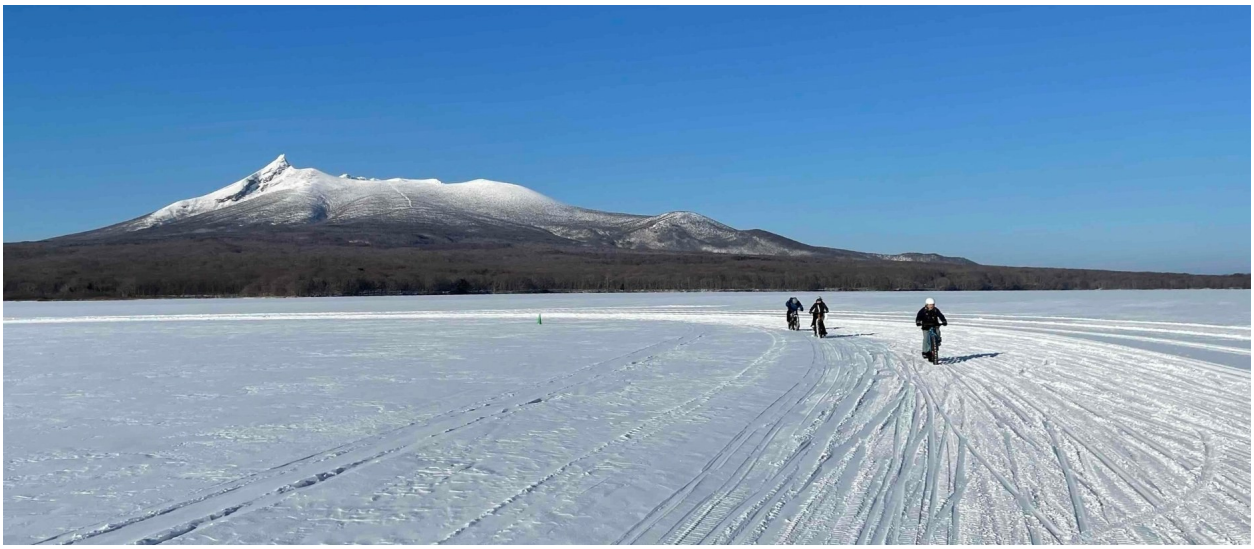
Connecting Lake Conservation and Coastal Prosperity through Community-Based Watershed Governance

Onuma Quasi-National Park, Japan

Nanae Onuma International Tourism and Convention Association

Protected Areas (including public natural or cultural parks)

People & Community



Summary of Good Practice Story

Onuma Quasi-National Park in Hokkaido, Japan, a Ramsar-listed wetland whose watershed feeds the coastal fishing town of Shikabe, saw rising agricultural and dairy runoff cause eutrophication and recurring algal blooms that degraded the lake's scenic appeal, hurt traditional smelt fishing and junsai harvesting, and threatened downstream premium kelp and scallop fisheries — all while fragmented, uncoordinated management across municipalities and industries left no unified response. The region established the Onuma Environmental Conservation Council to create a shared watershed conservation plan, expanded wastewater treatment, promoted tree-planting buffer zones around farmland to filter runoff, introduced nature-based algae-suppressing bacteria treatments, and built a resident-led citizen-science water monitoring network — while Hokkaido Nanae High School's Science Club students built a robot boat to collect algae. In 2022 these conservation efforts became the tourism-facing Onuma Education Park Project, now welcoming over 1,000 students annually across six educational themes. The lesson: conflicts between economic activity and environmental conservation transform into shared benefit once water-quality data is made visible to farmers and other stakeholders, helping the whole watershed — from upstream lake to downstream fisheries — understand they share one interconnected system.

Setting the Scene: Destination & context

Onuma Quasi-National Park is located in southwestern Hokkaido, Japan, about 30 minutes from the historic port city of Hakodate. Created by eruptions of Mount Komagatake, the park includes Lake Onuma, Lake Konuma, Lake Junsai, and 126 small islands. Its scenic beauty has attracted visitors for more than 150 years, and its wetlands were designated as a Ramsar Site in 2012.

What makes Onuma unique is the connection between its volcanic landscape, freshwater ecosystems, and coastal environment. Water flowing through the watershed reaches the fishing town of Shikabe, where nutrient-rich conditions support high-value fisheries, including kelp, scallops, and Alaska pollock. The health of these marine resources depends on the condition of the lakes and surrounding forests.

This shared watershed links residents, fishers, tourism operators, researchers, and public authorities. Their collaboration demonstrates how protecting a lake ecosystem can sustain coastal livelihoods, preserve local culture, strengthen regional prosperity, and support long-term environmental resilience.

The Turning Point: Why change was needed

Land-Based Activities, Lake Pollution, and Downstream Impacts on Coastal Fisheries

In recent years, agricultural and dairy activities within the Onuma watershed have increased nutrient runoff into the lake system. Elevated levels of nitrogen and phosphorus caused eutrophication and recurring algal blooms, particularly during summer and autumn.

These blooms degraded the scenic beauty of Onuma, an important tourism destination, and negatively affected local livelihoods. Traditional smelt fishing and the harvesting of junsai (water shield), both culturally and economically significant activities, experienced declining productivity. Tourism was also impacted as visitor numbers decreased and short-stop tourism became more common, reducing local economic benefits.

The effects extended beyond the lake. Water flowing from Onuma reaches the coastal fishing grounds of Shikabe, where marine ecosystems support the production of premium kelp and other fisheries resources. Concerns grew that changes in water quality could affect the long-term sustainability of these coastal industries.

A major challenge was the lack of integrated watershed governance. Although municipalities and industries were connected through the same watershed, resource management remained fragmented, limiting effective responses to environmental pressures.

The Vision: What you set out to do

To achieve long-term solutions rather than temporary water-quality improvements, the region established a watershed governance system involving local governments, researchers, businesses, and residents.

First, the Onuma Environmental Conservation Council was created to implement a watershed-wide conservation plan and expand wastewater treatment infrastructure. Following the Ramsar designation, a resident-led monitoring network was also established to strengthen community participation in water management.

Second, tree planting around farmland and dairy areas was promoted to reduce nutrient runoff into the lake system. The region also introduced nature-based biological control methods, including the use of naturally occurring algae-suppressing bacteria associated with aquatic plants, to improve water quality with minimal environmental impact.

In 2022, local tourism organizations, businesses, NGOs, and partners launched the Onuma Education Park Project (OEP). The program trains local youth as interpreters and provides education on ecosystem connectivity, sustainability, and responsible nature-based tourism.

The Journey: How change happened

Seven System Steps to Protect the Water Cycle from Land to Sea

To address environmental degradation in Lake Onuma and its downstream impacts on coastal fisheries, the region adopted a watershed-based approach that manages land, lake, and sea as one interconnected ecosystem. Environmental conservation was integrated with tourism, education, and local economic development to create long-term sustainability.

Step 1. Establishing a Watershed Governance Framework

The first step was the creation of the Onuma Environmental Conservation Council, bringing together Nanae Town, neighboring municipalities, researchers, and local stakeholders. The council developed the Onuma Environmental Conservation Plan, providing a shared framework for decision-making across administrative boundaries and sectors.

Step 2. Reducing Point-Source Pollution

To reduce nutrient inflows that contribute to harmful algal blooms, public sewerage systems were expanded and advanced wastewater treatment systems were introduced in households and tourism facilities. These measures significantly reduced nitrogen and phosphorus discharges from domestic and commercial sources.

Step 3. Addressing Non-Point Source Pollution through Nature-Based Solutions

Agricultural and dairy-related runoff was addressed through cooperation with local producers. Tree planting around farmland and pastureland created natural buffer zones that improve water filtration and reduce nutrient discharge. Biological control methods using naturally occurring algae-suppressing bacteria associated with aquatic plants were also introduced as a low-impact water quality improvement measure.

Step 4. Citizen Science and Watershed Monitoring

Following the Ramsar designation, the Onuma Ramsar Council established a watershed monitoring network supported by public environmental funds. Monitoring stations were installed at inflow rivers, within the lake system, and along waterways leading to the coastal area of Shikabe. Residents, researchers, students, and local organizations regularly collect data on water quality, ecosystem conditions, nutrient concentrations, and algal bloom occurrence. The data support evidence-based conservation and management.

Step 5. Youth-Led Environmental Action

Students from the Science Club of Hokkaido Nanae High School took action to address harmful algal blooms. They developed a robot boat to collect algae and explored ways to reuse the biomass as natural dyes and fire starters. Their efforts attracted regional attention and strengthened public awareness of watershed conservation as a shared community responsibility.

Step 6. Stakeholder Engagement and Consensus Building

To strengthen cooperation between upstream and downstream communities, participatory workshops titled “Discovering the Connection between Onuma and Shikabe” were introduced. Participants learn about water circulation, wetland functions, and ecological links between the lake and coastal fisheries, helping stakeholders identify collaborative solutions for the entire watershed.

Step 7. Developing the Onuma Education Park Project (OEP)

In 2022, these conservation experiences were transformed into the Onuma Education Park Project (OEP), a tourism and education initiative. Activities are organized into six themes, including environmental education, conservation, outdoor experiences, food education, and primary industry programs. Through hands-on learning, visitors gain a deeper understanding of the connections between ecosystems, local livelihoods, and sustainable development.

The Breakthrough: What you achieved
Results and Impacts

The seven-step watershed governance model has delivered measurable environmental, economic, social, and destination-management benefits in Onuma Quasi-National Park and the downstream coastal area of Shikabe.

Environmental Sustainability

Investments in sewerage infrastructure, advanced wastewater treatment systems, and buffer-zone tree planting reduced nutrient inflows into Lake Onuma. Together with nature-based biological control methods, these measures decreased harmful algal blooms and improved water quality, helping maintain the ecological value of this Ramsar Wetland. Improved lake conditions also contributed to healthier downstream marine ecosystems, supporting seaweed beds used for premium Shirokuchihama Ma-Kombu kelp production and enhancing habitats for scallops and Alaska pollock.

Economic Sustainability

The Onuma Education Park Project (OEP) created more than ten sustainable tourism experiences based on nature, culture, and local industries. These programs have encouraged longer visitor stays and increased participation in year-round tourism activities. The initiative has also strengthened the regional brand value of local products connected to the watershed.

Social Sustainability

Collaboration among farmers, fishers, tourism operators, researchers, and residents has strengthened through watershed workshops and conservation activities. OEP now welcomes over 1,000 students annually, increasing environmental awareness and helping develop future community leaders.

Destination Management

The Flow State Scale (FSS) is used to evaluate participant engagement, learning outcomes, and well-being. This evidence-based approach supports continuous improvement and demonstrates effective sustainable destination management.

Reflections: What you learned and what others can learn

The most important lesson from the Onuma initiative is that conflicts between economic activities and environmental conservation can be transformed into shared benefits through a watershed-based approach.

At first, simply asking farmers and other primary producers to reduce environmental impacts generated resistance. However, by sharing water-quality data and making environmental

conditions visible through monitoring, stakeholders came to understand that conservation actions, such as tree planting around farmland, improve lake water quality and ultimately benefit downstream fisheries and regional products. This helped build a shared vision across the entire watershed.
In tourism development, the region avoided large-scale infrastructure projects and instead promoted small-group ecotourism experiences using low-impact, low-carbon activities such as cycling, canoeing, and stand-up paddleboarding. This approach supports the local economy while keeping tourism pressure within the destination's environmental carrying capacity.

The Ripple Effect: Lasting impact
The combination of watershed governance linking land, lakes, and the sea, together with environmental education and leadership development through the Onuma Education Park Project (OEP), provides a practical and replicable model. It can be applied in protected areas and waterfront destinations worldwide that seek to balance conservation, community well-being, and sustainable tourism.

Awards or Certifications
On July 3, 2012, Lake Onuma was registered in the "Register of Wetlands of International Importance" held by the Ramsar Convention Secretariat, and Onuma Quasi-National Park became a "Ramsar Convention Registered Wetland." Subsequently, the Ramsar Council was established by residents and stakeholders.

Web Articles
https://www.env.go.jp/nature/ramsar/conv/ramsarleaflet/13_Onuma.pdf

Other Relevant Links
https://onuma-ramsar.jimdofree.com/%E5%85%AC%E9%96%8B%E3%83%87%E3%83%BC%E3%82%BF/

Quotes or Testimonials
Hokkaido Nanae High School Science Club Web Report
◆Project Name: Improvement and Enhancement of the Algae and Drifting Debris Collection Boat for Lake Onuma, Oshima, and Utilization of Collected Algae

We decided to conduct water quality surveys at eight locations around Lake Onuma once a month. After collecting water in a sampling bucket, we use measuring instruments on the spot to measure and record the water temperature, pH, and electrical conductivity. We also observe the turbidity, color, and smell of the water and record any observations. The water collected at each location is placed in a storage container and brought back to school for a simple water quality test (pack test). The pack tests performed included seven items: ammonium, nitrite, nitrate, phosphate, COD, residual chlorine, and magnesium. During the water quality survey, we

noticed a significant difference in water quality between the water near the mouths of the inflowing rivers, Gunkawa, Karimakawa, and Shukunobegawa, and the spring water at Oiwa and Reizendō. The areas surrounding the inflowing rivers are characterized by dairy farms, fields, and facilities such as golf courses, resulting in high levels of ammonium, nitrite, and nitrate. It's easy to see how human life significantly impacts water quality.

Based on the insights gained from this water quality survey, we conducted further experiments and presented our findings at the Southern Hokkaido Branch Science Research Presentation Competition on August 29th, titled "The Influence of Spring Water from Oiwa on Lake Onuma's Water Quality," receiving an Encouragement Award.

We plan to continue conducting water quality surveys monthly to find clues for improving water quality. However, more than collecting data, we believe it's crucial to visit Lake Onuma, feel a connection to it, constantly be mindful of its environmental conservation, and take action, even in small ways, to improve the environment.