Water and History Etched into the Islands
—Landscapes Revealed Through a Stroll in the Urato Archipelago









the Public Interest Incorporated Foundation Miyagi Environmental Life Outreach Network (MELON)

Table of Contents

1.	Introduction	1
2.	Overview of the Urato Four Islands	2
3.	Report on the Excursion	6
3-1	Nonoshima Stroll	6
3-2	Katsurashima Stroll	12
3-3	Sabusawajima Stroll	18
3-4	Houjima Stroll	25
4.	Final Remarks	32
	Acknowledgments	
Additional Notes	The History of the Water Supply System in the Urato Islands, Miyagi Prefecture	35
	Folktales of the Urato Islands	43
	Activities of the Urato Islands “Sea and Flowers Story”	44

1. Introduction

This document has been prepared not as a conventional tourist guide to the four islands of the Urato Islands, but for the purpose of communicating and promoting awareness of the islands' natural features, as well as the culture and history related to their water environment.

One of the activities of the Miyagi Environmental Life Outreach Network (MELON), a Public Interest Foundation, is the Water Research Group. The Water Research Group has carried out water-quality surveys of the Hirose River and conducted investigations related to deities associated with water—such as the "Search for Water Deities Project"—in order to promote the conservation of a healthy water environment in Miyagi Prefecture.

In addition to these activities, the Water Research Group began conducting water-focused field investigations in fiscal year 2022 on the Urato Islands—four remote islands situated in Matsushima Bay within the city of Shiogama—as part of its experiential learning program on local water conditions. The purpose of this initiative is to foster understanding of the islands' remarkable natural environment, as well as the culture and history connected to their water environment.

More specifically, on each island we examined how drinking water and domestic water have been secured as essential resources for daily life, whether deities associated with water are enshrined, and whether environmental changes caused by global warming are affecting local fisheries and other livelihoods. We also investigated the unique relationships between water and island life, as well as the historical background underlying these practices.

The stroll was conducted not only by members of the Water Research Group but also with the participation of MELON members and other interested individuals who were invited to join.

The islands visited and the catchphrases for the main activities for each year are as follows.

2022 **Nonoshima (Nono Island)** Microplastic Investigation Workshop

2023 **Katsurashima (Katsura Island)** What Is the Amefuri-ishi?

Amefuri-ishi refers to stones used for praying for rain.

2024 **Sabusawajima (Subusawa Island)** A Lifestyle in Harmony with the Island's Natural Environment and a Journey Through Its History

2025 **Hojima (Ho Island)** Hearing Firsthand in the Field About the Effects of Rising Sea Temperatures Caused by Global Warming

In addition, the following phrases were used when recruiting participants for the stroll.

Nonoshima：Join us on Nonoshima, one of the Urato Islands in Shiogama City, for a hands-on microplastic survey and a guided nature walk that will deepen your understanding of the local water environment. It's a great opportunity to learn, explore, and experience the island's unique coastal landscape. We also hope this will serve as a first step toward building connections with local groups that promote coastal cleanups, water-quality monitoring, and other environmental activities.

Katsurashima：Katsurashima is home to Mount Tsumoriyama, the highest point in the Urato Islands at 61 meters.

On the mountain are the Amefuri-ishi, stones traditionally used for rain-calling rituals, as well as the distribution reservoir that supplies water to the Urato Islands. Learning how island residents use water and interact with their water environment gives us a deeper understanding of their everyday lives.

We will also have an opportunity to connect with *Stories of Flowers and the Sea in the Urato Islands*, a local group that grows flowers with care for the environment. We welcome anyone who would like to stroll around Katsurashima or who feels drawn to the island's historic Amefuri-ishi rain-calling stones. We look forward to your participation and hope you'll join us for this experience.

Sabusawajima：Although the island has no rivers, traditional rain-fed rice cultivation is still practiced there. The irrigation channels running along the field ridges are a haven for creatures like Japanese killifish and crayfish.

On the other hand, *the Twelve Zodiac Direction Stone* located on Mount Hiyori played a role in supporting water transportation during the Edo period.

We invite you to join us for a guided walk on Sabusawajima, where you can deepen your understanding of the island's unique water environment. Come and enjoy the beautiful autumn colors as we explore the island together.

Hojima：This time, our program includes a stroll on Hojima and a bay tour aboard a small traditional boat called a *Danbeko-sen*, during which you will receive firsthand explanations from a former fisherman who lives on the island. The tour provides an opportunity to hear directly from those involved in the fishing industry about how rising water temperatures caused by climate change are affecting their work and altering the marine environment.

2. Overview of the Urato Four Islands

The Urato Islands are situated at the entrance of Matsushima Bay in Shiogama City, Miyagi Prefecture, and consist of four inhabited islands: Katsurashima, Nonoshima, Sabusawajima, and Hojima.



Source: Based on the "Urato Islands Walking Map" published by the City of Shiogama, with additional annotations.

Nonoshima

Nonoshima lies roughly at the center of the Urato Islands and hosts the Urato Islands Development Center (commonly known as the Blue Center), which functions as both a branch office of the Shiogama City Hall and a lodging and training facility. The island also hosts the Urato Clinic, making it a central hub for daily life within the Urato Islands.

On the hilltop of the island stands the only elementary and junior high school in the Urato Islands, housed together in a single facility.

The island features a variety of scenic and cultural attractions, including the Camellia Tunnel, a cluster of caves known as Bora, Kumano Shrine with its Christian-influenced Buddha statue, and the "Yonaki Jizō" guardian statue. Together, these mystical landmarks create the island's distinctive and enchanting atmosphere.

In addition, the island is actively engaged in volunteer-led planting activities under *the Nonoshima Flower Island Initiative*, focusing on lavender and other herbs that bring vibrant color and charm to the landscape.

Here are some of the key attractions on the island as listed in the sightseeing guide.

- Kumano Shrine: Behind the main deity statue, there is a small shrine housing a "Christian Buddha," which is said to have been secretly worshipped by hidden Christians. This unique history adds a sense of mystery to the site.
- Camellia Tunnel: This natural tunnel is formed by wild camellia trees, reaching its peak viewing season from late April to mid-May. Even outside the flowering period, the lush green archway remains a captivating sight.
- Unaihama: This beach connects to the island at low tide, offering a beautiful view of the shoreline, the sea, and the surrounding green islands. It is an ideal spot to take a break during your island walk.

Source: Nonoshima – Urato Islands, Shiogama City, Miyagi Prefecture Source: Matsushima Tourism Navi

Katsurashima

The island's western coast is lined with dramatic cliffs, offering sweeping views of nearby islands such as Omonejima, Komonejima, and Niojima, with the distant Ou Mountains visible on the horizon. Visitors can enjoy this strikingly scenic landscape as one of the island's most memorable highlights. Katsurashima Beach: Overlooking the Pacific Ocean, this well-equipped beach offers a comfortable and scenic place for visitors to enjoy the seaside.

The island's main industry is fishing, and it is especially known for its high-quality nori (fragrant seaweed) and oysters cultivated in the nutrient-rich bay. Whitebait fishing is also active, and in early spring the fishing lights glowing across the night sea create a beautiful scene—an iconic sight that heralds the arrival of spring in the Urato Islands.

In recent years, the island's fields have begun cultivating edible ground cherries, marking a new and growing local industry.

The island features well-maintained hiking trails, along with must-see spots such as an observation deck overlooking Matsushima, Matsuzaki Shrine, and Amefuri-ishi, all of which offer a glimpse into the island's rich history.

During the Great East Japan Earthquake, the island miraculously suffered no casualties, earning it the nickname "The Miracle Island."

Here are some of the key attractions on the island as listed in the sightseeing guide.

◉ Matsuzaki Shrine and Tabu Tree Forest : The shrine is one of the fourteen auxiliary shrines of Shiogama Shrine, where Okutsuhiko-no-Okina-no-Kami and Okutsuhime-no-Okina-no-Kami, the deities of the hearth, are enshrined.

The shrine's sacred grove is densely populated with large evergreen Tabu trees (scientific name: *Machilus thunbergii*), which reach the northern limit of their natural range in this region, making the area dark even during the day. There is a traditional belief that anyone who puts a blade to the trees within this shrine's sacred grounds will be punished by the heavens. The larvae of the Common Bluebottle (scientific name: *Graphium sarpedon*) grow by feeding on the leaves of the Tabu tree, and from May to October you can see their beautiful flight.

◉ Katsurashima Beach : The beach features a spacious sandy shore facing the Pacific Ocean, and it is fully equipped with showers and changing rooms. You can also enjoy marine sports and take part in shore-seine net fishing.

Tall Japanese black pines (*Pinus thunbergii*) stand densely around the beach, and the flowers of Rosa rugosa and beach morning glory (*Calystegia soldanella*) bloom in profusion across the area.

◉ Amefuri-ishi : It is said that, because Katsurashima has no rivers, the islanders once performed rain-making rituals when periods of drought continued. The details will be described later.

Source: Katsurashima – Urato Islands, Shiogama City, Miyagi Prefecture Source: Matsushima Tourism Navi

Sabusawajima

Sabusawajima flourished as a bustling island during the Edo period, serving as the Date domain's port for rice shipments to Edo, where numerous people, ships, and goods came and went.

On the island, many vestiges of its former prosperity still remain. On Hiyoriyama stand the 'Twelve Zodiac Direction Stone' and the figure known as the 'Shibarijizō'. There is also a monument to the 'Kaiseimaru', the first Western-style warship constructed by the Date Domain, along with remnants of artillery emplacements. In addition, an interpretive plaque recounts the life of Tsudayū, the first Japanese to circumnavigate the globe. Together, these landscapes and historical structures preserve the memory of an age long past, when the island flourished.

The island's principal industry is fishing. In particular, the island is counted among the nation's leading oyster-producing regions, and with the arrival of autumn, the landing and shipment of fresh oysters become especially vigorous. The island is also a production site for oyster spat, known as "seed oysters," which are shipped to major oyster-growing regions such as Hiroshima and Iwate, where they are cultivated.

The highlights of Sabusawajima are presented below. Items that overlap with the following descriptions are discussed in greater detail in Section 3, "Report on the Excursion."

◉ Monument to Shipbuilding : In the Edo period, the port of Sabusawa prospered as a busy maritime station, where Sengokubune—the large Japanese wooden cargo vessels that sustained the coastal transport networks of the age—made regular calls.

◉ Hiyoriyama Observatory (featuring the "Twelve Zodiac Direction Stone" and the figure known as the "Shibarijizo") : The "Twelve Zodiac Direction Stone", erected in the Tenpō era (circa 1830–1844), served in its day as an instrument for observing weather conditions and as a vantage point from which the comings and goings of ships were kept under watch. This stone, with a diameter of 45 centimeters and ranked among the foremost directional stones in Japan, stands as a quiet testament to the prosperity once enjoyed by Sabusawajima.

In those days, the island maintained a quarter, and it is said that the courtesans, wishing to prevent the men from putting out to sea, bound the Jizō statue with coarse rope and offered their prayers. This figure came to be known as the "Shibarijizo."

- Sabusawa Shinmei Shrine： The shrine building is said to date from the mid-Edo period, and its roof is fashioned in the distinctive “Nagare-Dukuri” style. Within this shrine are enshrined two deities—the Amaterasu-sumera-ōkami and the Toyouke-no-sumera-ōkami—who were long believed to watch over the prosperity of Sabusawajima. In addition, within the precincts there may be seen a small shrine dedicated to the water deity, known locally as Unnansama.

- Countryside： Rice cultivation on Sabusawajima, which has no rivers, is carried out using only rainwater. In autumn, the harvested rice stalks are laid out to dry under the open sky, revealing a nostalgic scene of traditional Japanese rice farming. As part of revitalizing the island, sake rice is now being cultivated, and with that rice the local brewery crafts its own sake — a heartfelt endeavor that brings new life and pride to the community.

- The Six Jizō Statues Found on Sabusawajima： The six Jizo statues standing quietly along the path originate from the Buddhist belief in the Six Realms of existence. That is, the Six Realms refer to the realms of Hell, Hungry Ghosts, Animals, Asuras, Humans, and Devas. It is said that Jizo pours boundless compassion upon all beings across the Six Realms without discrimination, guiding suffering and deluded souls toward salvation and delivering them to the Pure Land.

- The Jizo Adorned with Makeup at Shōrine Temple： At Shorine Temple, there is a Jizo known as the “Adorned Jizo.” It is said that when devotees apply white powder to the Jizo’s face as an offering of prayer, they may be blessed with a beautiful and healthy child.

Source: Sabusawajima – Urato Islands, Shiogama City, Miyagi Prefecture

Hojima

Although Hojima is the smallest inhabited island among the Urato Islands, it is well known as a major production site for “seed oysters.”

The island also produces the seeds of “Matsushima Hakusai (Chinese cabbage)”. In spring, its rapeseed fields burst into brilliant bloom, covering the entire island in what looks like a sweeping golden carpet. Visitors are treated to a breathtaking sight, as the landscape transforms into a radiant sea of yellow that embodies the gentle beauty of the season.

According to a legend passed down from the Edo period, this island was once believed to be a secret hiding place for the Date clan’s military funds and precious treasures. Inspired by such tales, it came to be known as “Takara no Shima (The Island of Gold),” the Island of Treasure. Over the centuries, however, the name gradually shifted, with “Takara” evolving into the similarly pronounced “Hou”, eventually giving rise to the name Hojima. Even today, the island retains an air of quiet mystery, its history wrapped in enduring intrigue and folklore.

As a sightseeing spot;

- A field of rapeseed blossoms and a grove of tabu trees： If you walk up the hill from Hojima Shinmei Shrine, there is a field of rapeseed flowers. The rapeseed flowers on Hojima are cultivated to take advantage of the island’s geographic isolation, allowing the production of “single isolated strain” of Matsushima type Chinese cabbage seed. Consequently, local residents take great care of the field, painstakingly removing weeds and performing other tasks to avoid any unintended cross-pollination with surrounding vegetation.

  Further on, there is a grove of tabu trees. In spring, the sweeping yellow of rapeseed blossoms blends harmoniously with the fresh green of the tabu leaves, and beyond them the sea and scattered islands come into view, forming a tranquil landscape that symbolizes the gentle character of the Urato Islands.

Source: Hojima – Urato Islands, Shiogama City, Miyagi Prefecture

3. Report on the Excursion

We present our findings from walking across each of the four islands of the Urato archipelago. This report offers a detailed account of the cultural, historical, and natural features related to the islands' water environment, which formed the central focus of our observations. We also made extensive use of photographs taken by MELON members, adding comments to items that attracted particular interest.

3-1 Nonoshima Stroll

The stroll and survey were carried out with Mr. Masanori Suzuki (a resident of Nonoshima) serving as our guide, following the route indicated by the arrows below.

Urato Islands Development Center (Blue Center): Greeting by Yamada, Leader of the Water Research Group and self-introduction → Unai Beach → microplastic survey → stroll (lavender field, camellia tunnel, Kumano Shrine etc.) → return to the Blue Center → Disbanding at the Nonoshima pier.

A map of Nonoshima is shown below.



Source: Based on the "Urato Islands Walking Map," published by the City of Shiogama, with additional annotations.

(1) Microplastic Survey Experience Report

In preparation for the survey, the leader of the Water Research Group provided a detailed explanation of the nature and defining characteristics of microplastics, the detrimental effects associated with their presence, the methodology to be employed in the investigation, and the specific precautions required to ensure the rigorous execution of the survey.



Unai Beach

The quantity and density of stranded debris differ along the shoreline at low tide and high tide.



Quadrat survey (Quadrat-based methodology)

Practical examples of the quadrat method

- A square frame measuring 50 cm on each side is used for quadrat surveys.
- The surface sand within the quadrat is scooped out with a shovel to a depth of 3 cm. The collected sand is passed sequentially through sieves with mesh sizes of 4.5 mm, 2 mm, and 1 mm to extract microplastic particles. Care is required because microplastics may also adhere to seaweed.
- Sand between the low-tide and high-tide lines is sampled at least at three sites, and the results are analyzed statistically. On sandy shores, stranded materials form distinct bands with each tidal cycle.

The samples are placed in sample bottles and transported to the laboratory, where their size and number are measured.



Examples of shoreline debris：

Small tubes used for oyster cultivation (shown on the right in the photo).

Materials provided by the Leader of the Water Research Group.



Plastic debris washed ashore and collected at Unai Beach

Amount Collected by 15 People in Approximately 20 Minutes

The participants raised the following questions, and the corresponding responses were provided.

- A large number of small plastic tubes used in oyster farming were found. Are there any alternatives?
  ➞ In the past, they were made of bamboo, but durability problems led to the adoption of plastic. Biodegradable plastics have also been considered, but they do not provide sufficient durability.
- I am concerned about microplastics adhering to edible nori (seaweed).
  ➞ Microplastics are usually removed through the natural metabolic processes of nori, but depending on the timing, it is possible for humans to ingest them.
- Wouldn't plastic shopping bags float in seawater?
  ➞ Contamination by oils and other substances can change their density, and plastic shopping bags have even been found in the deep sea. In the deep ocean, where ultraviolet light does not reach, their degradation tends to be further delayed.

Reflecting on the Coastal Cleanup

At the end of the survey, all participants collected plastic debris that had washed ashore on Unai Beach. Through this cleanup, we found that many of the items were plastic waste originating from fishing gear, such as small tubes and ropes used in oyster cultivation, as well as fragments of fishing nets.

The Leader of the Water Research Group noted that, because plastics are both highly durable and inexpensive, they are closely connected to the market prices of the seafood we routinely consume. He therefore emphasized that the issue of marine debris constitutes a challenge that must be addressed collectively. He concluded by expressing the hope that this activity would serve as a meaningful opportunity for local children to begin engaging with the problem together with the community.

Comment 1: Microplastics and Marine Plastic Debris

Microplastics are plastic fragments smaller than 5 mm, generated either through the breakdown of larger plastic debris by waves, ultraviolet radiation, and other environmental forces, or through the use of microplastic beads in products such as exfoliating scrub agents. It is currently estimated that, on a global scale, several million tons of plastic waste enter the marine environment each year.

The release of microplastics into the marine environment is an international concern, as it has the potential to cause a wide range of adverse impacts on natural ecosystems, including ingestion by marine organisms, endocrine-disrupting effects, reproductive toxicity, and human health risks associated with persistent organic pollutants (POPs).

Reference: 2020 Edition — White Paper on the Environment, Sound Material-Cycle Society, and Biodiversity

(Ministry of the Environment, Japan)

(2) Information and insights gained through a stroll



White triangular marker

This marker indicates the location of the submarine transmission pipe and serves to inform vessels of the pipeline’s installation area so that anchors are not deployed above it.

This is installed both at the outlet of the submarine transmission pipe and at the inlet on the other island.



A 10-Million-Year-Old Stratum of Consolidated Volcanic Ash

Tuff observed during the stroll

In addition, the islands in Matsushima Bay are composed of tuff.



The right side of the breakwater faces Matsushima Bay, while the left side is a lavender field.

Clam aquaculture had been conducted near the breakwater before the Great East Japan Earthquake, but post-disaster environmental changes prevented further growth, leading to the creation of a new tidal-flat site for cultivation in another area.



Naga Beach, the area with a canoe boarding point



A mountain trail where native lilies grow in clusters

Various other wild mountain plants also grow in dense clusters, and it is said that people who see photographs posted on social media come to observe them.



Viburnum (scientific name: *Viburnum dilatatum*)

It is sometimes added to pickled radishes. This fruit becomes sweet in late autumn.



Wild grape (scientific name: *Ampelopsis glandulosa*

var. *heterophylla*)

※On the island, it is said to be called “mekurabudō”.

“Be careful, as it is not suitable for food”.

It is unclear whether it has any pharmacological effects, but some studies have reported possible benefits such as relief of gastric disorders, improvement of arrhythmia, and potential usefulness in the treatment of arrhythmia-related liver cirrhosis.



Jizo Statue Found in the Mountains



Kumano Shrine

Following my visit to Kumano Shrine, which enshrines the Christian Buddha, we returned to the Blue Center, thereby concluding the stroll.

Shiogama Municipal Inter-Island Ferryboat

In the Urato Islands, the municipality operates an Inter-Island Ferryboat free of charge for both residents and travelers, providing transportation between Nonoshima and Ishihama, as well as between Nonoshima, Katsurashima, and Hojima.

The procedure for requesting the Inter-Island Ferryboat is quite unique: when we call from the boarding point, the boat comes to pick us up.

During our stroll, we found that there were no restrooms on the eastern side of Nonoshima, so we took the inter-island ferryboat to Sabusawajima on the opposite shore for a restroom break.



Inter-Island Ferryboat

“Kaachan Bento (Mother’s Bento)” provided by the Ganbaru Urato Mothers’ Association

There were no eateries on the island, so we enjoyed a homemade bento prepared by the local mothers. The Ganbaru Urato Mothers’ Association produces and sells bento made with ingredients sourced on the islands, as well as seasoned seaweed (tsukudani) and roasted nori.

At the end of our stroll, the Mothers’ Association kindly prepared a “treat set” for us, which included lemongrass and handmade umeboshi from the island.

3-2 Katsurashima Stroll

The stroll and survey were conducted under the guidance of Mr. Nobuyoshi Uchiumi of Katsurashima, along the route shown below.

Ishihama Shrine → Distribution Reservoir → Tsumoriyama・Amefuri-ishi → Katsurashima Station (Lunch) → Rapeseed Blossom Field → Komakake Park・Monument to the Eight Great Dragon Gods → Katsurashima Beach → Matsuzaki Shrine

A Map of Katsurashima



Source: Based on the “Urato Islands Walking Map,” published by the City of Shiogama, with additional annotations.

Below, we present the activity report, organized according to the route we took.



From Marine Gate Shiogama, we took the municipal ferry to Ishihama.



In front of the distribution reservoir, we listened to an explanation of the Urato Islands' water supply system and its history.



Distribution Reservoir Supplying Water to the Four Urato Islands

Source: Seventy Years of Shiogama's Water Supply

Urato Islands have no sources of good-quality water or natural springs and have relied almost entirely on rainwater. For that reason, in 1966 a transmission pipe with a diameter of 125 mm was laid on the seabed of Matsushima Bay. Subsequently, water shortages arose due to the cultivation of nori (laver) and oysters, and between 1975 and 1979 a 250 mm-diameter submarine transmission pipe was installed, and the capacity of the distribution reservoir was increased to 410 m³.

※ Details concerning the water supply system of the Urato Islands are provided in full at the end of this report.



Signpost Indicating the Direction to Amefuri-ishi



Amefuri-ishi



Wooden post on the Origin of Amefuri-ishi

A Japanese cleyera (scientific name: *Cleyera japonica*), a species used in Shinto rituals, was growing naturally beside Amefuri-ishi.

Japanese cleyera is a plant distributed in the south-central regions of Honshu (from Ibaraki Prefecture to Ishikawa Prefecture and westward), and its presence on Katsurashima gives the impression that distinctive ecological conditions may be at work there.

Comment 2: The Origin of Amefuri-ishi

It is said that not only the island's inhabitants but also people from neighboring villages came to petition for rain, and that this custom endured until the Taisho era.

There is a theory that the custom originated when the people of this area enshrined Ooyama Temple (in Isehara City, Kanagawa Prefecture).

In earlier times, men and women of all ages, carrying bamboo rods or wooden sticks, would gather around the stone and strike it while chanting, "Amaashi Kudasatta Zaa, Zaa Gozare" ("Pray send us rain").

And then, when the elder sprinkled water from a wooden pail over Amefuri-ishi and upon the assembled people, it was said that a heavy rain soon followed.

The guide added that the islanders would sometimes pray for the rain not to fall.

※ According to tradition, Ooyama Temple preserves a legend in which Kobo Daishi struck a stone with his staff, whereupon rain began to fall.

References：Kanzo Suzuki, Urato no Konjaku (The Past and Present of Urato) ,

Shizuo Iwasa, Shiogama City History VI: Documentary Volume II and The Islands of Urato"

Comment 3: Tarayo, the "Postcard Tree"

Near the Amefuri-ishi, the guide showed us a slightly larger, glossy, thick leaf and explained with a smile that if you write on it, the words will remain preserved for a very long time.

Scientific examination shows that when the leaf surface is scratched, the tannins within the tissue undergo oxidation, causing the markings to become visible and remain legible for a comparatively long period.

This leaf is from Tarayo (Scientific name: *Ilex latifolia Thunb*), an evergreen broad-leaved tree. Tarayo is ordinarily distributed mainly from central Honshu westward to Kyushu. It is therefore scientifically puzzling that this species appears to grow naturally on an island in the Tohoku region, far beyond its typical geographic range.

Incidentally, Tarayo is also known as the “postcard tree”, and it is said to be the origin of the Japanese word hagaki (postcard). The etymology of Tarayo is closely connected with Buddhist tradition. Looking back over two thousand and several hundred years of history, the teachings of the Buddha were originally transmitted orally. However, as inconsistencies began to arise, the doctrines were eventually committed to writing in the form of scriptures. A compilation council was convened, and it was decided that the Buddha’s teachings would be inscribed on the leaves of Tarayo.

In Japan as well, it is said that during the Heian period the leaves of Tarayo were used for recording Buddhist scriptures, and later, in the Sengoku period, samurai were believed to have used them as a medium for exchanging information.

Moreover, according to the island’s customary rules, these leaves may not be taken freely; one must obtain the permission of the deity before doing so.

The leaf we received from the guide still bears, with striking clarity, the date of our stroll—22 October 2023.



References: BOTANICA (https://botanica-media.jp) and other sources.



When we descend from Mount Tsumoriyama, the view suddenly opens up and the Pacific Ocean comes into sight.



Canola Fields of the Landscape Group “The Story of Sea and Flowers”



The Rugged Cliffs of Komakake Park

Komakake Park and Onigahama Beach

Komakake Park stands on a small, elevated cape at the eastern end of Katsurashima Beach.

A refreshing panorama unfolds there, offering a sweeping view of the island's greenery stretching from Mount Tsumoriyama to Ishihamazaki, together with the vast Pacific Ocean.

When the tide is low, we can walk over to the neighboring Onigahama Beach and Ojarahama Beach. It is a place woven into the old tales of the island—stories such as "The Demon Subjugation at Onigahama" and the curious legend of Ojyara.

Since the area is a cliff, we need to be very careful with our footing.



On the sandy shore of Katsurashima Beach, there was a metal fire pot used for burning driftwood.



From the slope that the tsunami overtopped during the Great East Japan Earthquake, we can look out over Katsurashima Beach.



Around the beach, tall black pines rise in clusters, and the flowers of rugosa roses and beach morning glories spread across the sandy shore in full bloom.



Visit to Matsuzaki Shrine



The Tabu Trees of Matsuzaki Shrine

Matsuzaki Shrine (Katsurashima Shrine)

Thick tabu trees grow densely around the shrine, giving it a dim, atmospheric feel even in the daytime.

It is counted among the fourteen subsidiary shrines of Shiogama Shrine, where the deities Okutsuhiko-no-Oji and Okutsuhime-no-Ona are enshrined.

There is a local belief that if you cut or damage the trees within the shrine grounds, divine punishment will befall you.

3-3 Sabusawajima Stroll

The stroll and survey were conducted according to the route shown below.

Sabusawa Pier → Makeup Jizo → Six Jizo Statues → Sabusawa Stay Station → Rural Area・Rice Fields →

Mae Beach → Sabusawa Shinmei Shrine → Walking Trail → Hiyoriyama → Sabusawa Pier・Disbandment

A Map of Sabusawajima



Source: Based on the “Urato Islands Walking Map,” published by the City of Shiogama, with additional annotations.

The report will be presented following the route shown below.



Makeup Jizo

This Jizo statue has long been revered for the belief that applying rouge and white powder to its face while praying will bring the blessing of a beautiful baby.

Its creator and date are unknown, and it stands near the entrance of Shōrin Temple.



Six Jizo Statues

Two Jizo figures are carved into a single rock, a construction style that is quite rare.



Rice field

Because the island has no rivers, rice cultivation relies solely on rainwater.



A scene that evokes the gentle nostalgia of days long past

Sun-drying the harvested rice stalks



Rice balls made with Sasanishiki harvested on Sabusawajima



The irrigation channels running along the footpaths are a paradise for living creatures.

In summer, we can see medaka fish (Scientific name: *Oryzias latipes*) and crayfish.



A Rural Landscape

Because the sea is nearby and the soil has a high salt content, the reeds grow short. In addition, the soil holds abundant moisture, so tall goldenrod does not proliferate.

It is said that the rural area once had a beautiful white road made by spreading oyster shells.

Agricultural countryside

Rice cultivation is practiced on Sabusawajima. It is said that the islanders once lived a self-sufficient life, engaging in both farming and fishing.

Because Sabusawajima has no rivers, rice cultivation is carried out using only rainwater. In autumn, the harvested rice plants are sun-dried, allowing visitors to see a nostalgic scene of traditional Japanese rice farming. When we took our stroll, it happened to be harvest season, and we were able to see the rice plants being sun-dried.

Furthermore, snow collected in winter is also used as agricultural water, and this farming method is known as “Fuyumizu farming”. The Sasanishiki cultivated using this method is sold as the branded rice “Sabusawa Rice”.

As part of the island revitalization efforts, sake rice is being produced, and using that rice, a local brewery is making the junmai-ginjo sake “Uragasumi-Sabusawa”.

Around the rice fields, wild “Black-medaka,” a species listed as Near Threatened, swim in schools through the earthen waterways that run along the footpaths. Crayfish and other small creatures also inhabit these channels, creating a landscape that truly evokes the timeless, natural scenery of rural Japan.

A scenic spot on Sabusawajima once featured a single white path laid with oyster shells running through the rural landscape. However, it has since been covered with soil, and the white path is now hidden from view. It is truly a pity.

Today, only a few rice field plots remain. The rice fields that are no longer cultivated have been taken over by reeds and cattails. The speed at which the ecosystem is changing is alarming.

For lunch, we were able to enjoy rice balls made from the precious Sasanishiki grown in the local paddies.



Along the path, large clusters of akebi fruit were hanging heavily from the vines.



The Calm, Shallow Maehama Beach

Sabusawa Shinmei Shrine

At the shrine where the deities who have watched over the prosperity of Sabusawajima reside, Amaterasu-Omikami and Toyouke-Omikami are enshrined. During the Onin era1 (1467-1477), the surviving retainers of the Kusunoki clan came to Sabusawajima and settled there, venerating the Inari deity. In later years, the shrine was united with the Ise Shrine and subsequently renamed the Shinmei-sha.

The shrine building is said to date from the mid Edo period, and its roof is fashioned in the distinctive “Nagare Dukuri” style.

In addition, within the shrine grounds there is a small sanctuary dedicated to the water deity known as Unnansama. However, the island residents now say that they no longer know much about this deity.



Sabusawa Shinmei Shrine

The roof is built in the rare architectural style known as “Nagare-zukuri.”



Could it be a weathered water deity?

Even when we asked the island residents, they said they no longer knew anything about the water deity.



The junction between the Artillery Field Ruins and the Hiyoriyama Observatory.



The Twelve Zodiac Direction Stone at the Hiyoriyama Observatory (Designated Tangible Cultural Property of Shiogama City).



Shibarijizo (Jizo statue bound with rope)

It reflects the earnest wishes of the island's women at the time, who hoped to keep the men from setting out to sea.

Twelve Zodiac Direction Stone and Shibarijizo

Hiyoriyama, overlooking the settlement of Sabusawa, was once the place where sailors observed the weather before setting out to sea.

Hiyoriyama is home to the Twelve Zodiac Direction Stone, one of the finest of its kind in Japan, built during the Tenpo era (approximately from around 1830 to 1845). It was used for observing the weather and monitoring ships entering and leaving the area.

Sabusawajima was a port where boats used to come and go during the Edo period with rice. Therefore, there was a licensed pleasure quarter that served the sailors. It is said that the women, trying to stop the men from setting sail, tied the Jizo statue on Hiyoriyama with straw ropes and offered prayers to overcome adversity.

Monument to Shipbuilding

There is a monument called *Monument to Shipbuilding* near the pier. This monument was erected to commemorate the construction of the Western-style sailing ship "Kaisei-maru", 33 meters in length, which the Sendai Domain built out of necessity for national defense. In preparing for the construction, a shipyard was built on Sabusawajima,

and materials were gathered from various parts of the domain. The shipbuilding work began in 1857 and was completed the following year.

As a maritime episode, during the Boshin War the shogunate fleet under the command of Enomoto Takeaki sailed from Ishihama on Katsurashima and set its course for Goryokaku in Hakodate. Sabusawajima is also remembered as the native island of Tsudayu and Sahei, the first Japanese voyagers ever to circle the globe.



Monument to Shipbuilding（left end）

Thus, Sabusawajima is a place where relics of the Edo period remain scattered across the island.

Source: Sabusawajima – Urato Islands, Shiogama City, Miyagi Prefecture

Source: Cultural Properties of Sabusawajima　urato-island.jp/about/sabusawajima/culturalproperty/

By the way, where did ships obtain the water they loaded at ports and the water used at shipyards? Although the exact details are not known, it is thought that drinking water, domestic-use water, and the water loaded onto ships depended primarily on well water. Traces of wells could be observed in several locations.



Traces of a well

Comment 4:　How is salty water measured

Assuming that Sabusawajima relied on wells as its primary source of water, the question arises as to where the “non-saline water,” or more technically, the “water with a low chloride ion concentration,” originated. Chloride ions originate from seawater. For reference, seawater contains approximately 19.9 g/L (19,900 mg/L) of chloride ions. Under the current water quality standards for drinking water, chloride ions are required to be kept at or below 200 mg/L from the standpoint of taste.

As an additional note, wells located near the sea contain high levels of salinity and have long been unsuitable as a source of water for daily life. For that reason, the shoguns constructed what came to be known as “the Six Canals of Edo”, beginning with the Kanda Josui (the present-day Kanda River).



Matsushima Chinese Cabbage at the Sabusawajima Community Farm

It is grown from Chinese cabbage seeds that were sent into space and brought back to Earth during the Tohoku Space Mission 2021, which was organized to convey gratitude to the world for its support after the Great East Japan Earthquake.



A group photo at the Sabusawajima pier after the stroll

3-4 Hojima Stroll

The stroll and survey were conducted along the route indicated by the arrows, under the guidance of Mr. Nobuyoshi Utsumi (guide and “Danbeko boat” captain).

Blooming canola fields → Tabu Tree Forest → Field survey on the impacts of seawater temperature rise conducted aboard the Danbeko boat, or an island stroll for participants who did not board the boat → Disbanding at Hojima Pier

※ Detail on the “Danbeko boat” will be provided later.

Here is the map of Hojima.



Source: Based on the “Urato Islands Walking Map,” published by the City of Shiogama, with additional annotations.

Below is the implementation report prepared in accordance with the procedure.



Welcomed by the Forest of Tabu Trees



We listened to the guide’s explanations about the plants seen along the path and about life on Hojima.



Rare Japanese Dandelion

The guide explained that, because the island is an isolated environment, this might be one of the conditions that allow Japanese dandelions to be seen frequently.



満開の菜の花とタブ

Canola Bloom and the Tabu Tree Forest

The contrast between the yellow canola flowers and the green tabu trees is magnificent.

This field of canola flowers is cultivated for seed production, and the seeds are shipped as Sendai hakusai (Sendai Chinese cabbage) seeds.



The inflorescences of Chinese cabbage are reported to contain both pistillate (female) and staminate (male) flowers.

Sufficient precautions are implemented to prevent unintended hybridization.



Tabu Tree Forest

This forest is a pleasant space enveloped in a mysterious atmosphere.

The tabu tree constitutes the potential natural vegetation characteristic of this region. Potential natural vegetation refers to vegetation that is considered capable of growing naturally in the absence of human influence. Hojima, where such an extensive Tabu Tree Forest has been preserved, can truly be regarded as an island of rich natural environment.

We also found a bird's nest inside the Tabu Tree Forest. Though the nest had already served its purpose, it was woven by hand-like care, using branches and stems gathered one by one. The abilities of birds impressed us once again. Tabu tree fruits are also utilized by birds as a food resource. Perhaps the bird that used to live in this nest had been eating Tabu tree fruits. We felt once again that this Tabu Tree Forest nurtures birds and other living creatures.

Comment 5: Tabu tree (Machilus thunbergii)

The Tabu tree (Scientific name: *Machilus thunbergii*) stands out as a characteristic species on both Katsurashima and Hojima. Tabu Tree is an evergreen tall tree of the laurel family, the same family as the avocado.

In Japan, Tabu trees are distributed in coastal areas of the Tōhoku region and the southern part of the Kantō region, and further occur in the forests of southern Chūbu, Shikoku, Kyushu, Okinawa, Hachijō Island, and the Ogasawara Islands. It is especially abundant in warm-temperate coastal hill habitats. Owing to its tolerance to both low temperatures and saline conditions, pure stands of Tabu Tree are also found along coastal zones of the Tōhoku region.

Reference: Wikipedia

In the Urato Islands, the Common Bluebottle (scientific name: *Graphium sarpedon*) is reportedly often seen. The larvae of the Common Bluebottle feed on the leaves of the camphor tree and the tabu tree, and eventually develop into adults. The Common Bluebottle can be observed from May through October. Because our visit took place slightly outside the peak season, we were unfortunately unable to see them in their beautiful form.

It is noted that the Common Bluebottle exhibits seasonal polymorphism, with the spring form tending to be smaller in size compared with the summer form. It would be of considerable interest if such differences could also be identified during future strolls.



Common Bluebottle

(Scientific name: Graphium sarpedon)

Source: The free encyclopedia Wikipedia

In the afternoon, we divided into two groups: one that boarded the Danbeko boat, and another that strolled around the Urato Islands. The Danbeko boat group received explanations from Mr. Utsumi, the guide and captain, regarding the natural environment surrounding the Urato Islands and the local oyster-farming practices.



Comment 5: Danbeko boat

One of the objectives of the Hojima exploration was to conduct a marine survey using the Danbeko boat. Since the local residents, including the guide, refer to it as the "Danbeko boat," we have adopted the same expression in this report.

According to an introductory article on the "Michinoku Coastal Trail" published in the Yomiuri Shimbun Online on July 24, 2024, it is noted that a traditional "Danbekko boat" originally existed in the Urato Islands. It appears that flat-bottomed boats used in local fisheries were referred to as "Danbekko boats". Whether referred to as the "Danbeko boat" or the "Danbekko Bout", both appear to be expressions originating from the local dialect of this region.

Further examination of its etymology indicates that the term "Danbei boat" referred to a traditional Japanese vessel characterized by a flat bottom and a broad hull, and historical documents record that it was used for transporting stones, coal, and similar materials. Accordingly, it is presumed that the term "Danbeko" derives from the flat, shallow-bottomed form of the vessel.

Furthermore, because the boat has a flat bottom, it was also suitable for transporting fish in water, and this appears to have led to the use of the name "Danbe" for containers used to carry fresh fish.

References: Kotobank, Weblio Dictionary, and others.



Explanation of Oyster Farming

It was a valuable experience, as the boat was able to approach very close to the oyster-culture rafts where cultivation is carried out, allowing us to observe them at close range.





In recent years, rising seawater temperatures have reportedly led to shifts in the species composition of plankton that serve as food for oysters.

Furthermore, it has been reported that the scallop shells used as settlement substrates for oyster seed also exhibit year-to-year variation in the species of algae and microorganisms that colonize their surfaces.

In Matsushima Bay, rising seawater temperatures have been altering coastal ecosystems, and these changes are now exerting serious impacts on local fisheries.

This water area is also an active site for “Shirasu fishing”, and it is said that the fishing grounds of each island are separated by invisible boundary lines.

Comment 6: Oyster Aquaculture and Warming in Matsushima Bay

Oyster aquaculture is an important sector of the fisheries industry in Matsushima Bay. However, in recent years, rising seawater temperatures associated with warming and shifts in fouling organisms have been affecting oyster aquaculture.

The following provides a brief overview of the types of adverse effects that have been observed.

In oyster aquaculture, numerous organisms attach to the oysters suspended in the water column. From spring through summer, hydroid species constitute the primary fouling organisms, whereas in autumn, bryozoan species become the dominant species.

In addition, in Matsushima Bay, episodes of mass mortality in oysters have occurred due to elevated seawater temperatures and the impacts of flatworms. Prolonged periods of elevated seawater temperatures inhibit oyster growth, and flatworms are known to parasitize the interior of oysters and consume their tissues. Bryozoans and the Japanese false mussel have also been identified as fouling organisms on cultured oysters. Furthermore, the rise in seawater temperature associated with warming facilitates the invasion of the sea squirt Styela plicata, which in turn inhibits the growth of juvenile oysters.

References: Masato Hirose, Seasonal Succession of Fouling Organisms on Oyster Culture Racks in Matsushima Bay, Tohoku Marine Science Project – Research on Marine Ecosystems, Atmosphere and Ocean Research Institute, The University of Tokyo.

Miyagi Prefectural Government Official Website

Hiroshi Ito and Akio Oshino, Fouling Organisms on Cultured Oysters and Their Removal Methods in Matsushima Bay. Bulletin of the Miyagi Prefectural Fisheries Research Institute, No.18, pp.47–50, 2018.

Comment 7: Current Status of Marine Heatwaves in Japan

In the waters surrounding Japan, the occurrence of marine heatwaves has become evident since around 2010. This has been attributed to the large meander of the Kuroshio Current, which has caused the Kuroshio Extension to shift northward to off Sanriku since the autumn of 2022, and sea surface temperatures have been reported to reach record-high levels.

Remark) Kuroshio Extension: After flowing along the southern coast of Japan, the Kuroshio turns eastward off the Boso Peninsula. The eastward flow beyond the Boso Peninsula is referred to as the "Kuroshio Extension".

It is considered that these phenomena have also contributed to the year-to-year increase in seawater temperatures in Matsushima Bay. Incidentally, it is reported that in July 2025 the seawater temperature in the northern seas of Japan was 3–4 °C higher than the average for that time of year.

Source: Fisheries Agency, Fisheries White Paper, Changes in the Marine Environment in the Waters around Japan.



The rise in water temperature has also led to a decline in eelgrass.

Eelgrass had been growing in this area until just a few months ago, but it disappeared within a short period of time.



Residual Eelgrass Observed in the Area

We have confirmed with our own eyes that eelgrass—an organism of critical importance to many marine species—is declining as a result of global warming.

There is also a view that eelgrass declines during tsunamis.

Comment 8: Eelgrass (Scientific name: *Zostera marina*)

Eelgrass is a marine plant that blooms underwater and reproduces by seeds. Through photosynthesis, it absorbs carbon dioxide, produces organic substances such as proteins and carbohydrates from nutrients, and releases oxygen.

This marine plant inhabits shallow, sandy coastal areas where waves are calm and sunlight can penetrate, and it is distributed across Japan from Hokkaido to Okinawa. In Matsushima Bay, numerous eelgrass meadows were once observed.

It is also understood that eelgrass plays an important role in reducing carbon dioxide (CO_2), one of the greenhouse gases responsible for global warming. Reference: *What Is Eelgrass?* Nippon Life Insurance Green Gift Program

Comment 9: Blue Carbon

In Matsushima Bay, coastal ecosystems are undergoing changes due to factors such as rising seawater temperatures. As one detrimental consequence, the decline of seagrass and seaweed beds has threatened the growth and survival of various marine organisms, thereby causing serious impacts on local fisheries.

Blue carbon refers to the carbon that is absorbed from the atmosphere as CO_2 by marine ecosystems and subsequently stored in the ocean over long periods of time. The term was coined in contrast to "green carbon," which refers to the carbon assimilated by terrestrial forest ecosystems. This term was first introduced in a report published in 2009 by the United Nations Environment Programme (UNEP).

Highly productive and biologically rich coastal areas—such as seagrass meadows formed by species like eelgrass and surfgrass as well as seaweed beds dominated by kelp and wakame—are collectively referred to as blue carbon ecosystems. Blue carbon is attracting growing scientific attention as a major source of CO_2 absorption within coastal ecosystems. Other coastal ecosystems such as tidal flats, salt marshes, and mangrove forests are also regarded as key components of blue-carbon systems.

Blue carbon is gaining attention as one of the negative-emission approaches aimed at capturing and removing CO_2 released from the use of fossil fuels. It is regarded as a measure contributing to the achievement of the 2050 carbon-neutral target.

References: Ecosystem changes driven by rising seawater temperatures, Public–private efforts for marine environmental conservation, Asahi Shimbun, May 15, 2025
Ministry of the Environment: What Blue Carbon Is
AIST Magazine: What Is Blue Carbon?



A Cave Just Wide Enough for a Danbeko Boat to Pass



Passage Between Narrow Islands

The cave, locally known as "Bora," is navigable only under calm sea conditions. Passing through the Bora is an extremely thrilling experience, and we were truly impressed by the guide's exceptional boat-handling skills. Riding in the Danbeko boat allowed us to directly witness the current state of the fisheries industry under the influence of global warming.



Group Photo at the Hojima Pier

4. Final Remarks

This report is not a conventional sightseeing guide to the four islands of the Urato Archipelago. Rather, it has been prepared to disseminate information on the islands' natural environment, water-related culture, and historical background, based on four years of strolls conducted by the Water Research Group of the Miyagi Environmental Life Out-reach Network (MELON).

The Urato Islands exhibit a highly diverse ecosystem and plant community, including Tabunoki (*Machilus thunbergii*), a representative tree species of the four islands, and Tarayo (*Ilex latifolia)*, a species naturally distributed only from central Honshu to Kyushu and found on Katsurashima.

Because the islands are isolated by surrounding seawater, unintended hybridization can be effectively prevented when collecting seeds of Sendai hakusai. Furthermore, the islands harbor self-sustaining populations of the Japanese native dandelion (*Taraxacum japonicum*), a species that has become rare elsewhere.

On Sabusawajima, a nostalgic rural landscape unfolds, where one can still encounter creatures such as the kuro-medaka. The island also offers a serene and beautiful sandy beach that feels as if one could have the Pacific Ocean all to oneself, evoking a deep sense of the richness of nature.

In terms of water, we came to know the rain-invoking custom associated with Amefuri-ishi on Katsurashima, while on Sabusawajima we could imagine the past rice cultivation that relied entirely on rainwater. Together, these encounters revealed the deep and poetic bond the islands have long shared with water. It may also be inferred that the water used in the shipyard, the water loaded onto *Sengokubune*—the large Japanese wooden cargo vessels that sustained the coastal transport networks of the age—and even the water used in daily life in earlier times all depended on wells. Nevertheless, unresolved issues remain, including the question of how non-saline water—specifically, water characterized by low chloride-ion concentrations—was secured. This matter represents an important subject for further technical and historical investigation.

At present, drinking water, domestic water, and the water used in fisheries-related activities on the Urato Islands are supplied through submarine transmission and distribution pipelines. The historical background and current conditions associated with the installation of these pipelines are provided as Additional Note appended to the end of this report.

The rise in seawater temperature driven by global warming is already exerting significant impacts on marine ecosystems and fisheries. Eelgrass in the Urato Islands is disappearing, and changes have been observed in the assemblages of organisms attached to oyster shells in aquaculture operations.

Sabusawajima reached the height of its prosperity as a principal port for “Rice shipped to Edo.” Facilities were also constructed to defend Matsushima Bay against hostile incursions. As a result, the island today retains numerous historically significant structures and commemorative monuments.

The island is steeped in history, with features such as the zodiac orientation stone on Hiyoriyama, the Shibarijizo, the monument commemorating the construction of Japan’s first Western-style warship, and the legacy of Tsudayu, the first Japanese to circumnavigate the globe.

In addition, the island contains a number of venerable Shinto shrines and Buddhist temples, each possessing a long-standing and well-documented historical lineage. Examples include Kumano Shrine, where a Christian Buddha is enshrined; Matsuzaki Shrine, noted for its flourishing groves of large Tabu trees; Shorin Temple, which houses the Makeup Jizo and the Six Jizo statues; and Sabusawajima Shinmei-sha, distinguished by its rare “Nagare-Dukuri” roof style. Together, these sites attest to the island’s rich and layered historical heritage.

The participants of the stroll were able to appreciate the rich natural environment of the Urato Islands. At the same time, they learned that the rise in seawater temperature caused by global warming has already had a significant impact on the islands’ natural environment and fisheries.

This encounter with the islands’ abundant natural surroundings reminded us to be grateful for them, while also giving us an opportunity to reflect on how we can protect these environments and their ecosystems into the future.

Lastly, the Urato Islands are included as part of the Michinoku Coastal Trail. The Michinoku Coastal Trail was developed by the Ministry of the Environment to support recovery from the Great East Japan Earthquake. Its distinctive feature lies in enabling visitors to experience the dynamic seas, forests, and other natural landscapes along the Tōhoku Pacific coast, while also learning about the region’s history and culture and engaging with local communities.

We hope that many people, including international travelers, will walk the Michinoku Coastal Trail—of which the Urato Islands form a part—and experience firsthand the remarkable natural environment, history, and culture that it offers.

Acknowledgments

We would like to express our gratitude—by name—to those who guided us during the stroll on the Urato Islands, as well as to all who provided their support.

Mr. Nobuyoshi Utsumi of Katsurashima and Mr. Masanori Suzuki of Nonoshima.

The Shiogama City Community Revitalization Team, Ms. Reina Takahashi of Sabusawajima, and the Urato Islands “Sea and Flowers Story” Limonia 311.

Teru-teru Jellyfish (Sunshine Jellyfish doll)

When the participants arrived on the islands, Mr. Nobuyoshi Utsumi, the guide, handed each of them a handmade “Teru-teru Jellyfish.” Each one had its own unique character, bringing a warm and comforting feeling to everyone.



Additional Notes

The History of the Water Supply System in the Urato Islands, Miyagi Prefecture

1. Introduction

One of the activities of the Public Interest Incorporated Foundation Miyagi Environmental Life Outreach Network (MELON) is the Water Research Group.

Since 2022, the Water Research Group has undertaken research activities on the Urato Islands—four remote islands situated in Matsushima Bay, Shiogama City—with the aim of enhancing understanding of the area's outstanding natural environment and the cultural and historical heritage associated with its aquatic environment.

As part of these activities, we focused our attention on the water supply system of the Urato Islands. This focus was adopted because the drinking water supplied to these remote islands is conveyed from Shiogama City via a submarine pipeline.

The Water Research Group became interested in the submarine pipeline and the water distribution to the islands.

This additional report reviews the process through which piped water was introduced to the Urato Islands, situating this development within the broader history of Shiogama's municipal water supply.

2. The Establishment of the Modern Water Supply System in Shiogama

In 1889 (Meiji 22), the town of Shiogama was established, and plans for the development of a municipal water supply system were initiated. In 1910 (Meiji 43), the project received approval from the Ministers of Home Affairs and Finance, enabling the municipality to commence construction. Spring water from the village of Rifu was designated as the source.

At that time, the planned service population was 14,000, with an estimated average daily water supply of 111 liters per person. When the Kasuga Water System was first implemented, a weir was constructed at the spring source, and the water was treated at the Gongendō Low-Zone Water Treatment Plant.

Q: What type of water treatment process (filtration method) was employed at the time of the system's initial establishment?

A: By the time the Gongendō Low-Zone Water Treatment Plant was completed in 1912, the rapid sand filtration method [1)] had already become widely adopted, as noted in the reference below. However, based on photographic records included in "*the 70-Year History of the Shiogama Waterworks"*, it appears that the Low-Zone Water Treatment Plant employed a slow sand filtration method [1)] at the time of its initial operation.

Trivia 1): *The principal water purification methods currently in use include rapid filtration, slow sand filtration, and membrane filtration. The rapid filtration method, developed in the United States in 1884, enables high-volume water production through a physicochemical treatment process incorporating coagulation.*

In contrast, the slow sand filtration method, first introduced in England in 1829, is characterized as a biological treatment process.

3. The subsequent evolution of the water supply system

From 1928 (Showa 3) to 1932 (Showa 7), the first expansion project was undertaken. In response to population growth, the municipality secured an additional water source by drawing surface water from the Nanakita River. A pumping facility was installed at the Kase Reservoir in Tagajō Village, and the water was conveyed to the Gongendō Water Purification Plant. In addition, raw water was further conveyed [2)] to the Gongendō Upper-Zone Water Purification Plant.

The design service population for this expansion was 50,000, with a planned average daily supply of 140 liters per capita.

Trivia 2): *The transport of raw water to a purification plant is referred to as "water conveyance".*

In 1941 (Showa 16), Shiogama was elevated to city status.

In 1950 (Showa 25), with authorization from the national government, the second expansion project was initiated. The design service population for this phase was 80,000, and the planned average daily supply per capita was 200 liters.

In 1952 (Showa 27), a system was introduced to convey water directly from the Nakano Weir intake facility on the Nanakita River to the Gongendō High-Level Water Purification Plant, although pumping from the Kase Reservoir continued to be used when necessary. Subsequently, as water leakage became increasingly severe, distribution reservoirs were constructed at Uenohara, Amanoyama, and at the Gongendō High-Level Water Purification Plant.

In the Third Expansion Project implemented in 1963 (Showa 38), Shiogama City began receiving a designated water allocation from the Okura Dam via Sendai City. The allocation was managed at the Kunimi Water Purification Plant in Sendai City [3)]. As a result of this new supply arrangement, water intake from the Nanakita River system was discontinued.

Trivia 3): *In the context of water supply administration, the term "division of water" refers to the provision of water to neighboring municipalities. Under the Water Supply Act, the act of supplying water to a water wholesaler is defined as "water wholesale." The raw water thus allocated was treated at the Umenomiya Water Treatment Plant, which employs a rapid filtration process.*

4. Water supply in the Urato Islands

In 1958 (Showa 33), the Urato Islands were designated as a project implementation area under the Remote Islands Promotion Act. In 1963 (Showa 38), the city and island residents examined the feasibility of installing a 6,600-meter transmission pipeline along the seabed. The installation method under consideration at that time was the barge-laying technique.

As a continuation of the preceding project, a small-scale water treatment plant [4] serving the Urato Islands was constructed in 1965 (Showa 40). The water source was the Ihoyama erosion control dam located on the mainland, and the treated water was conveyed across Matsushima Bay through a 125-mm-diameter steel pipeline [5] laid along the seabed.

The supply plan called for distributing water to the four islands by gravity flow from the Ishihama distribution reservoir (240 m³), which was constructed on Katsurashima Island.

Trivia 4): *A small-scale water treatment plant is defined as a water supply facility serving a population of 5,000 or fewer.*

Trivia 5): *Steel pipes, which are manufactured using steel as the principal material, exhibit high strength and toughness. They also possess substantial ductility, enabling them to withstand significant internal and external pressures. However, because steel is susceptible to corrosion, both interior and exterior surfaces require anti-corrosion coatings, resulting in lower workability compared with other types of pipes. Although steel pipes were widely used in the past, their use has declined in recent years.*

Treated water was first transmitted [6] to the remote islands in 1966.

Trivia 6): *The conveyance of treated water to distribution facilities is referred to as "water transmission."*

In 1969 (Showa 44), the transmission pipe receiving a bulk water supply from Sendai City experienced a major rupture, following several smaller breaks and damages that had occurred previously.

In 1971 (Showa 46), due to the depletion of the Ihoyama erosion control dam, the water supply system serving the Urato Islands was integrated into the Shiogama municipal water supply.

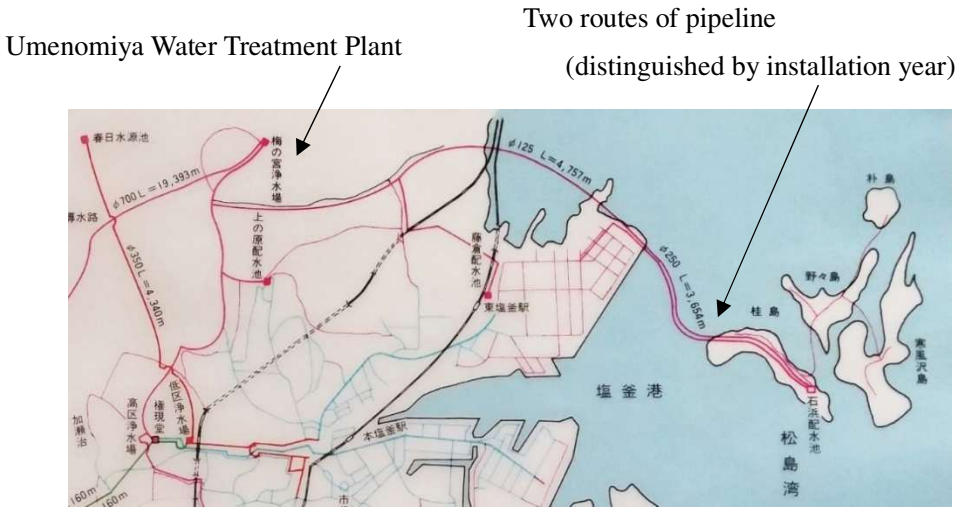
The small-scale water treatment plant serving the Urato Islands, which had been incorporated into the municipal system, was designed primarily for domestic water use. Consequently, during the peak production season for the island industries of seaweed laver (nori) and oysters (November to March), the available supply was insufficient. As a result, water was distributed to each island on a rotating schedule, with supply provided one day out of every three.

To address this shortage, reinforcement works for the Urato area were implemented. Between fiscal years 1975 and 1979, a 250-mm-diameter submarine water pipeline was installed, and the capacity of the distribution reservoir was increased to 410 m³.

Submarine water pipeline

In the figure below, two submarine water transmission systems are shown: the pipeline installed in 1966 and the pipeline installed between fiscal years 1975 and 1979. Although both pipelines are connected to the Umenomiya Water Treatment Plant, they enter the seabed at different locations.

Since the submarine water pipeline was replaced with a 250-mm line in 1975, the previously used 125-mm pipeline has remained out of service. According to the guide, Mr. Utsumi, the water currently supplied to the Ishihama distribution reservoir (water distribution facility) is pumped from a location near the west side of the Katsurashima pier. The former 125-mm pipeline was buried at the time of the replacement.



Overview of the Two Submarine Water Transmission Pipelines

Source: Shiogama's Waterworks: Seventy Years of Progress, published in 198

Ishihama distribution reservoir

The distribution reservoir (water distribution facility) consists of two tanks, designated as No. 1 and No. 2. The No. 1 tank is the original facility constructed during the period when the small-scale water treatment plant was in operation. The No. 2 tank was subsequently added to accommodate increased water demand during the peak seasons of seaweed laver (nori) and oyster cultivation.



Ishiyama Water Distribution Reservoir 410 m^3

Source: Shiogama's Waterworks: Seventy Years of Progress, published in 1982

Trivia 7): *The water depth of Matsushima Bay ranges from approximately 5 to 15 meters or more on the open-sea side beyond the Miyato–Mahanashi Islands. Within the bay, depths generally range from 1 to 4 meters, except in the artificially dredged Yogasaki Channel. The deepest point within the bay is located northwest of Nono Island, where the depth reaches 4 meters. Within the channel, the water depth is*

approximately 15 meters between Katsurashima and Mahanashi Islands, and around 10 meters between Nonoshima and Katsurashima. In the outer offshore zone, the seafloor exhibits complex dendritic valley formations, and shallow reefs with depths of less than 5 meters are found in the vicinity of Hakoshima and Futatsushima.

Ref. Hideaki Matsumoto: Geomorphological Development of Matsushima Bay, Miyagi Prefecture, Japan, Annals of the Tohoku Geographical Association, 36-1, 46-53, 1984

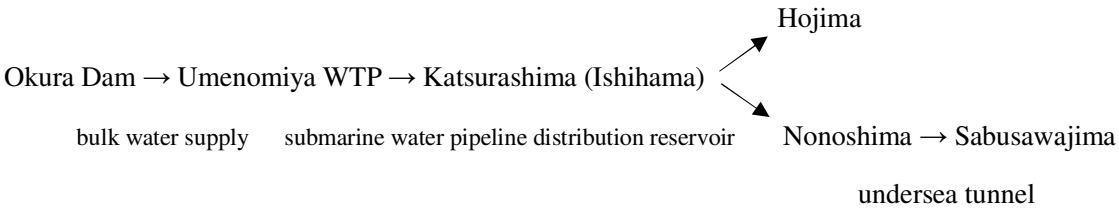
In 2010, the tsunami generated by the Chilean central coastal earthquake caused damage to the 125-mm-diameter, 277-meter submarine water distribution pipeline running between Ishihama and Nonoshima.

One year later, in 2011, the Great East Japan Earthquake occurred. As a result of these two major disasters, the submarine water supply pipeline sustained extensive damage, leading to a six-month suspension of water transmission. During this period, drinking water and domestic water were provided through a seawater desalination unit and bottled mineral water.

Meanwhile, a new water transmission pipeline was installed beneath the navigation route, and repair work was carried out even at night while monitoring vessel traffic. Owing to these efforts, water transmission was restored in 2013 for the sections between Ishihama and Nonoshima and between Nonoshima and Sabusawajima, and in 2014 for the section between Nonoshima and Hojima.

Current water supply system

At present, the flow of treated water supplied to the Urato Islands is as outlined below.



Specifically, the raw water drawn from the Okura Dam is conveyed via the Kunimi Water Treatment Plant in Sendai City to the Umenomiya Water Treatment Plant in Shiogama City. At the Umenomiya Water Treatment Plant, the raw water is purified, after which the treated water is transmitted to the Urato Islands.

In addition, Shiogama City currently receives water not only from the Okura Dam but also from the Shichigashuku Dam. Water from the Shichigashuku Dam is treated at the Nanbuyama Water Treatment Plant and supplied through the Sennan–Senen Regional Water Supply System as part of a wide-area supply arrangement.

The Umenomiya Water Treatment Plant and Katsurashima are connected by a submarine water transmission pipeline. At Ishihama on Katsurashima, a distribution facility is located, from which treated water is distributed by gravity flow to Nonoshima and Sabusawajima.

At present, the section between Ishihama and Nonoshima is a submarine distribution pipeline, while the section from Nonoshima to Sabusawajima is a submarine tunnel.

“Distribution” refers to the conveyance of treated water from distribution reservoirs or tanks to the service pipes that supply individual households.

Triangular markers, such as the one shown in the photograph, can be observed along the shores of the islands from the ferry. These markers indicate the landfall points of the submarine water pipelines connecting the islands. A corresponding triangular marker is installed on the opposite island to show where the pipeline comes ashore. In the vicinity of each marker, a manhole used for monitoring the pipeline is also present.



A marker indicating the entrance of the submarine water pipeline



A manhole for monitoring the submarine water pipeline

Overview of the Sendai–Shiogama Joint Water Treatment Plant Development Plan

In November 2022 (Reiwa 4), Sendai City and Shiogama City formulated a development plan for a joint water treatment plant. The plan calls for the decommissioning of the Kunimi, Nakahara, and Kumagane Water Treatment Plants in Aoba Ward, Sendai—each of which has been in operation for approximately 60 years and is exhibiting significant aging—as well as the Umenomiya Water Treatment Plant in Shiogama. A new joint water treatment plant is to be constructed on the site of the existing Nakahara facility. Basic design work for the joint plant commenced in fiscal year 2023 (Reiwa 5), with the start of water supply operations targeted for fiscal year 2036 (Reiwa 18).

Main Reference Sources:

Urato: Past and Present, Published by the Urato Community Center, Shiogama City, 1982.

History of the Shiogama Water Supply – Shiogama City Official Website

Shiogama's Waterworks: Seventy Years of Progress, published in 1982

Questions and Comments from Participants of the Urato Islands Site Visit

◉ It is noteworthy that within Miyagi Prefecture, Shiogama—then Shiogama Town—initiated its water supply service earlier than Sendai City.

→ Japan's modern water supply system was first established in Yokohama Village in 1887 (Meiji 20) as a public health measure against cholera, with construction having begun in 1883 (Meiji 16). Thereafter, water supply systems were developed in various regions, particularly in port towns such as Hakodate, where the need to provide water to foreign vessels engaged in trade may have contributed to early adoption. For this reason, it is considered that Shiogama also developed its water supply system at an early stage.

For reference, water treatment plants were constructed in Hakodate in 1889 (Meiji 22), Nagasaki in 1891 (Meiji 24), Osaka in 1895 (Meiji 28), Hiroshima and Tokyo in 1898 (Meiji 31), and Kobe in 1905 (Meiji 38). In Shiogama, the water supply system was established in 1912 (Meiji 45).

◉ How is treated water from the Ishihama Reservoir distributed to the other islands?

→ The Ishihama Reservoir is situated on elevated ground, and this difference in elevation is utilized to distribute treated water to the surrounding areas by gravity flow.

◉ What is the expected lifespan of the pipes? Don't the pipes corrode?

→ Although the explanation is complex, the following response takes into account the current circumstances of the water supply system. At present, water utilities in Japan face increasing pressure to replace aging facilities and pipelines and to improve earthquake resistance. However, due to declining water utility revenues associated with population decrease and the reduction in personnel engaged in water supply operations, progress in renewing facilities and pipelines has been slow. In general, water supply facilities are expected to be renewed every 30 to 40 years, and pipelines every 40 to 50 years. In addition, a growing trend in the sector is the shift toward wide-area management, in which multiple municipalities cooperate in the operation of their water supply systems. The Sennan–Senen Wide Area Water Supply System is one such example.

Steel pipes used for submarine water transmission lines have been widely adopted due to their ease of installation. However, because they are susceptible to corrosion, protective coatings must be applied to both the interior and exterior surfaces. (Information on steel pipes is provided in "Trivia 5" of this report.)

◉ Is the water in the Ishihama Reservoir safe to drink?

→ "Of course, it is safe.

The water transmitted to the Ishihama Reservoir is appropriately purified at the Umenomiya Water Treatment Plant. In addition, the Water Supply Act mandates chlorination, and a minimum free residual chlorine concentration of 0.1 mg/L must be maintained even at the tap located farthest from the water treatment plant. For the Urato Islands, this requirement applies to taps at the far ends of Sabusawajima and Hojima. Because water from the Ishihama distribution reservoir is further distributed to the other islands, the residual chlorine concentration at the reservoir must be maintained at a level higher than the minimum requirement. According to the guide, Mr. Uchiumi, when the residual chlorine concentration at the Ishihama distribution reservoir becomes low, sodium hypochlorite—commonly used in Japan as a disinfectant—is occasionally added at the site.

◉ Is the water quality safe?

→ The water quality standards for drinking water specify 52 items, all of which must meet the required criteria for the water to be deemed potable. At large water treatment plants, more than 120 items are tested in total, including water quality management target items and items requiring further examination. Pesticides are also subject to stringent testing, and the safety of drinking water is ensured nationwide. Furthermore, the water source (Okura Dam) is appropriately protected under the Basic Environment Act, the two Water Source Protection Acts, and other relevant regulations.

Accordingly, the tap water supplied to the Urato Islands can be consumed with confidence.

As a reference — Treatment and Disposal of Sewage and Domestic Wastewater on the Islands

In most households, as well as in public facilities such as the community center and schools, sewage and domestic wastewater are treated in septic tanks before being discharged into the sea.

Reference Sources: Water Supply in Urato Islands

5. Concluding Remarks

This report describes the water supply system of the Urato Islands, which is supplied with drinking water conveyed from Shiogama City via a submarine pipeline. Through this report, readers can gain an understanding of the historical challenges involved in securing domestic water on these remote islands, as well as the changes that have occurred in the methods of water conveyance over time.

MELON also disseminates a Japanese-language report aimed at introducing the culture and history related to the water environment of the Urato Islands. We encourage readers to consult the Japanese version as well.

Additional Notes　Folktales of the Urato Islands

＜The Amanojaku and the Three Monkeys of Nonoshima's Kōshin Shrine＞

On the island of Nono-shima, there stands a small Kōshin shrine with a most curious and humorous statue. At the very bottom crouches an "Amanojaku", the contrary little goblin of old tales. On its back sit three monkeys, stacked one above another. And towering over them all is the stern figure of Shomen Kongo, pressing down upon the mischievous goblin and the monkeys with overwhelming authority.・・・

＜The Shark and the Subari Jizo＞

At Sabusawajima's Subari Jizo, the custom was to wrap a rough straw rope tightly around the statue while making a wish, and then to untie the rope once the wish was granted. One day, Tagobei, an octopus fisherman, rescued a small shark that had washed up on shore and took it home; then, something mysterious happened.・・・

※　Although the main text uses the term "Shibarijizo", the form "Subarijizo" appears here due to dialectal variation.

＜The Nose-Pulling Ghost＞

Long ago, in Shiogama, there was a small fishing village that bustled with life whenever the sea blessed it with a great catch.

But from one night onward, a strange and eerie ghost began to roam through the village, groaning, "Nose-pulling, Nose-pulling", as it wandered about. The women grew frightened, the children began wetting their beds, and the men were at a complete loss over what to do. And so the men gathered at the head fisherman's house and began to discuss what could be done.

First, they decided that the ghost's true nature must be discovered, and so three of the village men set out to keep watch through the night. Then, just as they were keeping watch, the ghost appeared, muttering, "Nose-pulling, Nose-pulling," as it came creeping toward them. When they looked more closely, trembling with fear, they saw that it was a giant sandal ghost. Its thong had snapped, and it wandered along groaning, "It hurts, it hurts," while holding the broken strap with its hands.

The next day, when they went to the bamboo grove where the ghost had vanished, they found the villagers' dumping ground. Old straw raincoats and hats, along with sandals whose thongs had snapped, lay there carelessly thrown away. The villagers had grown careless, celebrating their great catches and no longer valuing the things they used. And so the cast-off objects, abandoned without a thought, had taken on spirits of their own and come back to haunt the village.

The villagers quickly gathered all the sandals, wooden clogs, and other things they had thrown away, piled them together in one place, and burned them as an offering. From that day on, the nose-pulling ghost never appeared in the village again.

Additional Notes　Activities of the Urato Islands “Sea and Flowers Story”

The volunteer group Urato Islands “Sea and Flowers Story” began its activities on Katsurashima by planting tulip and daffodil bulbs sent from across Japan as part of the recovery process following the Great East Japan Earthquake. Since then, the group has continued to plant seasonal flowers across the beautiful islands and to create opportunities for people to connect with one another while walking through the island landscapes.

In recognition of these many years of sustained activity, the group received the Minister of Agriculture, Forestry and Fisheries Award at the 35th National Flower Town Development Competition in October 2025.

For further details, please also visit https://totokoza.wixsite.com/umihana.

Miyagi Environmental Life Outreach Network (MELON), a Public-interest Incorporated Foundation, is an environmental NGO established in response to the United Nations Conference on Environment and Development (commonly known as the Earth Summit) held in 1992.

MELON is composed of citizens, researchers, cooperatives, companies, and organizations, and aims to consider the environment and daily life through the themes of greenery, water, and food, thereby contributing to the Earth and global environmental conservation.

Water and History Etched into the Islands

—Landscapes Revealed Through a Stroll in the Urato Archipelago—

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