, was once prospered for their fishery industries. Different kinds of fishing have thrived in Muroto in different period: whaling from the early 1600s to around the beginning of the1900s; bonito fishing after decline of whaling; and tuna fishing from the 1920s. Tuna fishing was conducted in the sea around Japan in its early stages. After the WWII, because fishing boats had got bigger and freezing technology had developed, Muroto broadened its fishing grounds.

Whales were long a primary source of protein for local Muroto people in the past. People used every part of whales and recognized that they owed their very lives to whales.

Chudoji-temple at Ukitsu was constructed by Miyaji, Buemon in 1697. As the leader of Ukitsu Whaling Association, he caught many whales. Therefore, he offered the temple and gongs to pray for the bells peace of the spirits of the whales he had caughts.

1.Spirit tablets commemorated whales 2.Whale stone in Sakihama (Basalt rock) 3.The beach where people used to dismantle whales. 4. Whale Mound in Shina



Whale Museum

(Home of Whales)

Whale Museum, Kujira Kan is located in Kiramesse Muroto.

Muroto formerly prospered as a whaling town, and whale culture still lives in this land. You can learn about how whale lives and history and culture of whaling at Kujira Kan.

Please join whale-watching tour. If you are lucky enough, you can see whales off Muroto. Let's think how whales were important for people's lives in Muroto.

Restaurant Shokuyu Isa no Go

Kiramesse Muroto has a restaurant. You can enjoy local cuisine there. You can also enjoy the beautiful view of the Pacific Ocean from the restaurant.

Market Rakuichi

Rakuichi is located on the opposite side of the restaurant, and it sells local fresh vegetables and seafood. Please enjoy sweet potatoes and water melons grown at marine terrace.Fish is also good.

Right in front of Kiramesse Muroto, significant formations can be ovserved. Sand and mud deposited on the sea bottom about 30 million years ago makes this beautiful stripes. You can also find traces of marine living used to live on the sea bottom.

Kiramesse Muroto

Closed: Monday (exept for National Holidays on Monday, in which case it is open on the holiday and closed the following tuesday instead)

Restaurant：0887-25-3500

Market：0887-25-2918

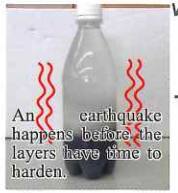
Whale Museum：0887-25-3377

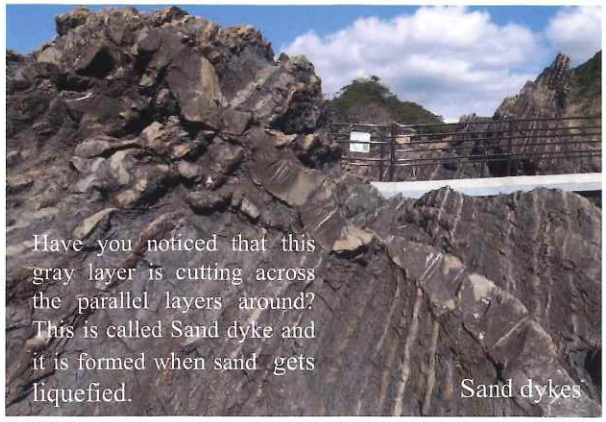
Kiramesse Muroto

Tasty gelato

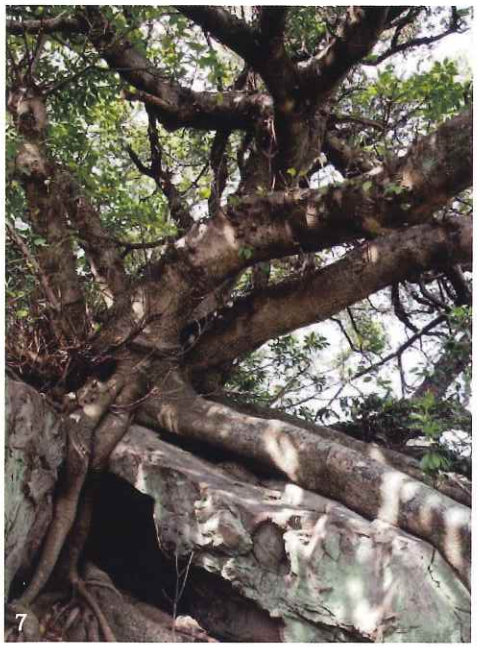
Gyodo -Kuromi Coast

How do you think these layered rocks were formed? If you look closely, you will notice that they are made up of lighter-gray sandstone and darker-gray mudstone. The alternation was repeated to form this rock sequence (called turbidite). The layers were at a seafloor, at the depth of around 4,000m, about 30 million years ago. When typhoons and earthquakes happen, a lot of sand and mud are washed down onto the deep ocean floor. The layers in front of you now were originally soft sediment layers of sand and mud.

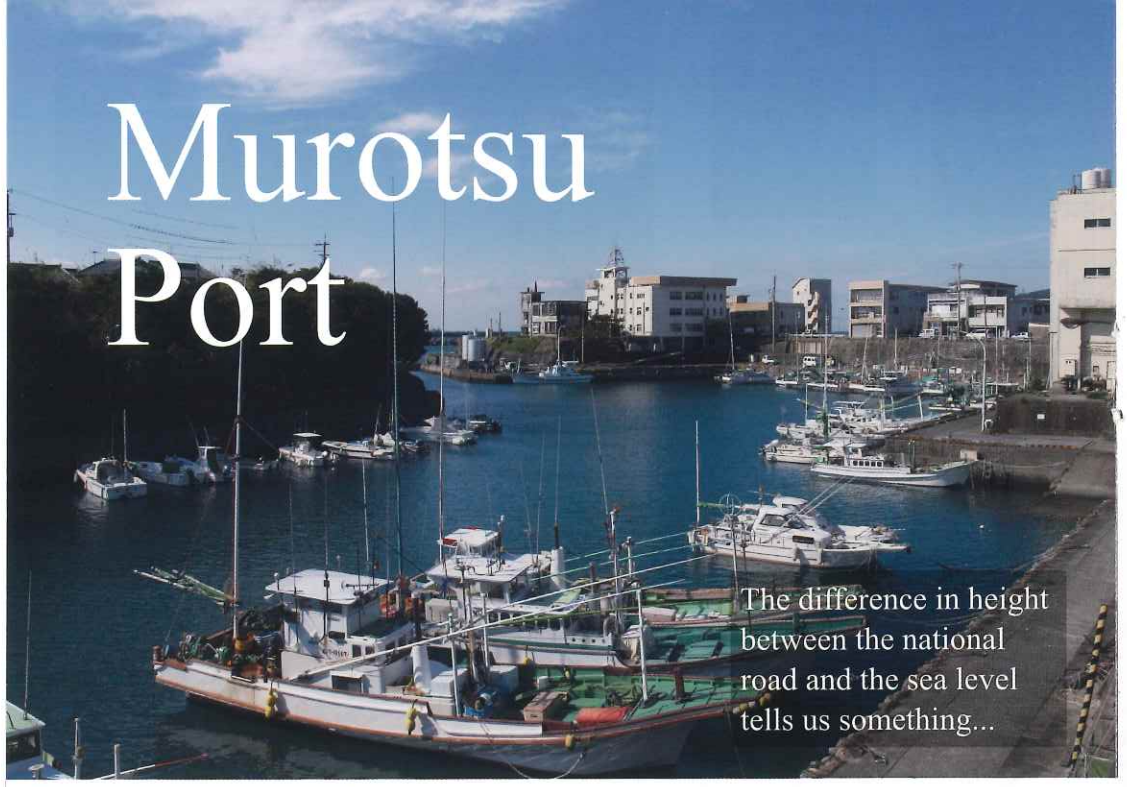




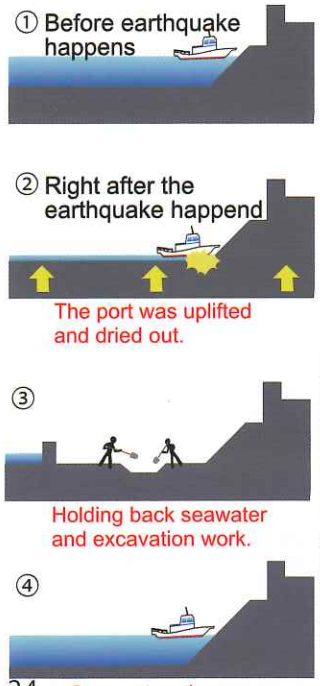
1. *Crepidiastrum keiskeanum*, a kind of daisy family plant grows in between the layers of sand and mud. Plants prefer mudstones rather than hard sandstones to set their roots deep. 2. Shimura Promenade is well-managed and easy to walk. 3. Current ripple mark. You can see it most clearly at Shimura. 4. Slump structure.Sediments on the seafloor, which are still not so hard, get warped by the landslides. 5. Jizo statue at the Fudo iwa rock. 6. The view of Cape Gyodo from Kiragawa. You can see the terrace clearly. 7. Akou (*Ficus superba*) at Shimura Fudo.



Murotsu Port



Murotsu port changes because of earthquakes



At Murotsu Port, if you look at the national road and the water level, you will see that there is a large difference in height between them. This reveals the history of the reconstruction of the port.

Around Murotsu Port, the wind is strong and the sea is choppy, so it was really tough for local fishermen to go to the sea. Therefore, people wanted a port which could be secure place of shelter for ships. Finally, Murotsu Port was opened in 1679.

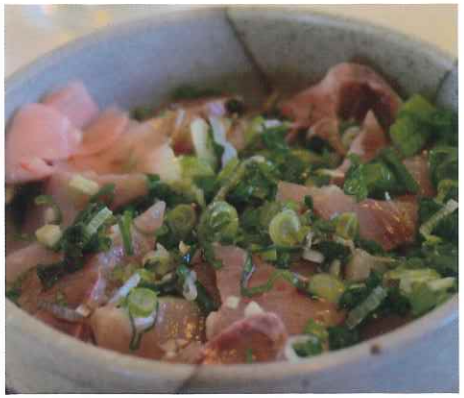
However earthquakes hit the port, forcing a reconstruction in its design. Two plates meet off Muroto and this is the main cause of earthquakes. A magnitude-eight earthequake happens once every 100 to 150 years here.

The land of Muroto has been uplifted about one to two meters by the earthquakes. Murotsu Port, of course, has been uplifted, too.

Land upheavals have dried out the port. Therefore, Murotsu Port has been re-excavated repeatedly after earthquakes. You can find lots of histrical evidence of excavation work at Murotsu Port.

Evidence of reconstruction work conducted after the earthquakes in 1854 and 1946

Toromu



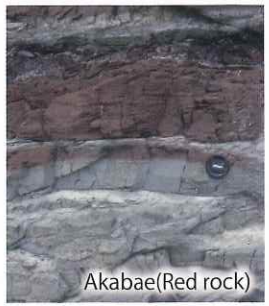
Drive for about 5 minutes from Cape Muroto to the west, you can get to the Murotomisaki Fishing Port (new port) where seaside station, Toromu is.There are a restaurant 'Jibaumaya', a local produce market 'Kujirahama' and you can enjoy fresh seafood. Experience of roasting bonito is also available.

Nabae-Sakamoto Beach

You can find red rocks with white and green layers between them along the rocky shore at Sakamoto Beach. This red rock is called "akabae" (literally 'red rock') and is used to be a play around for the local children. Today, it is also used for a garden stones and walls. Where is the red rock from? Has it been here all along?

It is actually formed by red mud deposited on sea floor far from the land. On the other hand, white and green layers are formed by volcanic ash. They were also deposited on the sea floor. The reason why we can see the layers, formed in the distant ocean, at Sakamoto Beach is because th plates are moving.

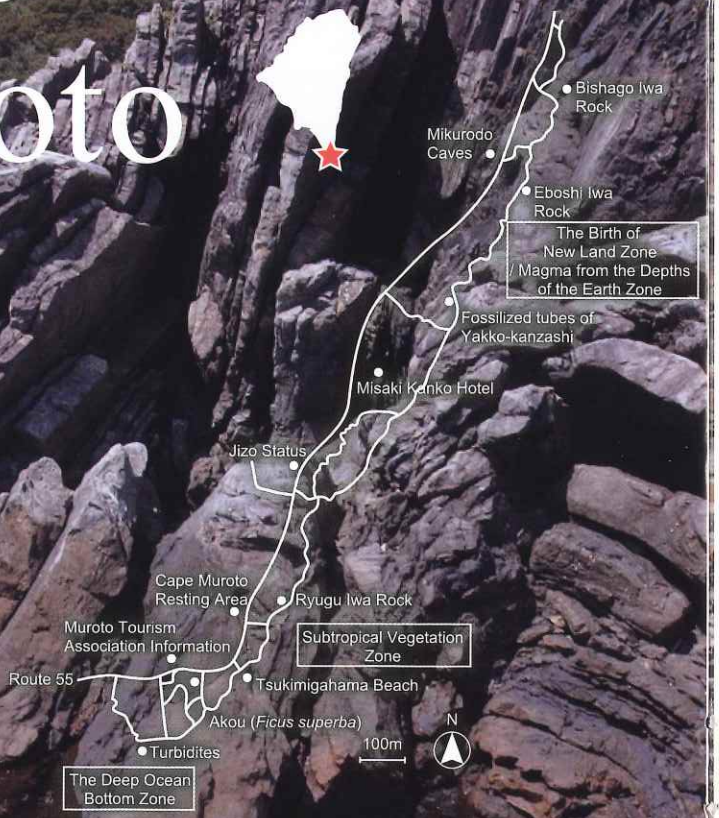
Hibiscus Flowers



Akabae(Red rock)

Sand Formation at Nabae Coast

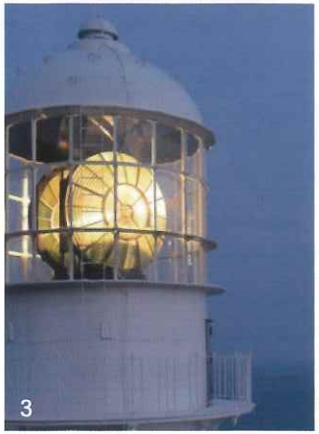
Cape Muroto



Cape Muroto has unique geopark sites than anywhere else in Muroto UNESCO Global Geopark. There are evidences of uplift, jizo statues, the seven mysteries of the monk Kukai and much more. Wherever you look, there is something new to see here. And there are guides to show you around. While looking at the courses available, you can also enjoy making your own course through the many sites of the cape.

Let's Walk along the Deep Seafloor!!

You can see many jagged rock formations here at Cape Muroto. Actually, they were formed at the bottom of the deep sea.
In a sense, they are letters sent from the depths of the ocean. The rocks are records of various events that took place there. What happened at the bottom of the deep ocean a long, long time ago?



1. The view from the observatory at Cape Muroto. 2. The view of sky and ocean from Mikurodo cave. This is one of the places where the monk Kukai is said to have had his religious training. 3. Cape Muroto Lighthouse. The light reaches approx. 49km far. 4. A flower of Hamaazami(*Cirsium maritimum*),a type of thistle. In Muroto, the roots of this plant are cooked as Tempura in spring. 5.Jobitaki(*Phoenicurus auroreusis*), the daurian redstart. There are many birds flyng around in the forest along the coast. 6. Akou(*Ficussuparba*) 7. Jizo Statues:Names of the ships which had marine accident are engraved in the base stone of statues.

You should visit here and there!

Guided Tours at Cape Muroto

Let's walk at the coast line with a guide who can share an interesting story of the land of Muroto.

Deep Sea Area (Turbidite Layers)

Trace Fossil

Here!

Since the Muroto Peninsula jets out into the Pacific Ocean, it is directly affected by sea breeze. Kuroshio Warm Current flowing off Muroto brings the land warm winds from the south. Therefore, many subtropical plants can be found in Muroto. Akou Tree (*Ficus Superb*), embracing a big rock is the most popular plants amoung those!

Lookout point

Tip of Cape Muroto is a starting point of the tour. The unique shape rocks and formations in front of you have been brought here from the deep sea. Those rocks and formations are composed of sand and mud deposited on 4,000-meters deep sea bottom 16 million years ago. You will also find "traces" which was printed on rock surface by marine animals lived under the sea.

Subtropical Plants Area (Akou Tree: *Ficus superb*)

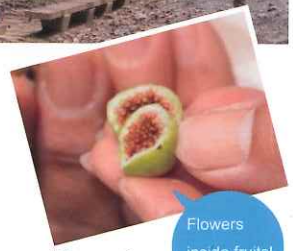
Pittosporum tobira

Fruits of Akou Tree

Directly grown from branches.

Fancy outfit!

Thunberg (*Eucorysses grandis*)



Flower of Akou Tree

Flowers inside fruits!

Mikurodo Cave

Osprey

Guided Tour at Cape Muroto The Lighthouse Hiking Tour

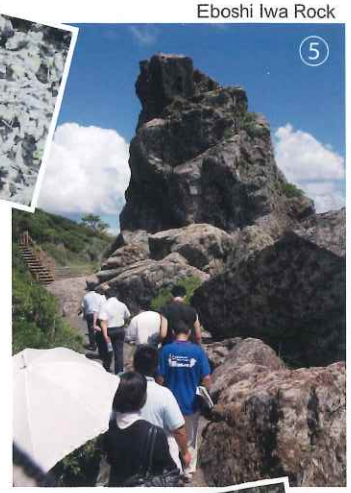
Let's walk with unique guides and find evidence the earth is moving.

Operation time: 9am to 5pm
Price: ¥2,000-/ 1~2 persons
¥1,000-/ over 3 persons
Please contact to the following information about group discount and child fare.
[Muroto Geopark Promotion Committee
TEL: 0887-23-1610]

Beautiful Crystals!

Gabbro

Eboshi Iwa Rock



Japanese White-Eye, the bird of Muroto City

Zosterops japonicus

You can see 2 types of rocks at Cape Muroto; one was formed on the deep sea and uplifted, the other was formed by magma from deep earth. About 14 million years ago, there was magma boiling away at temperatures of 1,000 degree Celsius and over! Those magma was slowly cooled and hardened into rock, called "gabbro" with beautiful black and white crystals.

Mikurodo cave, well-known as a sacred place where a Japanese monk had religious training is a goal of the guided tour!

Fossilized colony of tube worms

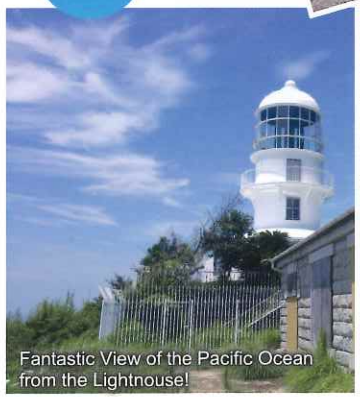
Wow! Interesting!

A stone monument telling the poet visit

A famous Japanese poet visited here!

Gabbro

I touched "magma!"



Fantastic View of the Pacific Ocean from the Lightnouse!

Hike to Murotozaki Lighthouse Tour

Visitors go through the forest and visit Lighthouse.

Letters from Deep Sea

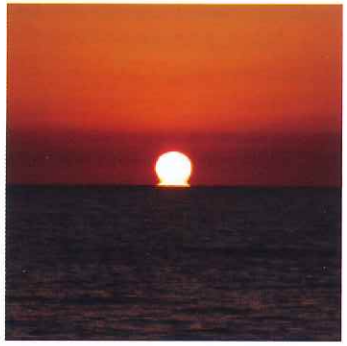
Cape Muroto is rising. You can see the power of the earth and the birth of new land here in the diverse rock formations, such as the large turbidities, which were formed on the sea floor, and twisted and pushed to the surface of the water at the tip of the cape.

Subtropical and Coastal Vegetation

At the cape you can observe coastal and subtropical vegetation adapted to Muroto' s strong sea breezes and mild climate. Here you can enjoy the diverse colors of the seasonal flowers and the interesting plants designated as a natural monument by the national government.

Daruma Sunrise and Sunset

Cape Muroto is a rare place where you are able to observe both a daruma sunrise and a daruma sunset. These are mirages that occur when the sun is close to the horizon, and looks like a traditional Japanese daruma doll is poking its head over the sea horizon.



Conserve Rare Flora and Fauna Found in Muroto

Syneilesis: This plant can be found mainly in the forest near inhabited area.

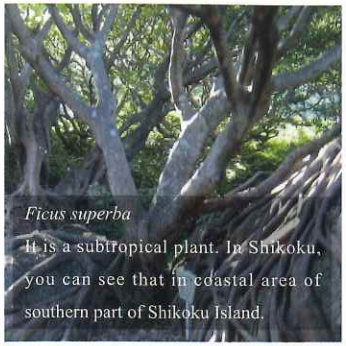
Cassytha filliformis: It is a vine being parasitic in plants at coast. This plant was firstly found in Kochi Prefecture in 2016 for the first time.

Ludwigia stipulacea: This tiny little flower grows in mashy places such as pond or lake.

Rhinolophous ferrumequinum: It lives in a cave. The living place of the species has not been reveiled everything.

Vegetation along the walking trail at Cape Muroto

jjj



Ficus superba
It is a subtropical plant. In Shikoku, you can see that in coastal area of southern part of Shikoku Island.

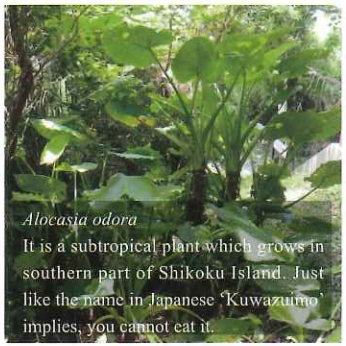
Quercus phillyraeoides
It forms community in warm coastal area such as Muroto. Binchotan charcoal is made from these trees.

Pittosporum tobira
Bloom; a pale yellow flower, smelling like jasmine, from March to May. It grows warm coastal forests.

Marsdenia
Bloom; pale yellow flowers from August to September. Its seed has white puff like a dandelion.

Rose luciae
Bloom; white flowers from June to July. It grows in coast or dried up river. Its stem has thorns.

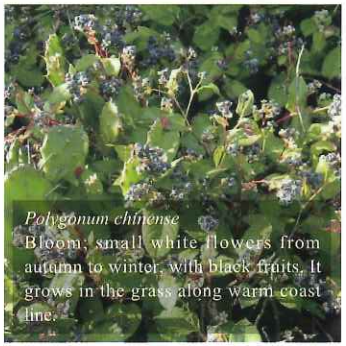
Raphanus sativus
Bloom; a pale purple flower from February to May. It has gourd-shaped fruits.



Alocasia odora
It is a subtropical plant which grows in southern part of Shikoku Island. Just like the name in Japanese 'Kuwazuimo' implies, you cannot eat it.

Vitex rotundifolia
It is a bushy tree which grows in coast line. Its fruit smells good and is used as stuffing of a pillow such as buckwheat husks.

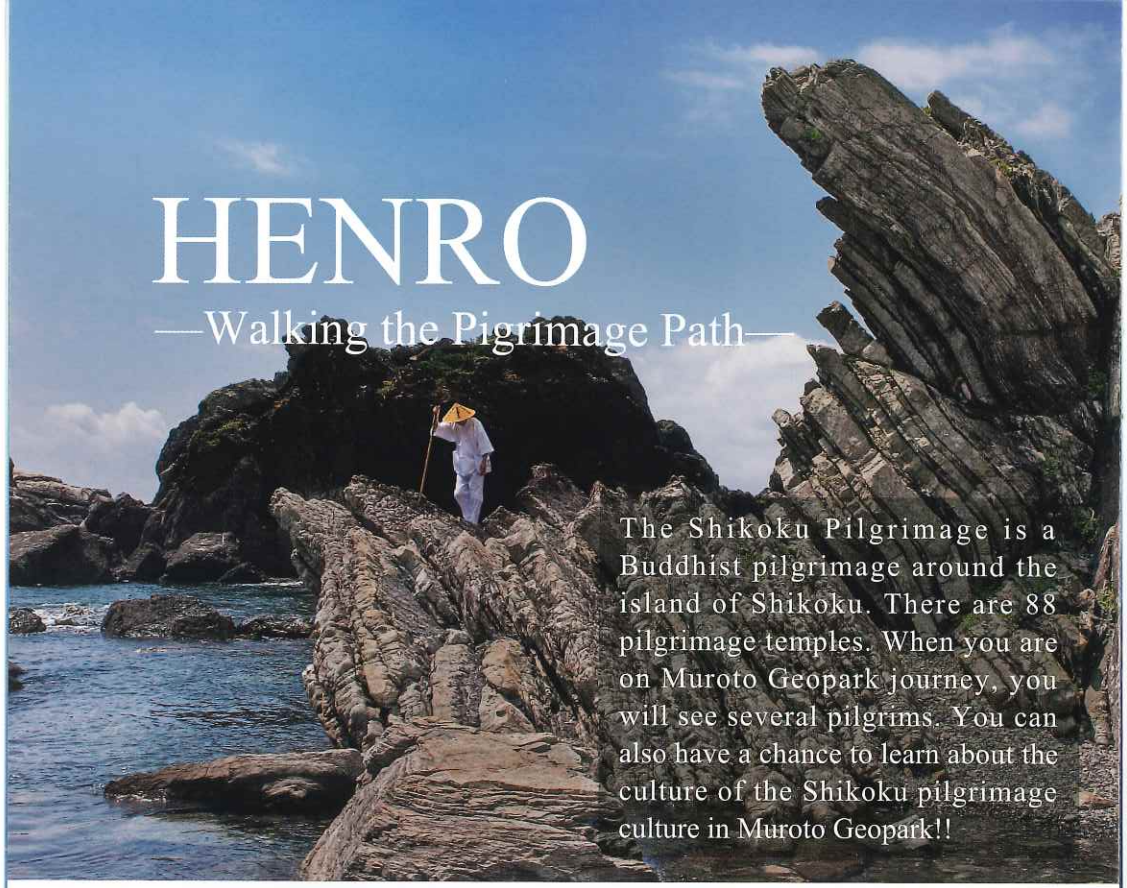
Chrysanthemum shiwogiku
Bloom; yellow flower from autumn to winter. It grows at rock faces and in rocky areas.



Polygonum chinense
Bloom; small white flowers from autumn to winter, with black fruits. It grows in the grass along warm coast line.

Camellia
Bloom; bright pink or red flowers from January to March. Extracted oil can be used in cosmetics and cooking.

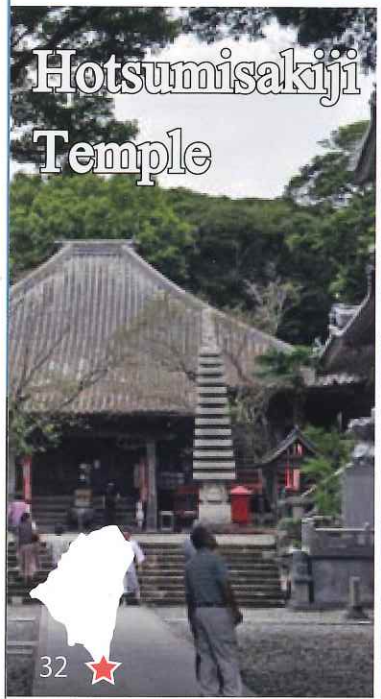
Senecio scandens
Bloom; yellow flowers which pile up one another from November to March. It grows at warm coastal area.



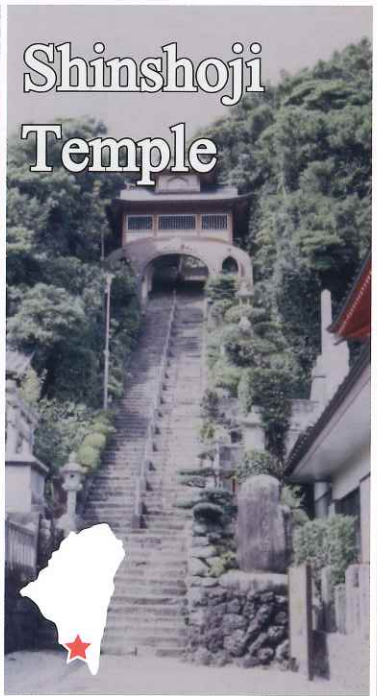
HENRO

—Walking the Pigrimage Path—

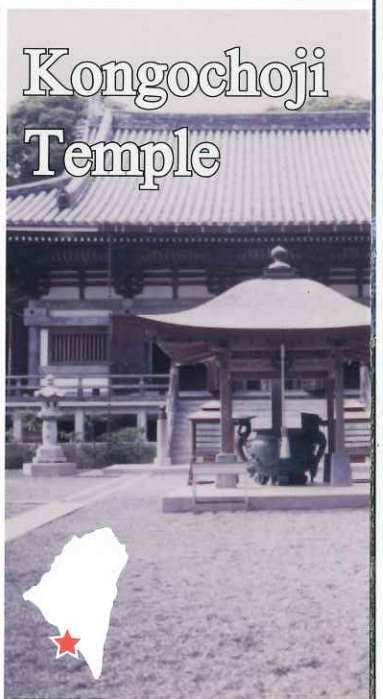
The Shikoku Pilgrimage is a Buddhist pilgrimage around the island of Shikoku. There are 88 pilgrimage temples. When you are on Muroto Geopark journey, you will see several pilgrims. You can also have a chance to learn about the culture of the Shikoku pilgrimage culture in Muroto Geopark!!



Hotsumisakiji Temple



Shinshoji Temple



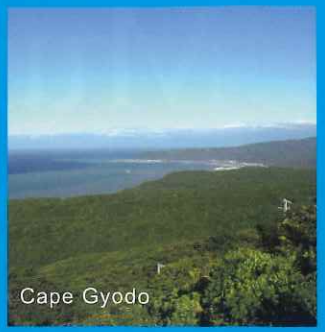
Kongochoji Temple

Photogenic Sights of

Muroto UNESCO Global Geopark

National Muroto Youth Outdoor Learning Center

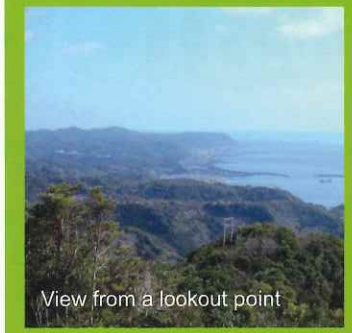
Experience Nature!



Cape Gyodo

Muroto Skyline

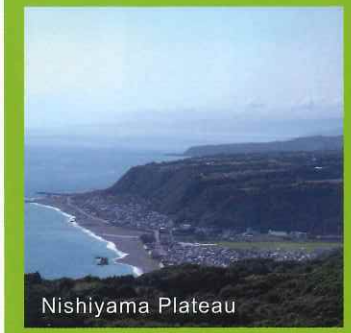
Great View Point



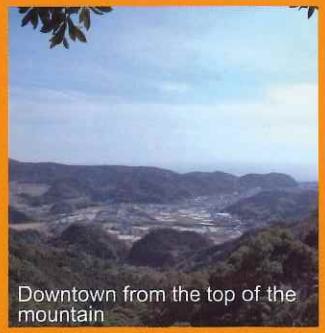
View from a lookout point

Cape Muroto

East Coast of Muroto



Nishiyama Plateau



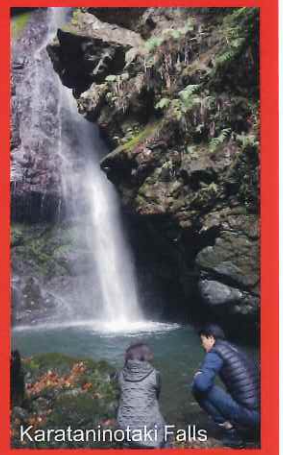
Downtown from the top of the mountain

Local Mountain stares at Muroto.

Karataninotaki Falls

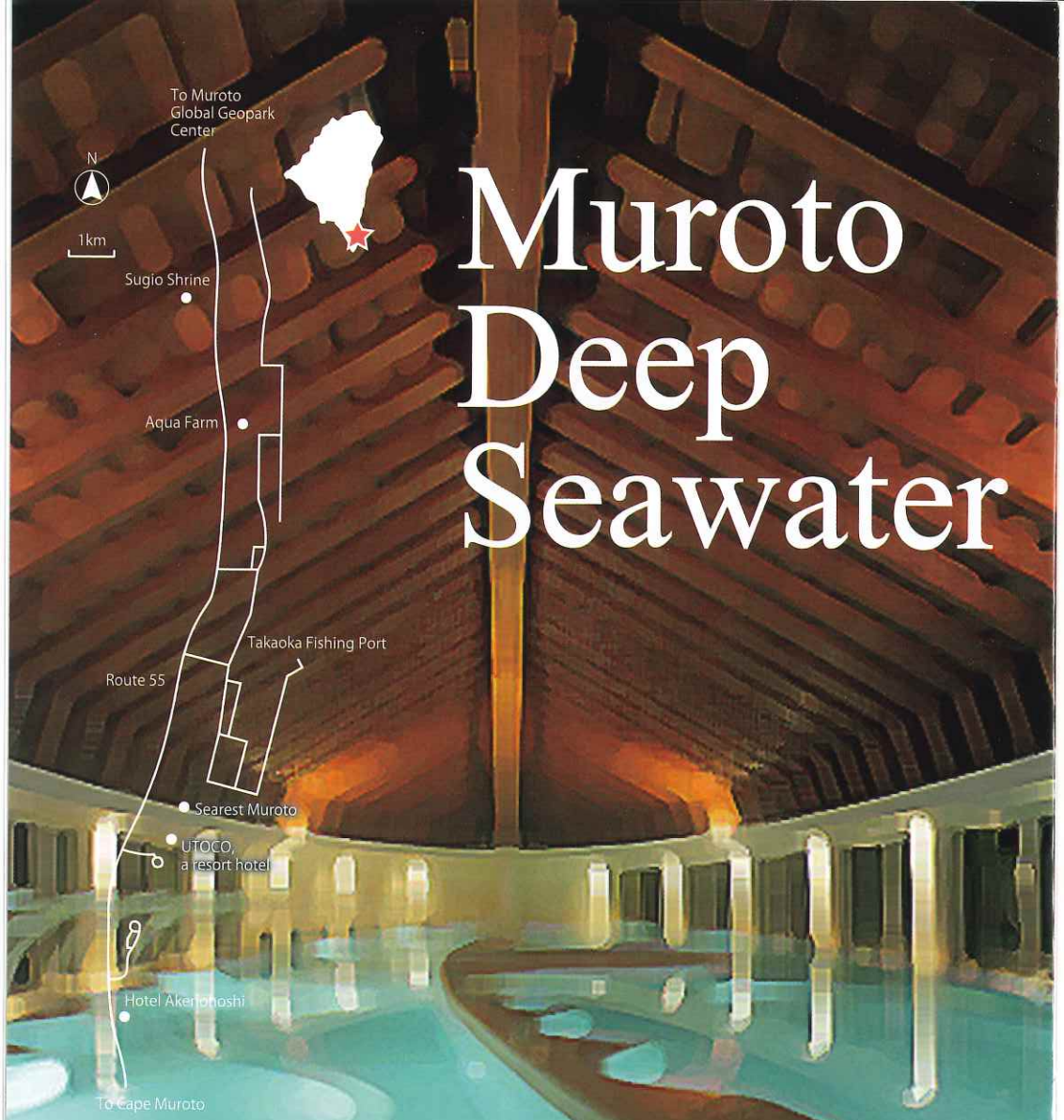
Rivers flowing on pillow lava.

Karataninotaki Falls



Karataninotaki Falls

Muroto Deep Seawater



Muroto's deep seawater is characterized as rich in nutrient compared with surface water, so it is used for various industries, such as green seaweed farming and vegetable. There are also several facilities utilizes the deep seawater for a spa and a thermal bath at east coast of Muroto.

1. A deep seawater thermal bath at Hotel Akenohoshi 2. Aqua Farm: At this deep seawater harvesting facility, you can see the intake pump and deep sea fish. The facility also has an exhibition explaining the harvesting process. 3. Marine Isopod: You might be able to see them at Aqua Farm. 4. Small Abalones cultured with deep seawater. 5. Seaweeds cultured with deep seawater. 6. UTOCO, a resort hotel at Cape Muroto, has a spa and a beauty salon with deep seawater. 7. Deep Sea World 8. Searest Muroto has a pool of deep seawater and a thermal bath and a foot bath.

Why is Deep Seawater Harvested in Muroto?

The sea layout and ocean current has a close relationship with upwelling of the deep seawater. The depth of east coast of the cape becomes suddenly deep from about 2-3km off the coast. This is because the steep cliff, with a depth of 1000m, is formed on the east side of the cape. Deep seawater travels on the ocean current, reaches the cliff and finally upwells towards the sea surface. In Muroto, the upwelling water is harvested at the depth of 320m, 344m and 374m for industrial use.

How is Deep Seawater Made?

Seawater is divided into surface water and deep seawater. Surface water is found at a depth of 200m or less; and deep seawater is found below this depth. In the ocean, water temperature and saline concentration are different between the depths. Deep seawater is heavier than surface water because temperature is lower and saline concentration is higher than surface water. Therefore sea surface and deep seawater move in different directions. Deep seawater sinks into deep sea in the northern part of the Pacific Ocean (near the Okhotsk Sea and the Gulf of Alaska), travels clockwise through the North Pacific Ocean at a depth of around 500m~1,000m, and then heads in a clockwise direction northeast towards Japan.

Hioki- Maruyama Coast

When you come to Hioki Fishing port, you will see a huge rock in the sea. What do you think that is? It is a rock called basalt. It was actually magma, which was chilled quickly by seawater. The basalt you can see at this fishing port shows round, pillow-like lumps on the surface. You can see many of them if you look closely. They are called "pillow lava."

When magma comes out of the earth into sea water, it is chilled quickly. As a result, only the surface of the magma sets, while the inside stays gooey and runny. The runny inner part breaks the weak part of the surface and comes out into sea water again, and then its surface sets again. The repetition makes pillow-shaped rocks called "pillow lava."

Narashi-Moto Beach

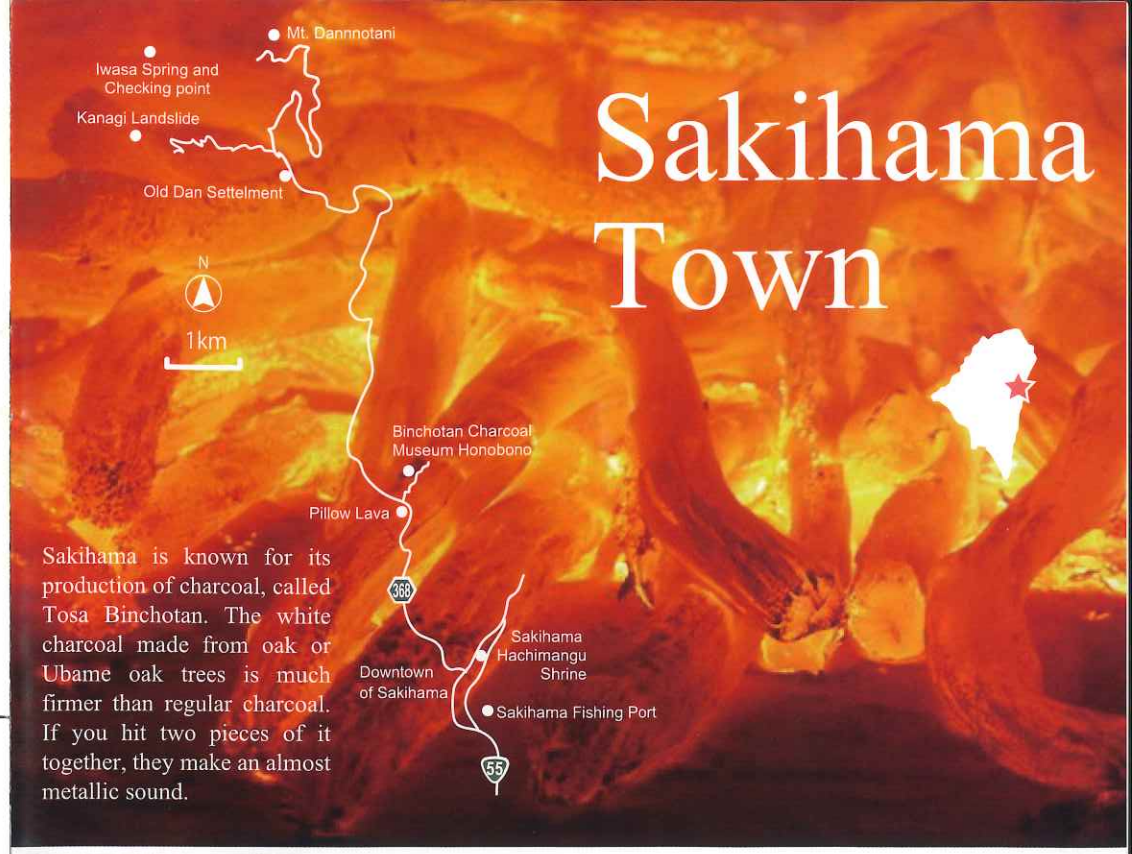
Sea turtles come to the Narashi-Moto Coast every year to lay theire eggs. At Moto Elementary School, located near the Moto Coast, students study about the nature and environment through the conservation activity of sea turtles.

Fossils of big mammals, 300 million years old are found in Narashi-Moto Coast. It is recognized as fossile of whale.

Meotoiwa Rock

If you look closely at surface of a rock, standing in front of Meotoiwa Rock, you can find several interesting things on it. Meotoiwa Rock is composed of mainly sandstone and a small quantity of mudstone.

Sakihama Town



Sakihama is known for its production of charcoal, called Tosa Binchotan. The white charcoal made from oak or Ubame oak trees is much firmer than regular charcoal. If you hit two pieces of it together, they make an almost metallic sound.

Muroto enjoys a warm climate thanks to the warm current flowing offshore. Wild oak trees and Ubame oak trees are found in the coastal and mountainous areas. Local charcoal production has been sustained by this abundant wood resource. The fury of nature (landslides), the blessings of nature and the traditional culture passed down for generations – you can learn about all of them in this town, Sakihama.

In Sakihama Town, a traditional play called Niwaka is performed by members of the local community. Niwaka is an ad-lib play popularly performed on the street or at parties from the Edo period (1603-1868) to the Meiji period (1868-1912). It was brought to this area from Osaka more than 240 years ago. The play has been designated as an Intangible Cultural Asset by the Japanese government. The local people perform the play on the 2nd Sunday of October every year at the autumn festival of the local Hachimangu Shrine. The performance by actors in unique costumes and makeup always gets great laughs from the audience.

While Niwaka was 'imported' from Osaka to Sakihama, certain things were 'exported' from Sakihama to Osaka. Since the days of the Shogunate, Sakihama has been known for its wood production. Some of the lumber from this town was used to build Osaka Castle. Firewood, called bosa, was another major product. Good quality fuel firewood and charcoal were sent to Osaka for sale, and the trade brought Osaka culture to Sakihama.

Mt. Dannotani

In the upstream part of Sakihama River, there used to be a small hamlet called 'Dan'. And further upstream, (on the slope at about 675～900 m above sea level) there are inhabitants who have been there before any people had access to the area. They are large wild cedar trees that look down at the foot of the mountain. There are 33 of them, all in unique shapes. Some have two or four-pronged branches, others have thick branches.

1. Hello cedar
2. Twin cedar
3. Jomon cedar
4. Tengu cedar
5. Nidai cedar
6. Danno cedar
7. Giant cedar
8. Great King cedar
9. Hermit cedar
10. Rhino cedar
11. Chief minister cedar
12. Goku cedar
13. Yayoi cedar
14. Beck cedar
15. Glove cedar
16. Holy fire cedar
17. Sea lion cedar
18. Guardian cedar
19. Flame cedar
20. Pregnant cedar
21. Octopus cedar
22. Tenjo cedar
23. Sisters cedar
24. Great Satan cedar
25. Piggyback cedar
26. Future cedar
27. Edo cedar
28. Elephant cedar
29. Imitating cedar
30. Crab cedar
31. Good view cedar
32. Brothers cedar
33. Jizo cedar

1. 'Giant cedar' is one of the largest cedars and has a circumference of up to 12 meters. 2. Lush ferns 3. Trails are well-managed and easy to walk. 4. 'Great Satan cedar' streches its branches towards all directions. 5. Mt. Dannotani is also formed from accretionary complex. 6. Young healthy cedar trees drinks a lot of water and makes moss on the surface of the tree. 7. At the bottom of Mt. Dannotani, there used to be "Dan Settlement." 8. There are "a closed checking-point of Iwasa" on the ridge.

Guided tour at Mt. Dannotani

We recommend you to go with a guide to Mt. Dannotani Site for the conservation of the forest and safe climbing.

Permission for the entry to Mt. Dannotani Site, the national forest, is necessary. However, if you go there with a guide, you don' t have to apply for the permission by yourself. The fee for the guided tour is ¥10,000／2～5persons. The tour takes for about 5 hours.
For booking and inquiry, please contact
Muroto Geopark Promotion Committee
Phone: 0887-22-5161

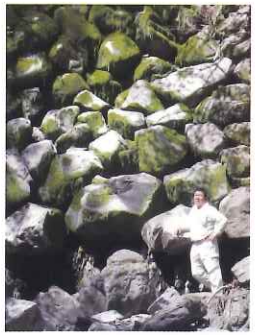
At Mt. Dannotani you can view ancient cedars, massive and gnarled, while the Kanagi landslide is a testament to the people of Sakihama, who worked for almost fifty years restoring the mountains to stop the frequent landslides that used to bury Sakihama with sediment.

Kanagi Landslide

Springwater wells up fresh in Iwasa, you see.
Ever-flowing down to the sea.
The sands of Sakihama beach keep ever piling up.
And that's how Mount None was finally built up.
- From the Sakihama Elementary School Song –

The lyrics on the right are from the first verse of the school song of Sakihama Elementary School. It means that the river takes sand and mud from the mountains down to the sea, then the sediments return to the mountains of Sakihama Town. That is how the land area of today's Sakihama Town has been formed. So, where did the sand and mud come from?

It was the mountain collapses in the most upstream area of the Sakihama River that produced the soil on the riverbank. In that area, there was a small community called Kanagi. The mountains there have experienced major lanslides repeatedly since long ago.
In Muroto, the land is rising fast and it often rains heavily. Firm mountains gradually become crumbly. This causes the slope of the mountain to collapse, which makes the mountain more unstable. That leads to large-scale slides or falls. Landslides have happened repeatedly in Kanagi. The communities in the middle and downstream areas along the Sakihama River have suffered serious damage with many casualties. In response, the local people conducted mountain restoration work for 49 years, from 1916 to 1964. People living downstream have built their houses on hills to cope with natural disasters. Additionally, the sediments washed down by the Kanagi landslide have been used for building material such as concrete. The mountains, the river that washed down the soil, and the life of the local people who stand fast against natural disasters – all are there for you to see in Sakihama.



List of Muroto UNESCO Global Geopark Sites

Area	No.	Name of site/ facility	Category: Geosite	Ecological site	Cultural site	Information Centers	Related Pages
Hane	H01	Cape Hane Turbidites and Trace Fossiles	○				12
	H02	Nobori Formation	○				12
	H03	*Cassytha* Plant Community		○			30
	H04	Nakagawauchi Village on a Fluvial Terrace	○				
	H05	Round Hill Made by Hanegawa River	○				
	H06	Fluvial Terrace Deposits in Hanegawa River	○				
Kiragawa	K01	Nishiyama Plateau (200,000yBP Marine Terrace)	○				16–19
	K02	Nishiyama Plateau (125,000yBP Marine Terrace)	○				
	K03	Kiragawa Townscape			○		13–14
	K04	Onda Hachimangu Shrine			○		
	K05	*Luisia teves* at Onda Hachimangu Shrine		○			
	K06	Sakihama Melenge and Gabbro	○				15
	K07	Fault Trace at Chojano Outcrop	○				
	K08	Kuromi Coast Trace Fossile	○				
	K09	Hirao Coast Turbidites and Trace Fossils	○				
Muroto	T01	Fudoiwa Rock	○				22–23
	T02	Trace Fossils at Cape Gyodo	○				
	T03	Current Ripple at Cape Gyodo	○				
	T04	Sand Dyke at Cape Gyodo	○				
	T05	Slump Structure at Cape Gyodyo	○				
	T06	Sakiyama Plateau (100,000BP Marine Terrace)	○				16–19
	T07	Sakiyama Pleateau (300,000BP MArine Teracce)	○				

Area	No.	Name of site/ facility	Category: Geosite	Ecological site	Cultural site	Information Centers	Related Pages
Muroto	T08	Henro Pilgrimage Culture/ Kongochoji Temple			○		32
	T09	Pilgrimage Route Milestone at Moto Coast			○		
	T10	Moto Coast Marine Mammal Fossil Site	○				36
	T11	Narashi-Moto Coast		○			
	T12	Ikeyamaike Pond		○			
	T13	Ukitsu Coast Kujirabae			○		20
	T14	Ukitsu Chudoji Temple			○		
	T15	Henro Pilgrimage Culture/ Shinshoji Temple			○		32
	T16	Murotsu Port			○		24
	T17	Maigo Well			○		
	T18	Gomen Area			○		
	T19	Mt. Shijuji	○				33
Murotomisaki	M01	Takahama Coast Turbidites and Melenge	○				25
	M02	Tsuro Port			○		
	M03	Mt. Otaruyama Red Shale	○				33
	M04	Sakamoto Coast Red Shale	○				25
	M05	Sakamoto Coast Melenge	○				
	M06	Cape Muroto *Ludwigia stipulacea* Plant Community		○			30
	M07	Cape Muroto Gabbro Pegmatite	○				26–29
	M08	Cape Muroto Gabbro Crystal Growth	○				
	M09	Cape Muroto Gabbro-Sandstone Boundary	○				
	M10	Cape Muroto Turbidite	○				

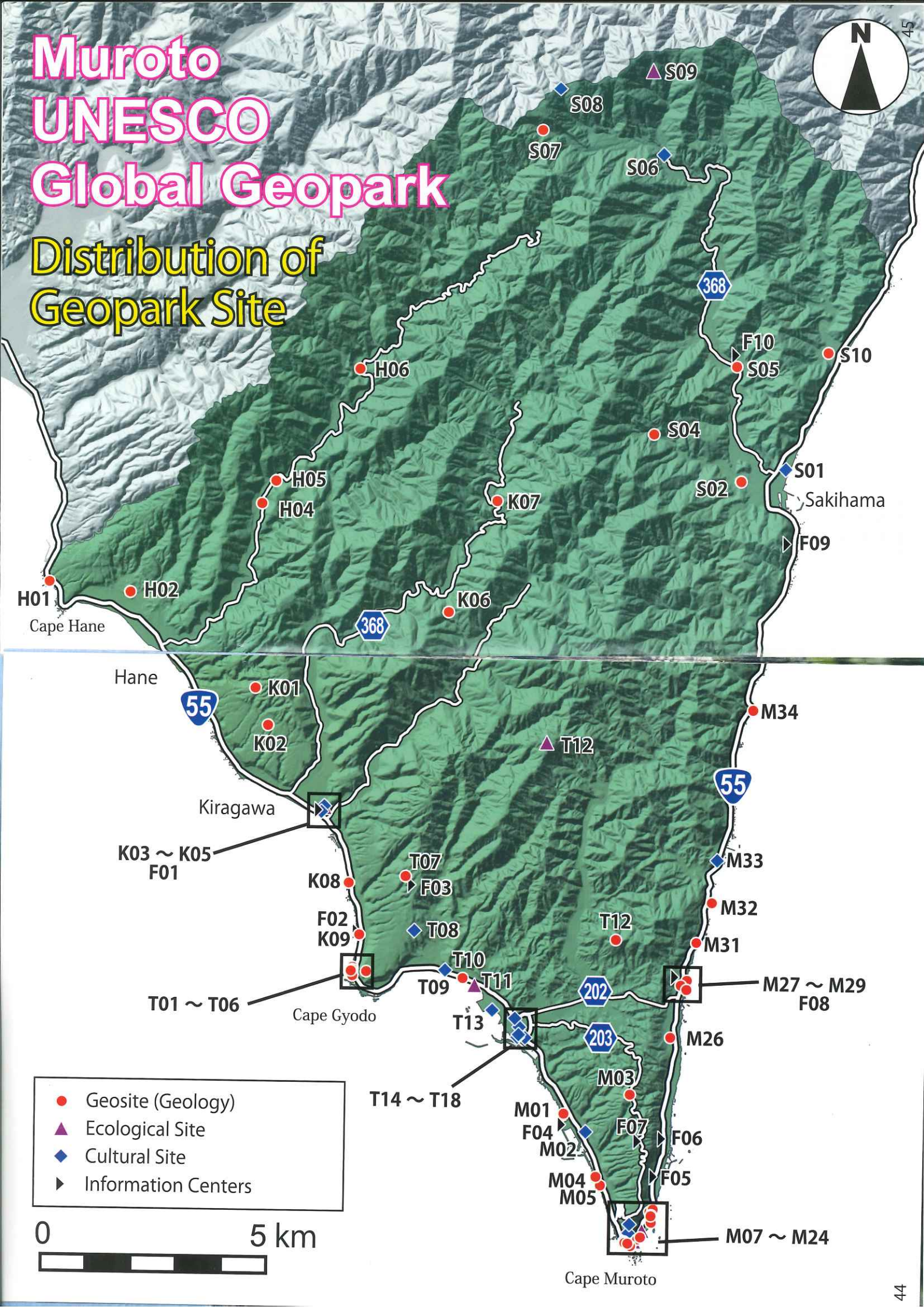
Area	No.	Name of site/ facility	Category: Geosite	Ecological site	Cultural site	Information Centers	Related Pages
Murotomisaki	M11	Cape Muroto Akou Tree (Ficus superba)		○			30–31
	M12	Cape Muroto Fold Structure	○				26–29
	M13	Cape Muroto Conglomerate and Pseudo-conglomerate	○				
	M14	Cape Muroto Coastal Vegetation		○			30–31
	M15	Cape Muroto Tafoni	○				26–29
	M16	Cape Muroto Seismic Uplift	○				
	M17	Cape Muroto *Spirobranchus kraussii* Tube Remains	○				30
	M18	Eboshi Iwa Rock	○				26–29
	M19	Cape Muroto Hornfels	○				
	M20	Cape Muroto Potholes	○				
	M21	Bathing Pond	○				
	M22	Mikurodo and Shinmeikutsu Cave	○				
	M23	Murotozaki Lighthouse			○		
	M24	Henro Pilgrimage Culture/ Hotsumisakiji Temple			○		32
	M25	Wild Bat Habitat		○			30
	M26	Mitsu Alluvial Fan	○				
	M27	Maruyama Dolerite	○				
	M28	Mitsu-Maruyama	○				
	M29	Hioki Melange	○				
	M30	Mitsu Coast Deep Marine Bivalve Fossils	○				
	M31	Mitsu Coast Volcanic Breccia	○				36
	M32	Hioki Coast Pillow Lava	○				

Area	No.	Name of site/facility	Category: Geosite	Ecological site	Cultural site	Information Centers	Related Pages
Muroto misaki	M33	Shiina Whale Lookout			○		20
	M34	Married Rocks in Kabuka	○				36
Sakihama	S01	Sakihama Hachimangu Shrine			○		37
	S02	Marine Terrace at Sakihama Myokengu Shrine	○				18
	S03	*Syneilesis tagawae* Kitam		○			30
	S04	Karatani Falls	○				33
	S05	Sakihama Pillow Lava	○				
	S06	Dan Settlement			○		40
	S07	Kanagi Landslide	○				41
	S08	Wild Cedar Trees at Mt. Dannotani		○			38–40
	S09	Iwasa Spring and Checking Point			○		40
	S10	Stone Memorial of Tsunami			○		
	F01	Kiragwa Information Center				○	13
	F02	Kiramesse Muroto				○	21
	F03	National Muroto Youth Outdoor Learning Center				○	19, 33
	F04	Toromu				○	25
	F05	Searest Muroto				○	34–35
	F06	Aqua Farm				○	
	F07	Muroto Skyline Lookout Point				○	33
	F08	Muroto Global Geopark Center				○	10–11
	F09	Tsuro Tsunami Shelter				○	
	F10	Honobono Museum				○	37

There is the list of Muroto UNESCO Global Geopark Sites.
Some of sites does not reveal detail information in order to conserve important natural heritage.

Muroto UNESCO Global Geopark

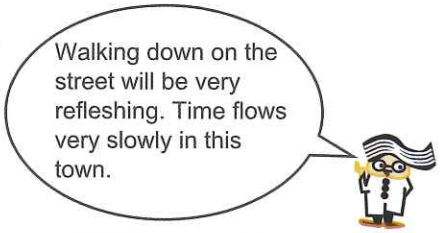
Distribution of Geopark Site



Walking Down on Historical Street with Local Guide

Kiragawa has developed its history and culture based on Tosa binchotan charcoal manufacturing. Traditional architectural technique enriches the town and also protects locals' life from heavy rain and winds. Some of architects in this town has been here over 100 years. Locals are pround of their history and they work on conserving the town.

Guided tour starts in the middle of the traditional street. White plaster wall decorates the town.



A local guide tells you how those white walls have been maintained for over hundreds years to protect houses.

Those traditional houses are built in harmony with climate; heavy rain and winds. Muroto UNESCO Global Geopark is not only about Cape Muroto, ocean, or coast line. This townscape and houses are formed based on Muroto's climate and topography. In Kiragawa, local works on conserving their traditional townscape and welcome visitors to know their unique culture and history.

An old post office (already closed) still stays in the town and shows you history of the town.

Ishiguro, stone-wall can be found everywhere in this town. Most stone-wall is made of sand stones.

Contact Info. of the Tour

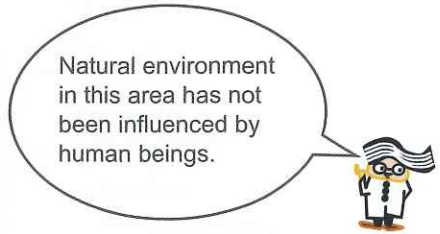
Kiragawa Information Center (Japanese)
TEL: 0887-25-3670 (9am to 4pm, closed on Tue.)
Email: kiragawa-machinami@muroto.fiberbit.net

Price
¥1,200-/1~5 persons
¥2,100-/6~10 persons
¥3,000-/11~14 persons
¥4,000-/15~29 persons
¥5,000-/over 30 persons

Mt. Dannotani Trecking Tour

There is a guided tour to see dynamic cedar trees on Mt. Dannotani. It will be about 5-hour hike tour. On the way to Mt. Dannotani, you will also see several plants and flowers and encouter old communities where used to have some villagers. A local guide will tell you how locals lived on the mountain.

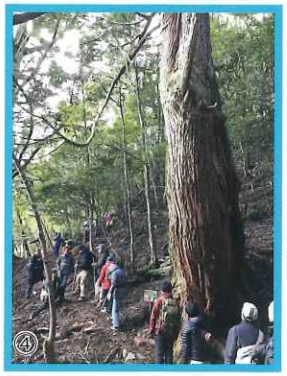
Old wooden shrine entrance, *torii*



Wild fruits can be found everywhere on the way. (*Ardisia crenata*)

A stone memorial in old "Dan" settelment

You could find a trap for catching a wild boar.



Finally found to wild cedar tree community!

Mt. Dannotani is the best place for visitors who love trecking! Humongous wild cedar trees gives you specutacler view.

The tour participants also will learn about history on the mountain in this area. There used to be a settelment, called "Dan." Several evidence of the old settlement can be found such as stone-walls, kitchen area, bathroom, etc.

Contact Info. of the Tour

Muroto Geopark Promotion Committee
TEL: 0887-22-5161 Email into@muroto-geo.jp
Approximate time required for the tour: 5 hours

Price
¥10,000-/2~5 persons
¥2,000 for each person over 6.

*The tracking tour is easily affected by weather conditions.