

**In Japan
No. 5**

Restoration of coastal forest for the purpose of recovery of marine resources and improvement of living environment in Cape Erimo, Hokkaido Prefecture, Japan

1. Regional Profile

Geographical Location	Country and Region	Erimo Town, Hokkaido Prefecture, Japan, East Asia												
	Longitude and Latitude	North Latitude 41° 55' 30", East Longitude 143° 14' 56" (Cape Erimo)												
	Geographical Conditions	<ul style="list-style-type: none"> • Fishing village distant from the urban area • Approximately 800 km from Tokyo (capital) • Approximately 250 km from Sapporo (prefectural capital) 												
Natural Environment	Topography and Altitude	<ul style="list-style-type: none"> • Cape Erimo, located in the southernmost end of the Hidaka mountain range that stretches from the center to the south in Hokkaido Prefecture, is a point jutting southward into the Pacific Ocean. • At its edge are cliffs standing over 60 meters high that form a seashore terrace. 												
	Climate	<ul style="list-style-type: none"> • The average yearly temperature in Cape Erimo is 6.9°C and the annual precipitation is 970 mm. • Its climate is classified into Dfb (cool temperature, humid, warm summer), based on the Koeppen Climate Classification. • The area is one of the windiest in Japan, with maximum peak winds of over 10 meters per second blowing for over 270 days a year. 												
	Vegetation and Soil	<ul style="list-style-type: none"> • Natural deciduous broad-leaved forests spread over the high-altitude area of the northern part of Erimo Town, while grass fields and afforestation mainly lie in the southern hilly terrains and flat lands. • The soil of Cape Erimo and its surroundings is acidic and infertile. 												
	Biodiversity and Ecosystem	<ul style="list-style-type: none"> • A mountainous area forming a part of the Hidaka range spreads over the northern part of Erimo Town. Immense natural forests range in this area where extremely abundant biota can be seen. • A hilly terrain and plateau in the south of the Hidaka mountain range lie in the southern part of Erimo Town, with Cape Erimo located at its tip. Although natural forests used to cover the area, human-induced desertification once took place. Currently, man-made restored forests and grasslands are growing. • The coastal sea area at Cape Erimo and its surroundings falls on a point where warm currents from the west and cold currents from the east converge. In this area, diversified fish, shellfish, and seaweed inhabit, while marine animals such as harbor seals and steller sea lions make their habitat. 												
Social Background	Population and Changes in Population	<ul style="list-style-type: none"> • The population of Erimo Town decreased from 7,777 in 1975 to 5,796 in 2005. 												
	History and Culture	<ul style="list-style-type: none"> • It is recorded that about 300 years ago, immigrants from the Honshu mainland settled down in Erimo Town and made a living by fishery. Since then, the town has existed to the present as a fishing village. • The town has been well known as a production area of kelp seaweed (konbu) since old times. "Hidaka konbu" produced in this area is distributed throughout Japan. 												
	Regional Economy (Major Industries, Livelihood (including data and forecasts))	<ul style="list-style-type: none"> • The major industries of this area include fishery and tourism. • The number of workers in each industry sector in 2005 is as follows. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Primary Industry (agriculture, forestry and fishery)</td> <td style="text-align: center;">1,622</td> <td style="text-align: center;">47.8%</td> </tr> <tr> <td>Secondary Industry (mining, manufacturing and construction)</td> <td style="text-align: center;">430</td> <td style="text-align: center;">12.7%</td> </tr> <tr> <td>Tertiary Industry (commerce, tourism and others)</td> <td style="text-align: center;">1,343</td> <td style="text-align: center;">39.6%</td> </tr> <tr> <td>Total*</td> <td style="text-align: center;">3,395</td> <td style="text-align: center;">100.0%</td> </tr> </table> <p><i>*Note: As the percentages of workers in Primary Industry, Secondary Industry, and Tertiary Industry are rounded off to one decimal place, they may not add up to 100.0%.</i></p>		Primary Industry (agriculture, forestry and fishery)	1,622	47.8%	Secondary Industry (mining, manufacturing and construction)	430	12.7%	Tertiary Industry (commerce, tourism and others)	1,343	39.6%	Total*	3,395
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2. Use and Management of Natural Resources in the Region

(1) Use and Management of Natural Resources in the Past and Present

1) Land Use Related to the Use and Management of Natural Resources in the Past and Present

- The continental area at Cape Erimo and its surroundings was bare at the beginning of the 19th century due to the impact of human activities such as the collection of firewood and charcoal and pasture development. After the middle of the 20th century, a conservation project regenerated the forests and grasslands of Japanese black pines and other plant species.
- The coastal sea area at Cape Erimo and its surroundings falls on a junction where warm currents from the west and cold currents from the east converge, making it one of the best fishing areas in Japan. Although the yield of fish and shellfish once fell dramatically due to the flowing of sand and dirt as a result of the above-mentioned desertification of the continental land, a recovery has been observed in recent years owing to the regeneration of forests and grasslands.

2) Objectives and Details of the Current Use and Management of Natural Resources

- Grasslands and forests at Cape Erimo and its surroundings were designated as a special area of the Hidaka Sanmyaku-Erimo Quasi-National Park in 1981. Direct use of natural resources by agricultural or forestry business or the likes has been restricted.
- Owing to this, landscapes of natural coasts and seawater in harmony with man-made recovered forests and grasslands make for attractive sightseeing resources today. Every year, 300,000 to 400,000 people visit this area, and it is one of the most popular tourist spots in Hokkaido Prefecture.
- In the seawater at Cape Erimo and its surroundings, shallow sea fishing for kelp, glue plants (funori seaweed), sea urchin, and sailfin sandfish as well as boat fishing for salmon, whelk, horsehair crab, octopus, and flatfish are performed. Kelp in this area or “Hidaka Konbu” is particularly famous nationwide.

(2) Problems Associated with the Use and Management of Natural Resources and their Impact on Biodiversity

- The continental area of Cape Erimo and its surroundings were once covered with natural forests of deciduous broad-leaved trees. However, desertification took place due to firewood extraction, pasture development, and damage by grasshoppers. The conditions worsened to the extent that the area was called the “Erimo Desert” in the 1920s and 1930s.
- With the above changes, the coastal area waters turned red due to red soil blown by winds to the coast over a distance of 10-km. This phenomenon kept migratory fish away from the water and damaged kelp roots, dramatically exacerbating damage to the coastal area ecosystem.
- Local life was considerably disturbed by effects of the above changes on fishing, which had been the means of living for this area. In order to resolve this problem, the first conservation work was undertaken in 1940; however, results were not favorable. The work was then discontinued as the Second World War intensified.



Picture: Desertification of Cape Erimo at the beginning of the 20th century

(Source: Material of the District Forest Office for the Southern Part of Hidaka, Hokkaido Regional Forest Office)

(3) Regional Plans and Other Measures toward a Resolution of the Above Problems

- In order to resolve the problem described in paragraph 3) above, the national government (Forestry Agency) undertook a full-fledged conservation project in 1953.
- Details are described in the following section: “3. Details.”

3. Details

(1) Overview

In order to curb the decrease in fish and shellfish yield and also to stop the deterioration in the living environment due to desertification at Cape Erimo and its surroundings, the national government (Forestry Agency) established the Erimo Conservation Project Bureau of the Urakawa Forest Service Office (currently, the District Forest Office for the Southern Part of Hidaka) in 1953 and started to develop coastal forests under the name of “Bald Mountain Restoration Project” (currently, the Greening Project for Coast disaster prevention). Detailed efforts made after 1953 are shown below.

Location	National forests of Cape Erimo, Erimo Town, Hokkaido Prefecture
Involved Parties	[Land owner and primary implementing body] Hokkaido Regional Forest Office, Forestry Agency [Workers of coastal forest restoration] Local residents (fishermen)
Background and history	<i>Refer to the previous pages</i>
Purpose and objectives	<ul style="list-style-type: none"> • To develop coastal forests to prevent the blowing and outflow of red soil • To improve the living environment of residents • To recover marine resources of the coastal sea area
Main contents	<p><i>For detailed matters including technical information, refer to the following pages.</i></p> <p>[Start of Greening Work (from 1953 -)]</p> <ul style="list-style-type: none"> • In order to develop coastal forests, efforts began with grass planting through turfing and seeding. The works covered 3 hectares in 1954, 5 hectares in 1955, and 3 hectares in 1956; however, the growing conditions were not always favorable. • Although trees were also planted, growing conditions were not favorable. Therefore, tree planting was temporarily discontinued and priority was given to grass planting. <p>[Development of the Erimo-Style Greening Technique and the Progress of Grass Planting (from 1957-)]</p> <ul style="list-style-type: none"> • In 1957, the “Erimo-Style Greening Technique” was developed. It is a method for bedding marine algae drifting to the seashore over the seeded area. • This method realized a reduction in the use of synthetic fertilizer, labor, and cost, and brought about a dramatic acceleration in greening. In 1970, grass planting work was completed for 192 hectares, the area of the original plan. <p>[Restart and Progress of Tree Planting (from 1971 -)]</p> <ul style="list-style-type: none"> • In 1971, full-fledged tree planting started again. Japanese black pine was primarily planted in combination with broad-leaved trees such as Japanese emperor oak, autumn olive (akigumi), and <i>Amorpha fruticosa</i> (itachihagi). • In addition, after reviewing past techniques, methods uniquely used in Erimo were developed and implemented one after another. Some of the most typical techniques are the “Belt Unit Technique” and use of windscreens and snow-driving fences with larch (hurdle fence). • As a result of such efforts, a forest of 183 hectares was successfully formed by the end of 2009, 50 years after the start of the project.

Main achievements	<ul style="list-style-type: none"> • Greening was realized for 192 hectares, which was the area of the original plan (183 hectares of which was restoration of coastal forests). This success led to a drastic reduction in damage caused by flying sand and a dramatic improvement of the living environment for residents. • The greening prevented red soil from flying and flowing into the coastal area, restoring the quality and quantity of the marine ecosystem and recovering fishing yields for the key industry of the region. • Scenic views of natural coasts and seawater in harmony with man-made recovered forests and grasslands make for attractive sightseeing resources today. Every year, 300,000 to 400,000 people visit this area, and it is one of the most popular tourist spots in Hokkaido Prefecture.
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Picture: Oblique photograph of Cape Erimo taken from the south

(Source: Material of the District Forest Office for the Southern Part of Hidaka, Hokkaido Regional Forest Office)

(2) Details of the Use and Management of Natural Resources from the “Five Perspectives” of the Satoyama Initiative

The table below shows the primary relevance of this case to the five perspectives.

Details are given below the table for the perspectives which have high relevance (items with the “ ” mark in the table).

Five Perspectives	Relevance to this Case	
	Degree of Relevance	Summary of Relevance
1) Resource use within the carrying capacity and resilience of the environment		<ul style="list-style-type: none"> In order to realize greening by overcoming the harsh natural conditions of Cape Erimo, the growth of plants through artificial means was absolutely necessary. In this project, unique techniques were developed and refined through long-term efforts, contributing to success in the restoration of coastal forests. <p><i>* Details to follow.</i></p>
2) Cyclic use of natural resources	○	<ul style="list-style-type: none"> Marine algae drifting to the seashore was used as a natural windbreak material and fertilizer.
3) Recognition of the value and importance of local traditions and cultures		<ul style="list-style-type: none"> This project was based on the “relationship between ecosystems of forests and coastal sea area ” which has been well known since old times. <p><i>* Details to follow.</i></p>
4) Natural resource management by various participating and cooperating entities	○	<ul style="list-style-type: none"> Although this project was a public work, it was promoted based on the cooperation with local residents (fishermen) who were involved in the project as greening workers.
5) Contributions to local socio-economics		<ul style="list-style-type: none"> Through this project, the ecosystem of the coastal sea area and fishing yields for the key industry of the region were recovered. The regenerated coastal forest became a new sightseeing resource. <p><i>* Details to follow.</i></p>

1) Resource use within the carrying capacity and resilience of the environment

[Harsh Natural Conditions in Cape Erimo]

- The natural conditions of Cape Erimo are extremely harsh for plants. Cape Erimo is an exceptionally windy area in Japan, with maximum peak winds of over 10 meters per second blowing over 270 days a year. This area also tends to suffer from a lack of sunlight due to dense fogs in the summer, while experiencing strong winds that blow over seedlings due little snow accumulation in winter. In addition, the soil of Cape Erimo and its surroundings is acidic, containing few fertilizer elements due to the strong winds blowing away topsoil.
- For these reasons, in order to realize greening, the growth of plants through artificial means was absolutely necessary. Unique techniques were developed and improved through long-term efforts as shown below, eventually contributing to the successful restoration of coastal forests.

[Development of grass planting techniques suitable for the natural environment of Cape Erimo]

- In the grass planting project that started in 1954, two methods were implemented. One method was to transplant grass from other places (turfing) and the other method was to sow seeds of grass (seeding).
- In order to protect grass from the strong wind characteristic to Cape Erimo, grass and seeds were covered with fascines and reed screens and additionally, the area was surrounded by wooden windbreak hedge. However, these protective installations had to be frequently repaired since they were blown away by wind and growing grass was covered with flying sand. Moreover, since the soil of Cape Erimo and its surroundings is acidic and contains few fertilizer elements, the neutralization of the acids with lime and fertilization were necessary.
- This method was expected to take a tremendous amount of time and labor to realize any greening over the projected area. The Conservation Project Bureau, which focused on marine algae traditionally used as fertilizer in the Erimo region, then started to conduct a test on the use of marine algae to aid in the greening in the year following the commencement of the project.
- Following a 3-year testing period, the Bureau made a full-fledged implementation of the “Erimo-Style Greening Technique” that is a method of bedding marine algae washed up to the seashore over the seeded area. Marine algae served as a weight to prevent the flow of seeds as well as functioning as a fertilizer.
- This method realized a reduction in the use of synthetic fertilizer and eliminated the need for labor in troublesome work of placing fascines and reed screens. In addition, this low-cost and simple work helped to dramatically accelerate greening.
- Because the marine algae for the project was purchased in bulk from a fisheries cooperative, it became an important source of cash income of fishermen who had been struggling with the reduction fish and shellfish yields .
- Through the “Erimo-Style Greening Technique,” the foundation of today’s Erimo conservation project was established. In 1970, grass planting work was completed for 192 hectares, which was the area of the original plan.



Picture: Erimo-Style Greening Technique

(Source: Material of the District Forest Office for the Southern Part of Hidaka, Hokkaido Regional Forest Office)

[Development of a tree planting technique that is suitable for the natural environment of Cape Erimo]

- Although tree planting began in 1954 as a part of the project, they did not grow easily because of the

harsh conditions of Cape Erimo, an exceptionally windy area in Japan and that tends to suffer from a lack of sunlight due to dense fog in the summer and strong winds blowing over seedlings due to little accumulation of snow in winter.

- Since there were no successful examples of seaside greening in Hokkaido Prefecture at that time and the cultivation method of trees suitable for Erimo was not established, the Bureau gave priority to grass planting by discontinuing the planting of woody plants and making efforts for technical development during the period when the planting was discontinued.
- In 1971, full-fledged tree planting started again. As a result of trial and error, Japanese black pine was mainly planted in combination with broad-leaved trees such as Japanese emperor oak, autumn olive bush (*akigumi*) and *Amorpha fruticosa* (*itachihagi*). Although black pine was not a native tree species of Hokkaido Prefecture, it was known to be resistant to the sea breeze and therefore was shipped from the Honshu mainland.
- In addition, methods unique to Erimo were developed one after another after reviewing past techniques. For example, water drains were created as a measure against freezing in winter. The effects of windbreak hedges were also re-analyzed as a measure against winds. As a result, hedges started being planted in a grid pattern, instead of being conventionally planted in parallel with the coastline and the topography, while the space and direction of their installation was modified to be able to resist violent northeasters. Moreover, a semi-permanent windbreak mound (1.5-meters high) was built.
- In 1976, the Bureau started implementing a “Belt Unit Technique” where 50-meter wide, 150 to 400-meter long dense plant zones and a vacant zone were being placed one after the other in order to enhance early greening across immense wasteland.
- Furthermore, in order to improve the durability of the windbreak hedge, the Bureau introduced the use of a windscreen and snow-drifting fence with larch (hurdle fence), which was developed by Professor Azuma of Hokkaido University in 1985. This method, which makes use of thinned larch wood, features high durability, maintenance-free operation, and portable reusability. Its most distinctive feature is its snow drifting effects, helping cover seedlings with snow and thereby overcome the harsh winter.
- As a result of these ceaseless efforts in technical development and improvement, a 183 hectare forest was successfully formed by the end of 2009, about 50 years after the start of project.

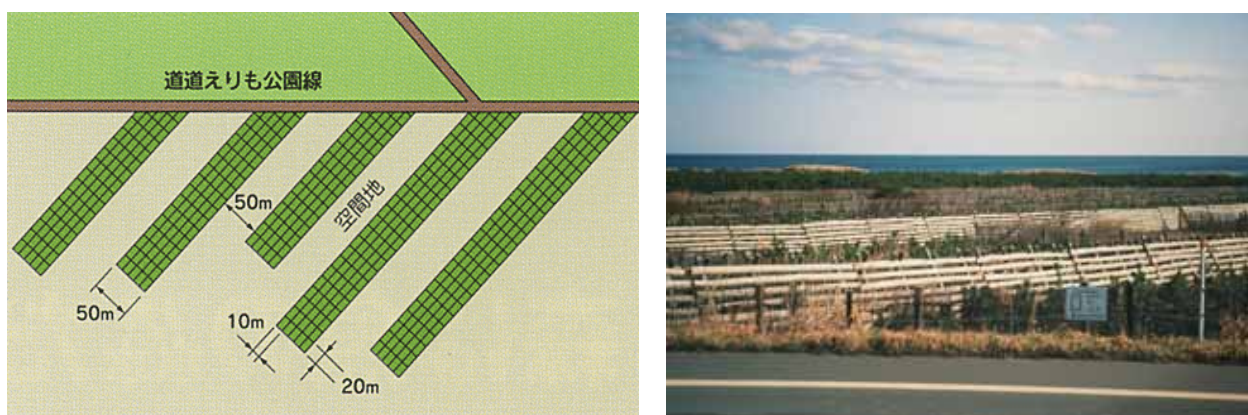


Figure and Picture: Tree planting technique developed through this project

(Left: Overview of the Belt Unit Technique, Right: Hurdle fences)

(Source: Material of the District Forest Office for the Southern Part of Hidaka, Hokkaido Regional Forest Office)

3) Recognition of the value and importance of local traditions and cultures

[Relationship between forests and fish]

- In Japan, it has long been said that there is a strong relationship between forest and fish. Fish breeding forests have been developed in many regions since the Edo Period (1603-1868). This project was executed with such empirical traditional knowledge in mind.
- The relationship between forests and fish is specified today as follows:

- 1) Forests supply the nourishment necessary for growth of fish and shellfish. Many different nutrient elements are blended in the water supplied to oceans through forest soil as well as insects, branches, and leaves that fall from trees into the oceans, helping the breeding of phytoplankton, which is the food of fish and shellfish and promoting the growth of seaweed and clams.
- 2) Forests properly intercept sunlight, creating an environment suitable for fish habitats and spawning sites.
- 3) Forest soil, which has a high ability to retain rainwater, supplies the sea with a constant amount of rainwater at a stable temperature through coastal forests.

4) Natural resource management by various participating and cooperating entities

[Close cooperation with local residents]

- This project was executed in response to the voices of local residents. Although the primary stakeholder was the national government (Forestry Agency), it was carried out in close cooperation with local residents.
- A number of local residents were involved with this project as labor for the greening. Many residents were willing to participate in this project since it not only would improve their living environment but also provide them with cash income.
- Although most of the work in the greening project starting in April had to be terminated by June when kelp gathering started, the hard work was successfully completed owing to the cooperation of local residents.
- Even today, in a joint effort with the “Association to Preserve the Green of Cape Erimo,” a group of local residents, and the administrative body, the wives of fishermen carry out a green activity called “wakuwaku morizukuri” (fantastic forestation forum) in spring and fishermen carry out an activity called “ikiiki morizukuri” (dynamic forestation forum) in fall.

5) Contributions to local socio-economics

[Contribution to fisheries]

- As the greening expanded, the amount of red soil blown to the coast was reduced, and as the forests grew, nourishment necessary for the growth of fish and shellfish started being supplied. As a result, the ecosystem of the coastal area was dramatically improved.
- By around 1965 when 80% of grass planting was completed, the blowing of red soil and flow of sand and dirt was nearly under control, and the red soil accumulated was washed away by currents, resulting in the beginning of marine resource recovery.
- The yield of fish and shellfish returned to 2,264 tons in 2001, compared with 72 tons in 1952. Moreover,

the quality of kelp dramatically improved and a sea urchin aquaculture business newly began in 1989.

[Contribution to tourism]

- Scenic views of natural coasts and seawater in harmony with man-made recovered forests and grasslands make for attractive sightseeing resources today. Every year, 300,000 to 400,000 people visit this area, and it is now a popular tourist spot in Hokkaido Prefecture.
- Because Erimo drew attention for its success in greening and received a great number of visitors, promenades and an observation tower were built in the regenerated coastal forest.

[Use in the environmental education]

- As a part of junior and senior high school education in Erimo Town, tree-planting activities are performed once a year. Moreover, junior high school students from other prefectures visit this site for their school trips and participate in on-site kelp gathering and tree-planting programs. In this manner, this site is widely used for environmental education.

[Technical contribution to overseas forestry]

- JICA training is done in this region, and 40 people from 9 countries (mainly from Asia) who work on forestry visited the greening project areas in fiscal year 2009.

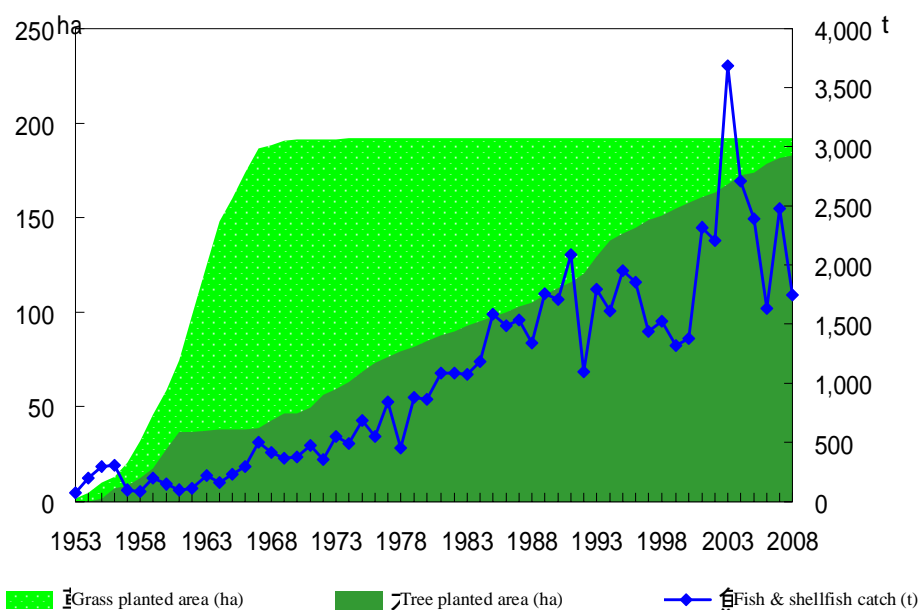


Figure: Relationship between greened land area and fish and shellfish catches
 (Source: Material of the District Forest Office for the Southern Part of Hidaka, Hokkaido Regional Forest Office)

End