Synergistic actions on climate change, biodiversity and the SDGs – three cases from Japan

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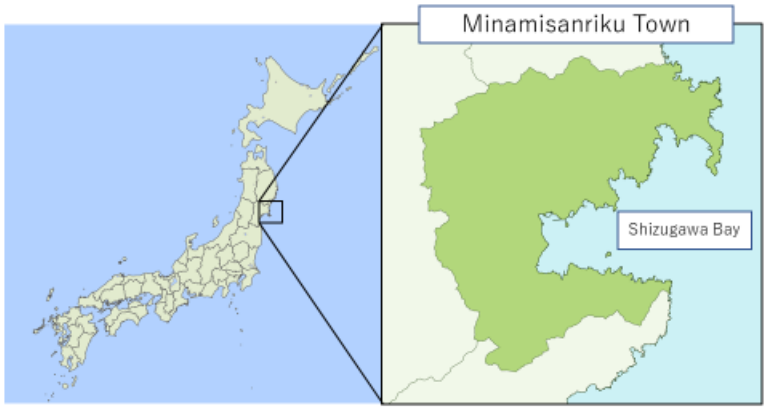
Minamisanriku Town

1. Background



- Minamisanriku Town is home to about 12,000 people. It is located in the north-east of Miyagi Prefecture, on the southern part of the Sanriku coast.
- The town's area extends from the headwaters of streams to the sea, and its rich natural environment supports aquaculture and tourism.
- The town's boundary is a watershed, and rainfall flows into the bay through streams, which run through the town. This geographical feature of Minamisanriku means that land-based activities in the town have a significant impact on the fishing industry in the bay.
- Overcoming the damage caused by the Great East Japan Earthquake, Minamisanriku aims to become a sustainable, self-sustaining and decentralised town.

2. Restoration of seaweed beds (blue carbon)

- Minamisanriku is located facing Shizugawa Bay, which is home to more than 200 species of seaweed and seagrass, and boasts high biodiversity, including the endangered brant goose or *kokugan* which winter there. In 2018, the bay was registered as a Ramsar Convention wetland. Recently, the area of seaweed beds was found to be decreasing due to damage from the earthquake and the effects of rocky shore denudation that is spreading nationwide, as such, restoration of the seaweed beds has become an urgent issue. Therefore, the Minamisanriku Nature Center, in collaboration with the Center for Sustainable Society and a private company, is promoting the restoration and expansion of seaweed beds in Shizugawa Bay. The aim is not only to maintain biodiversity but also to convert blue carbon into credits by making eelgrass and other seaweed function as a CO_2 sink. In collaboration with Tohoku University, analysis is also being carried out on how to increase biodiversity through the expansion of seaweed beds.

Seaweed beds under restoration

Photo by Akihiro Dazai

3. Biodiversity-conscious forest management

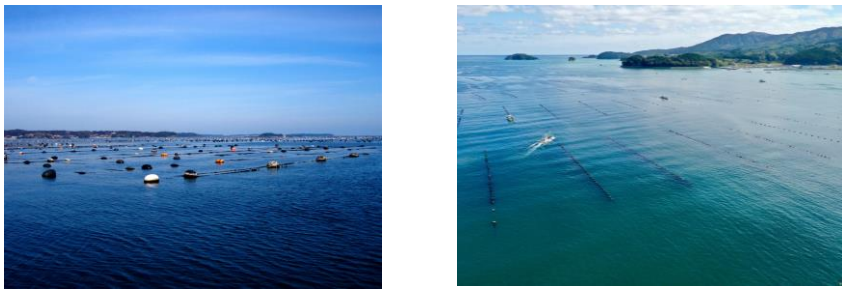
- Properly managed forests are important CO_2 sinks. Minamisanriku is 70% covered by forests, and the town is managing the forests with biodiversity in mind, with the coexistence of cedar, red pine, and cypress along with subvegetation. Zoning is implemented for riparian forests. In addition, the Minamisanriku Forest Stewardship Council obtained FSC certification in 2015. Sakyu Corporation, which is a member of the Minamisanriku Forest Stewardship Council and supports the local forestry industry, is also working with the World Wildlife Fund to research and analyse how FSC's efforts comply with the Taskforce on Nature-related Financial Disclosures. By proactively disclosing information, the company aims to support information disclosure of wood user companies, which may lead to purchase of certified woods and protection of nature.

Forests certified by FSC®

Photo by Akihiro Dazai

4. Other Synergies

- In 2016, the Shizugawa Branch of the Miyagi Prefecture Fisheries Cooperative, practising aquaculture off the coastline in Shizugawa Bay in Minamisanriku Town, became the first in Japan to receive ASC certification for oyster farming with reduced environmental impact. Before the earthquake, good quality oysters were not produced even after three years due to overcrowding. After the earthquake, the area under cultivation was reduced to one-third, and the water quality and nutrition was improved, meaning that after only one year, oysters were ready to be shipped. This increased oyster farmers' income by 1.5 times and reduced working hours by 40%.
- Organic waste from homes and stores in Minamisanriku is fermented and processed to produce biogas and liquid fertilizer. The biogas is used to generate electricity, and the liquid fertilizer is applied to farmland as a fertilizer. This project has created an intra-regional cycle of resources, energy and food.

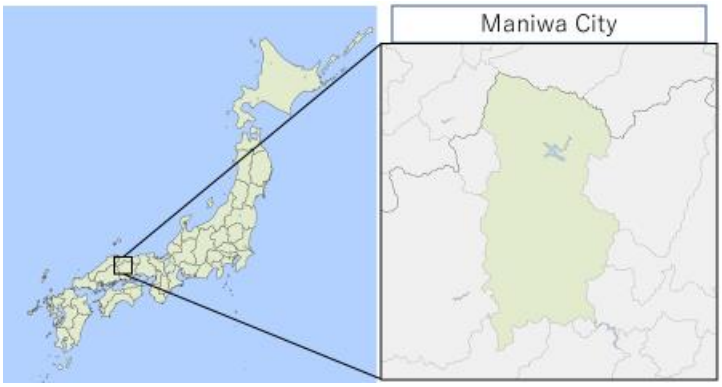


Oyster farms in Shizugawa Bay in the past (left) and the present (right)

Photo by Akihiro Dazai

Maniwa City

1. Basic Information



- Maniwa City is located in the central-north part of Okayama Prefecture, and roughly in the centre of the Chugoku Mountains.
- The total area of Maniwa is approximately 828 km², and about 80% of the city area is forested, with abundant forest resources.
- The forestry industry has been thriving for a long time, and the production of cypress in Okayama has been the highest in Japan since 2012, except for 2017. On the other hand, large amounts of forest residues and wood waste have not been used effectively, having been disposed of or abandoned.
- In 2006, Maniwa City announced its “biomass town concept” with the aim of making better use of these unused woody resources, and was certified as a biomass town by the national government.
- Biomass power generation produces benefits such as ensuring resilience to natural disasters, revitalising local industries and communities, and preserving biodiversity in secondary forests.
- Maniwa City declared itself a Zero Carbon City in 2020, and aims to achieve 100% self-sufficiency in renewable energy by utilising forest resources and building a forestation and timber industry cluster.

2. Biomass power generation

- Ten organisations, including Maniwa City and local forestry-related business entities, invested to establish Maniwa Biomass Power Corp in February 2013, and the Maniwa Biomass Power Plant began operating in April 2015. The scale of operations is 10,000 kW, and the operating rate is 103%. Annually, the plant uses 110,000 tonnes of biomass as fuel and generates 79,200 MWh (enough for 22,000 households).
- By efficiently accumulating thinned wood, forest residues and lumber offcuts generated from forests, the company is able to stably supply and generate power from biomass as fuel for power generation. This has contributed to an annual reduction of 80,000 tonnes of CO_2 emissions and an increase in energy self-sufficiency (from 11.6 to 37.3%). In addition, the company aims to use about 350,000 tonnes/year of biomass and reduce CO_2 emissions by about 300,000 tonnes/year.

Biomass Power Plant

Photo by Maniwa City

- Establishing and using the information management system, which covers resource procurement to distribution, Maniwa City created a system to return profits to forest owners. By trading fuel, which used to be unused or disposed of as industrial waste (with disposal costs equivalent to JPY 100 million or more), as a valuable resource, approximately 20 materials suppliers and 30 lumber companies have increased their profits. In addition, JPY 550 /tonne of the fuel cost is returned to forest owners.
- In the past, logging companies abandoned most of the wood left over from logging in the mountains. This led to soil weakening, disruption of ecosystem balance, and was a potential cause of disasters. However, now that forest residue has become a valuable resource, it can be removed from the mountains, making it easier to manage the mountains including through reforestation.
- Maniwa City now promotes main cutting and thinning of planted forests by utilising the forest environment gift tax.
- The city is also working on the cyclical use of broadleaf forests, the revival of mountain burning, and the restoration of wetlands.

Fostering forests that produces energy

Photo by Maniwa City

Lake Inba and its basin

1. Background

- Lake Inba is located in the northern part of Chiba Prefecture. The basin area is about 541 km2, accounting for about 10% of the prefecture's total area. Its watershed spans 13 cities and towns, and the population of the basin is approximately 790,000. There are about 600 small valleys or *yatsu* in the watershed. Groundwater from the plateau comes to the surface as springs where the valley slopes meet the plains (at the edges of the valley floor of *yatsu*), and these springs collect to form rivers, which in turn flow into Lake Inba.

Source: JICA Japan's Experience on Water Resources Management Theme 2-2. River Basin Planning

2. History

- Until around the 1950s, people practiced paddy rice cultivation mainly on the valley floor, taking advantage of the abundant spring water. In addition, valley slopes and the top of the plateau provided fertilizers needed for agriculture and grass to feed cattle and horses. The grasslands and forests on the plateau maintained for agriculture and daily life also helped to recharge groundwater and maintain spring water, and land use was integrated with the water cycle.
- After the 1960s, fallow and abandoned cultivation became widespread, and after the 1970s, urbanisation, mainly on the plateau, led to land reclamation in the valleys. Grasslands and forests were replaced by asphalt, concrete and other materials that do not allow rainwater to permeate the ground, and as a result, springs in the valleys decreased.
- In addition, many native plants and animals were decreasing and even disappearing in Lake Inba, while alien species such as black bass and snapping turtles invaded and bred in the surrounding area. The ecosystem deteriorated day by day. COD, an indicator of water quality, significantly exceeded environmental standards (COD75% value: 3 mg/L), and in 2007, the lake became one of the worst lakes in Japan in terms of water quality.
- In the basin, flood flows increased due to rapid land use changes such as residential development. In October 2019, heavy rainfall exceeding 200 mm in a short period of time caused flood damage due to leaks from levees and overflows in the incoming rivers. There are concerns that global warming will lead to an increase in rainfall and more frequent flooding in the future, making it imperative to act.

3. Restoration of Lake Inba and its Watershed

- In October 2001, Chiba Prefecture established the "Committee on restoration of sound hydrologic cycle in Inba-numa watershed" consisting of concerned parties (residents, academics, water user groups, and local government) in order to improve water quality and restore the natural environment in the basin. In February 2004, the "Emergency Action Plan for Sound Hydrologic Cycle in the Inba-numa Basin" was formulated, but it failed to improve water quality. Based on the results obtained from the emergency action plan, new initiatives were added, and the "Plan for the Sound Hydrologic Cycle in the Inba-numa Basin" (Master Plan) was formulated in January 2010 with a target year of FY2030 (subsequently revised in March 2017 and March 2022). Based on this plan, the 3rd Action Plan was formulated in March 2022, which stipulates specific measures.
- The 3rd Action Plan incorporates the concept of "River Basin Disaster Resilience and Sustainability by All," in which all parties involved work together to address the impacts of climate change and changing social conditions throughout the basin, with the aim of using this as a driving force to revitalise efforts to improve the sound hydrologic cycle. In addition, the plan aims to improve the attractiveness of the waterfront area by creating a network linking the rich natural environment, history, culture, and tourist facilities.
- In addition to river improvement and levee maintenance, efforts for river basin disaster resilience and sustainability by all include the conservation and utilization of valleys and satoyama, mainly through the use of green infrastructure, and measures in catchment areas such as paddy field storage and rainwater harvesting and infiltration measures.
- The "Green Infrastructure Initiatives Utilizing Abandoned Valleys" have brought multiple benefits by wisely utilizing the various functions that valleys have to offer.
  - Utilization and improvement of valley topography (e.g. restoration of abandoned rice paddies,) to slow runoff of rainwater (flood control effect)
  - Removal of nitrogen and phosphorus, which cause water quality deterioration in the Lake Inba, by slowly allowing rainwater and spring water to flow into the preserved and restored wetlands within the *yatsu*, (water purification)
  - By conserving and restoring wetlands, valuable organisms that prefer wetland environments are conserved and restored (ecosystem conservation).
  - Utilization of the preserved and restored *yatsu* environment as a place for environmental education and community exchange and recreation (community revitalization).
  - Beautiful landscape of well-kept *yatsu* (local landscape formation)

Utilisation of abandoned *yatsu*

Agricultural land spreading out on a plateau

Groundwater high in nitrogen and phosphorus gushes into *yatsu*

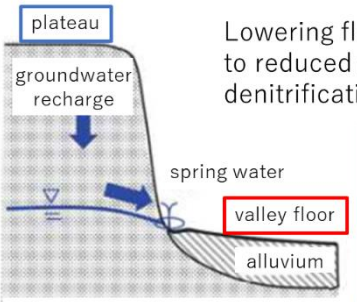


Diagram of the plateau and *yatsu* transects

Lowering flow velocity at *yatsu* contributes to reduced peak flows and accumulation of denitrification and dephosphorization

Yatsu that contributes to rainwater storage and infiltration

Effects of *yatsu*

Disaster Prevention and Mitigation Effectiveness
- About 10 times more effective in delaying runoff (Comparison between an urbanised valley and a valley with surrounding forests, grasslands, and wetlands) - Reduction of precipitation runoff to rivers by 30% or less (In urbanised valleys, 70-100% of the precipitation runs off.)
Water purification effect
- Nitrate nitrogen concentration decreased from 20 mg/L to 0-5 mg/L

Source: Based on Green Society Working Group, Environment Subcommittee and Technology Subcommittee, Council for Social Infrastructure Development and Council for Transport Policy, Ministry of Land, Infrastructure, Transport and Tourism

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