

An aerial photograph of a vast, green wetland landscape. A dark, winding river meanders through the center of the frame, creating several loops and oxbow-like shapes. The surrounding land is a mix of vibrant green grass and patches of darker, more dense vegetation. In the far distance, a range of blue mountains is visible under a clear sky.

For our future children who will live together with the wetland

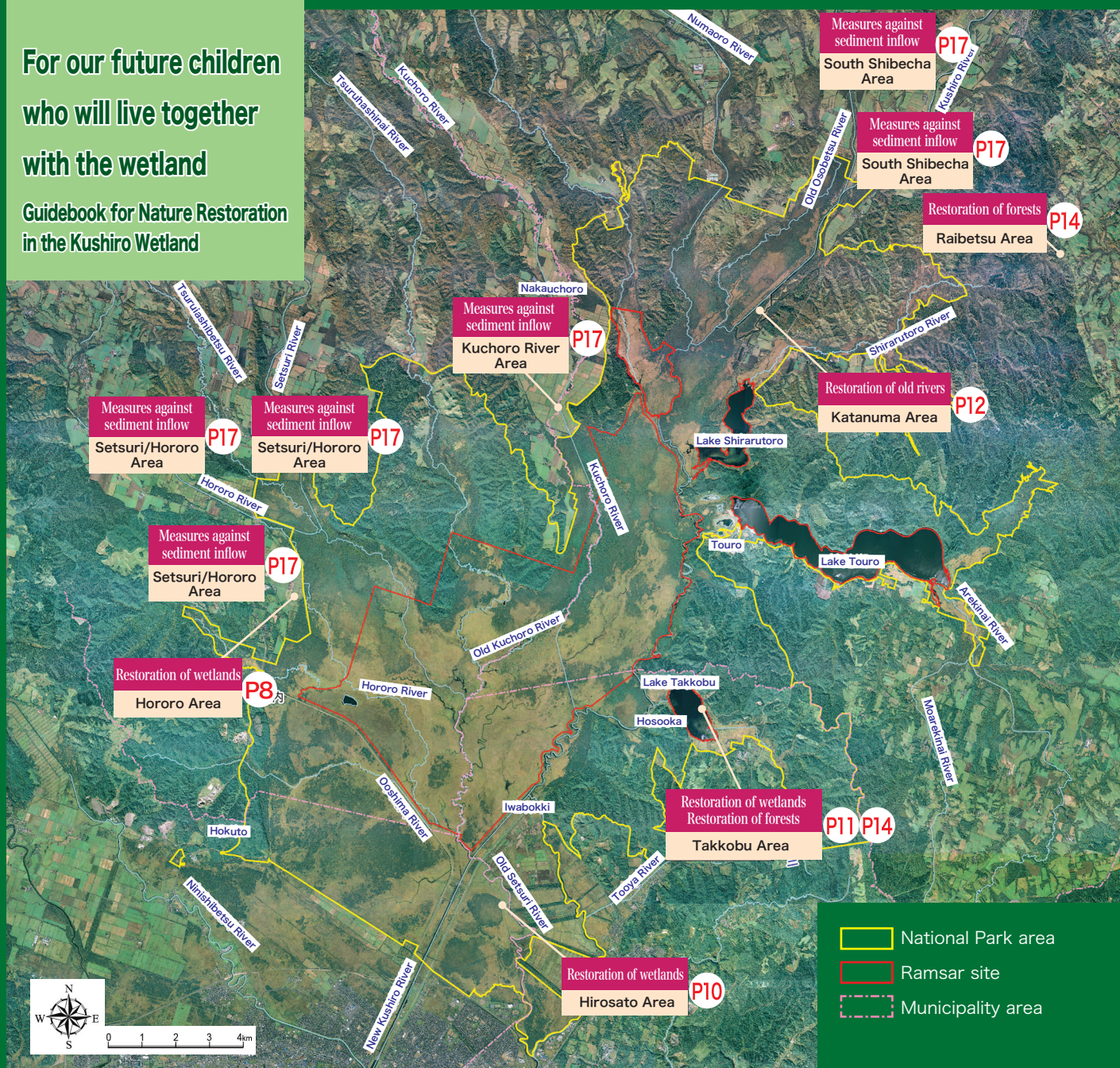
Guidebook for Nature Restoration in the Kushiro Wetland

December 2017

The Kushiro Wetland Restoration Committee

For our future children who will live together with the wetland

Guidebook for Nature Restoration
in the Kushiro Wetland



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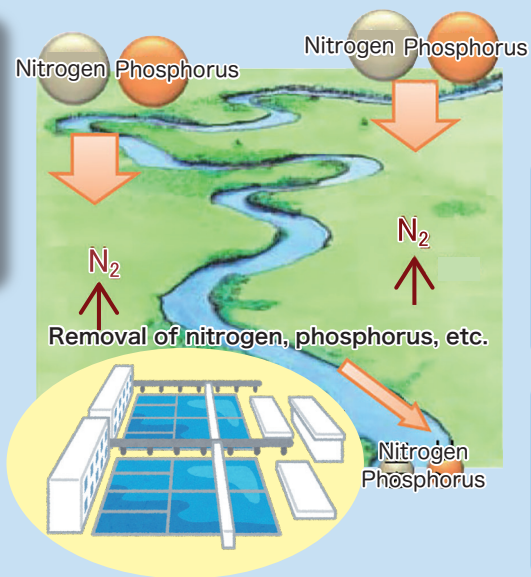
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Lake Sirarutoro and Lake Takkobu are classified as a marsh from the standpoint of limnology, but will be described as a lake by the Kushiro Wetland Restoration Committee.

Conservation of water

The wetland purifies water



The wetland absorbs and decomposes **excessive nutrients (such as phosphorus and nitrogen)** contained in the water and improves the water quality.

The yearly amount of nitrogen absorbed and decomposed by the Kushiro Wetland is equivalent to the yearly amount of nitrogen emitted by:

Approximately 1.95 million people.
(10 times as large as the population of Kushiro City!)

If nitrogen absorbed and decomposed by the Kushiro Wetland in a year were to be removed by a sewage treatment plant, it would cost:

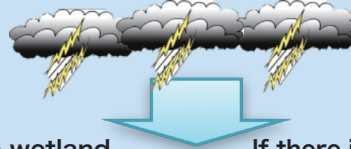
Approximately 85.8 billion yen.

*The budget of Kushiro City for sewage treatment is 6.3 billion yen (FY2016).

Safety and security

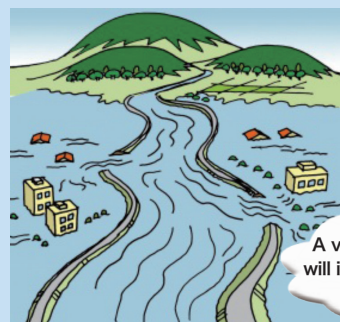
The wetland prevents flood damage

In the event of heavy rains or typhoons...



The wetland adjusts the flow rate of rivers so that the flow rate may not drastically increase in the event of heavy rains and typhoons.

If there is no wetland...



If there is a wetland...



Water will not instantly flow into the city!

After a typhoon (August 24, 2016)



A very large amount of water will instantly flow into the city ... There may be a flood.

Photo: Kushiro Development and Construction Department, Hokkaido Regional Development Bureau

Tourism

The wetland attracts people

Kushiro Wetland is very famous, and many tourists wish to have various experiences in the wetland!



High degree of recognition!

- "Kushiro Wetland, wetland, marshland"
→ **Ranks 1st** among the things that are associated with "Kushiro"!!
- "Kushiro Wetland"
→ **Ranks 3rd** among well-known tourism spots in "Kushiro"!

[Ranks high among the things tourists wish to do in Kushiro!]



Canoe

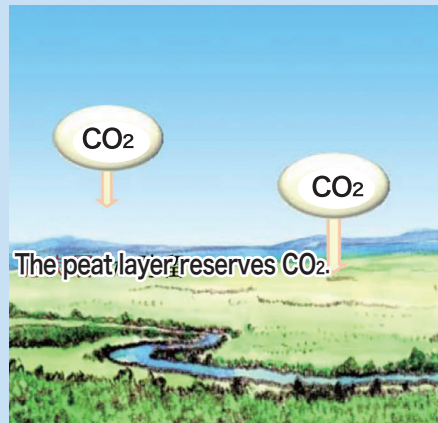


Walk of wetlands

- Canoeing in the Kushiro River flowing across the Kushiro Wetland: **ranks 1st!!**
- Kushiro Shitsugen Norokko Train: **ranks 2nd!!**
- Stroll along the wooden path in the Kushiro Wetland: **ranks 3rd!!**
- Tour of mysterious areas in the wetland and forests: **ranks 4th!!**

Global warming

The wetland absorbs CO₂



The wetland absorbs carbon dioxide (CO₂), which is a major cause of global warming!

[The absorbed amount of CO₂]

Equivalent to the annual CO₂ emissions of:

Approximately 8,577 households.

(= approximately 45,200 (t-CO₂) per year)

The absorbed CO₂ is accumulated in the wetland as peat.

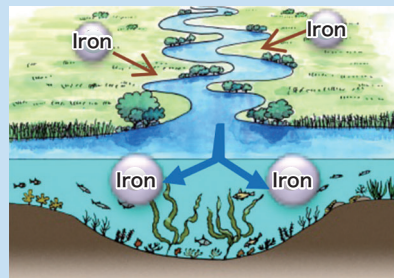
Fishery

Iron brought by the wetland enriches the sea

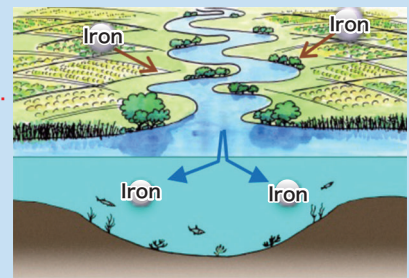
The water in the wetland contains a lot of iron, which nourishes seaweed and fish in the coastal zone!

The amount of supply of dissolved iron:
Approximately 916kg per year

- The amount of dissolved iron shown in the left is based on the private note by Takeo Onishi, "Attempt for Assessment of the Level of Dissolved Iron in the Kushiro River Basin" (January 2015).



If the wetland were to be lost...



[If the wetland were to be lost...]

The amount of supply would be decreased by approximately

40 percent!!

*Based on the assumption that the whole wetland was converted into farmland

[If all of said decrease is converted into the iron content of marine products]

- Approximately 288.3 million sheets of dried kelp (per year)

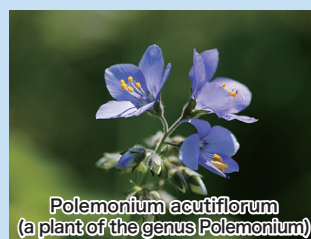
- Approximately 910.4 million raw oysters (per year)

*The above calculation is based on the Food Composition Database (Ministry of Education, Culture, Sports, Science and Technology)

Life

The wetland nurtures many lives.

The Kushiro Wetland is where many species of wild fauna and flora are living and breeding.



Provided by Mr. Eiichi Onishi

Red-crowned cranes that have increased in number in the Kushiro River basin are distributed all over Hokkaido.

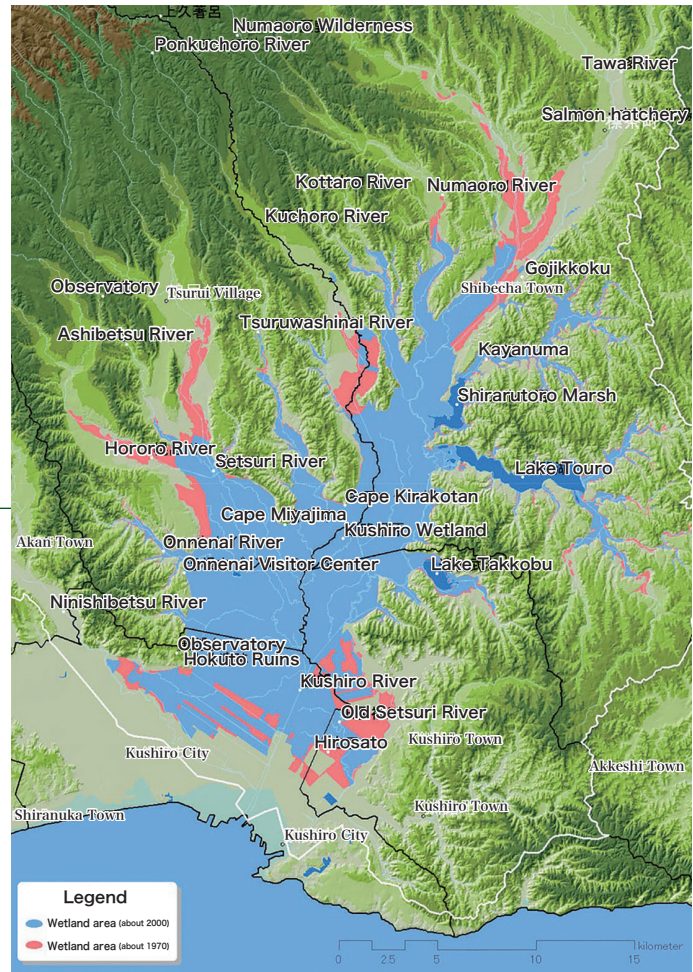


Present state of the Kushiro Wetland

The Kushiro Wetland, which took approximately 6,000 years to form, has been gradually changing due to the natural process. However, human activities are causing drastic changes to the wetland in terms of quality and quantity.

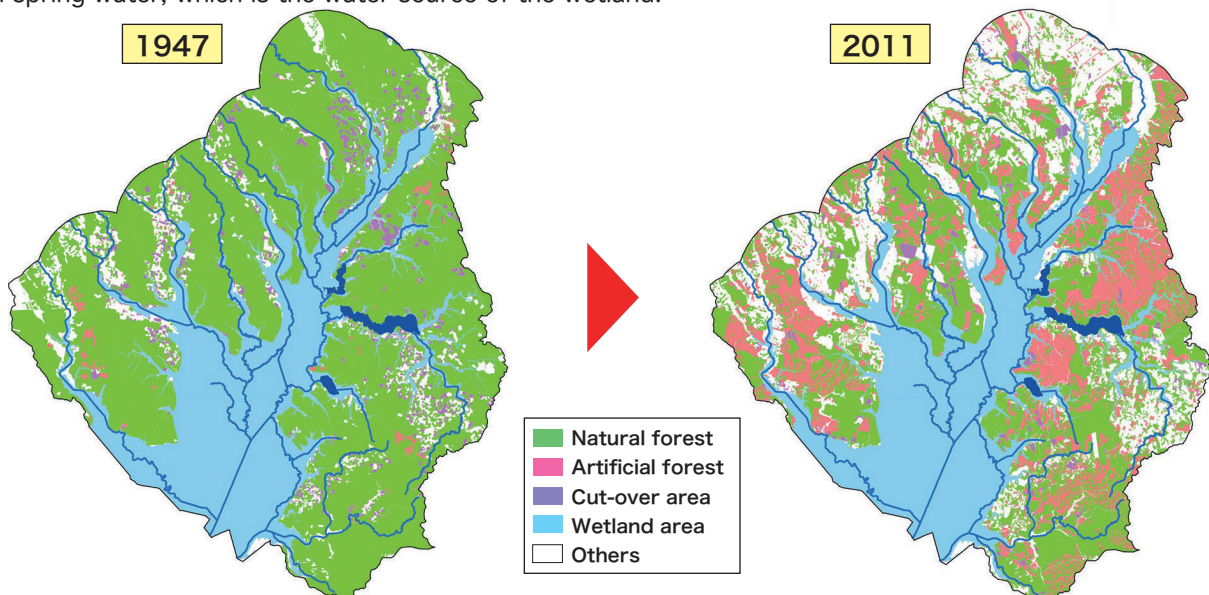
◆ 20% of the wetland area has disappeared over the past 60 years

After World War II, with the progress of farmland reclamation under national policy, wetlands were gradually converted into farmland. In addition, the southern part of the wetlands was filled up with earth to build cities and roads.



◆ Decline of forests on hills

Forest management was started in the river basin in the early Meiji period, and natural forests have been decreasing since the end of World War II due to afforestation and development of farmland. Sediment is discharged from forests that are poorly managed, and there is concern about the impact of such sediment on spring water, which is the water source of the wetland.



◆ Accumulation of sediment discharged into the wetland and expansion of Japanese alder forests

Sediment is discharged into the wetland not only from forests but also due to the erosion of the river beds and river banks accelerated by the straightening of rivers. As a result, Japanese alder forests have spread in the reed and sedge wetland and affected the habitat of red-crowned cranes, changing the ecosystem in the wetland.



1988

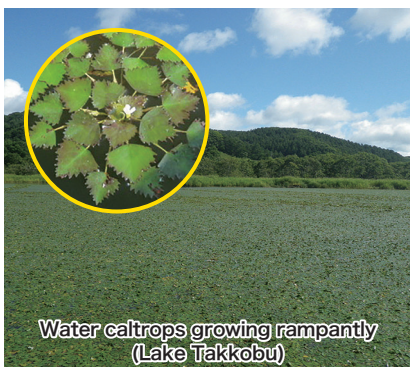


2012

◆ Change of wildlife

Deterioration of wetlands and forest environments are posing a threat to the living environment of rare wildlife species such as the Siberian Salamander and the Japanese huchen. In addition, the eutrophication of lakes has changed the ecosystem and landscape, as seen from water caltrops covering the surface of the lake.

Meanwhile, alien species such as the American mink, the signal crayfish and the cutleaf coneflower have widely spread into the wetland, affecting the native flora and fauna. In addition, an excessive number of Hokkaido Sika deer eat or stamp on crops everywhere.



Water caltrops growing rampantly
(Lake Takkobu)



American mink



A flock of Hokkaido Sika deer in the wetland

Start of the Kushiro Wetland Nature Restoration Project

Due to these changes, the natural environment in the Kushiro Wetland has deteriorated in various ways, and its distinctive landscape is beginning to change. If such changes continue, the blessings of the Kushiro Wetland will continue to be lost. Artificial changes of the environment must be stopped. This is why nature restoration in the Kushiro Wetland was started.

- 1995 "Kushiro Wetland Restoration Plan" was established (Hokkaido)
- 1999 "The Committee for the Preservation of the River Environment of Kushiro Marsh" was established.
- 2002 Law for the Promotion of Nature Restoration was enacted.
- November 2003 The Kushiro Wetland Restoration Committee was established.

◆ Ideal state

One image of the goal of nature restoration is to restore the Kushiro Wetland to the condition before it was registered under the Ramsar Convention.

The ideal state is the one in which many people start to work together toward achievement of said goal.

One image of the goal of nature restoration is to restore the Kushiro Wetland to the condition before it was registered under the Ramsar Convention (1980), when its value was internationally recognized.

It will take the catchment 50 years, or even 100 years to regain an environment in which people can live, and children can play, learn and grow up, while enjoying generous blessings such as the rich connection of life where red-crowned cranes, blakiston's fish owls and the Japanese huchen live, natural gifts from forests and the sea are abundant, delicious drinking water is available, the waterside does not get muddy even in the rain, and where exists an impressive wetland landscape. The ideal state is the one in which many people start to work together toward achievement of said goal.

◆ 10 principles

In order to realize the magnificent objectives over a long period of time, natural restoration will be based on the following principles.

1. Consider natural connections within the whole basin (Catchment perspectives)
2. Take advantage of natural resilience as much as possible (Passive restoration)
3. Understand the present state from scientific standpoints (Scientific understanding)
4. Set specific goals with a long-term vision (Setting clear goals)
5. Validate results of the project and flexibly adjust efforts (Adaptive management)
6. Use human power to restore the wetland to its natural state (Conservation, restoration and rehabilitation of nature)
7. Strike a balance between nature restoration and the regional industries and lives and contribute to development of the community (Balance of effective local industries and flood control measures)
8. Promote local people's participation and consider the future of the community together (Participation by diverse stakeholders)
9. Disclose information and collect many people's opinions (Information sharing)
10. Learn about nature in the wetland and its relationship with regional industries and living (Promotion of environmental education)

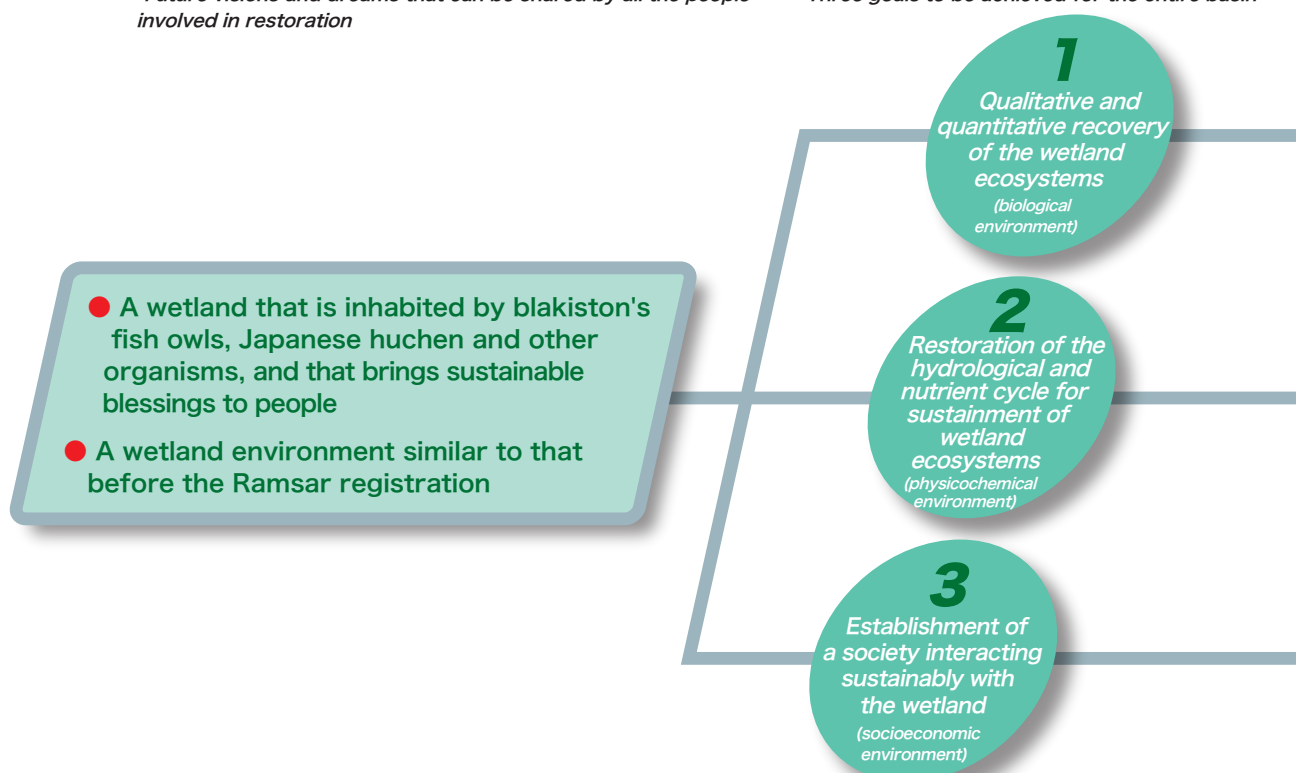
◆ Three areas and seven efforts

[Ideal state]

= Future visions and dreams that can be shared by all the people involved in restoration

[Goals]

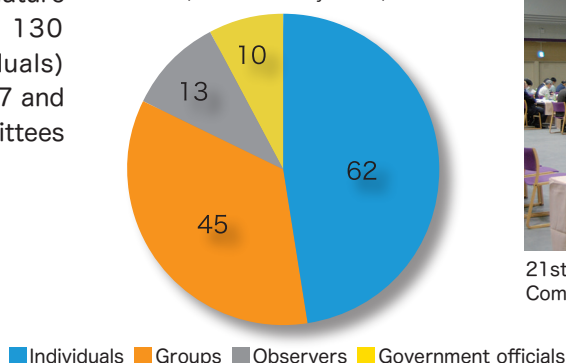
= Three goals to be achieved for the entire basin



◆ Mechanism for nature restoration

The Kushiro Wetland Restoration Committee was established under the Act for the Promotion of Nature Restoration in 2005. It has 130 members (groups and individuals) as of the end of February 2017 and is operating in seven subcommittees established for each area.

Membership of the Committee
(as of February 2017)



21st meeting of Kushiro Wetland Restoration Committee

Organization chart of Kushiro Wetland Restoration Committee (as of December 2015)



[Measures]

= Specific measures in seven fields to achieve each goal

1. Conservation and restoration of wetland ecosystems and the habitats of rare wildlife species

2. Conservation and restoration of the river environment

3. Conservation and restoration of forests in hilly areas connected with wetlands and rivers

4. Restoration of hydrologic and material cycles

5. Sediment control in wetlands, rivers and lakes

6. Promotion of regional development through nature restoration

7. Public relations of nature restoration and promotion of environmental education and civic participation

[Evaluation criteria]

= Criteria for evaluating the achievements of each measure

Area of wetland, populations of rare species, area with alien species, etc.

P8~11

Diversity of river configuration, flood frequency and number of river species, etc.

P12~13

Area of forests, dimensions of trees, number of forest species, etc. P14-15

P14~15

Groundwater level, load of nutrient salts, etc.

P16

Sediment transport rate, sediment accumulation, etc.

P17~19

Coordination with and ripple effects for regional industries, new products, etc.

P20~21

Number of leaders and events, increase of interest, the loads from use, etc.

P22~25

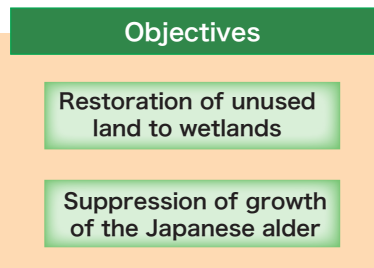
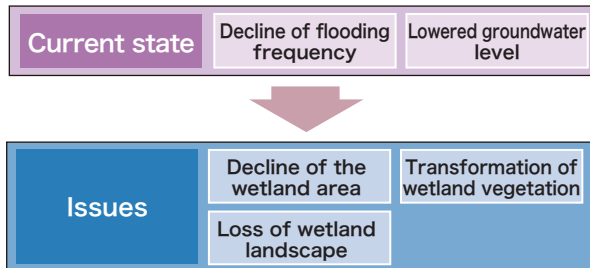
Restoration of wetlands

Restoration of the boundary between the wetland and people's lives / Hororo Area (Tsurui Village)



Objectives

In the vicinity of Hororo Area, Tsurui Village, efforts to increase agricultural production were made through development of agricultural land and river improvement during the high economic growth period. Meanwhile, the area of wetlands decreased, and flooding frequency and the groundwater level were lowered. As a result, types of wetland vegetation such as the reed and the sedge were replaced by reed canary grass, giant goldenrods and other alien species and the wetland landscape was compromised.



In order to restore the wetlands, a project aiming to restore unused farmland into wetlands and suppress the growth of the Japanese alder will be implemented.

Content of Project Implementation and Anticipated Effects

(1) Digging up the ground

Topsoil will be ripped from unused land to make the ground closer to the groundwater level so that wetland vegetation may be restored.

(2) Backfilling unused drainage canals

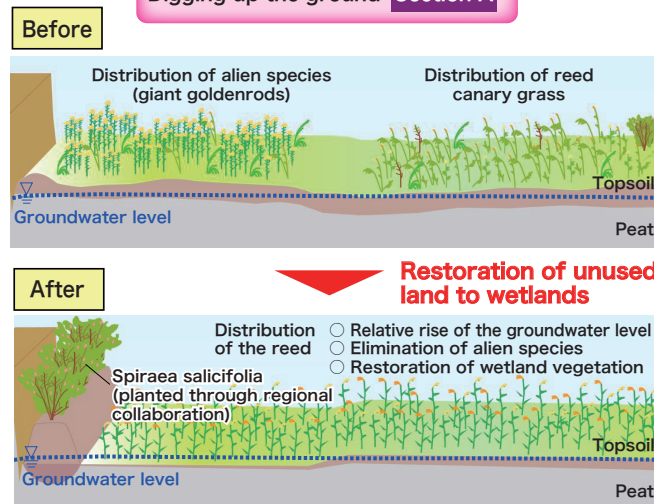
Unused drainage canals will be backfilled to raise the groundwater level, so that wetland vegetation may be restored and the growth of the Japanese alder may be suppressed.

Specific measures for achieving the goals

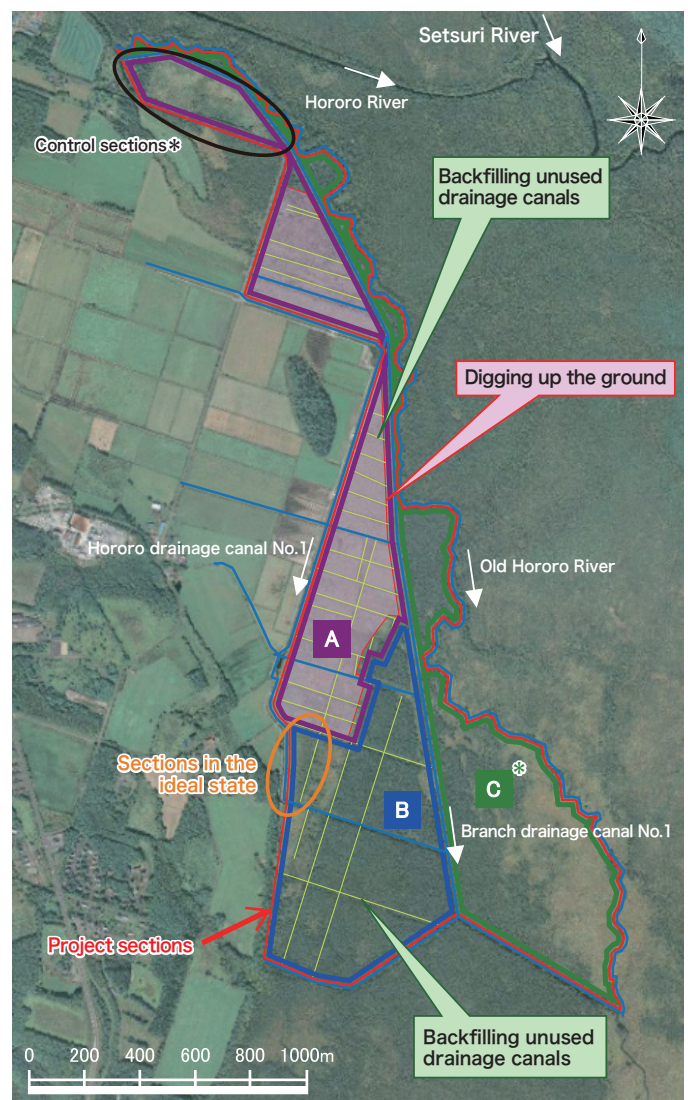
Digging up the ground

Backfilling unused drainage canals

Digging up the ground **Section A**



The current ground surface will be dug up by approx. 10 to 50 centimeters to make it closer to the ground height of the original wetland. As a result, the ground surface will be closer to the groundwater level and be kept wet, so that wetland vegetation may be restored.



* Control sections: Sections for confirming the status in the case the project is not implemented

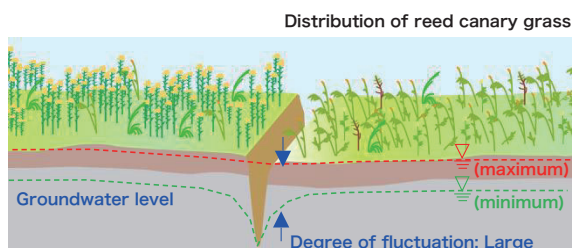
* Section C: The section for verifying effects and impacts of the project in Sections A and B and examining the content of implementation of the project

Backfilling unused drainage canals

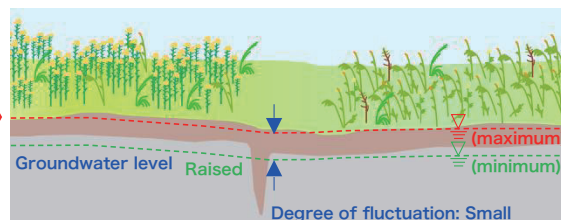
Section A

Section B

Section A Before



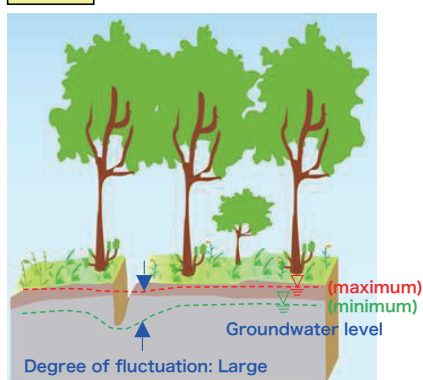
After



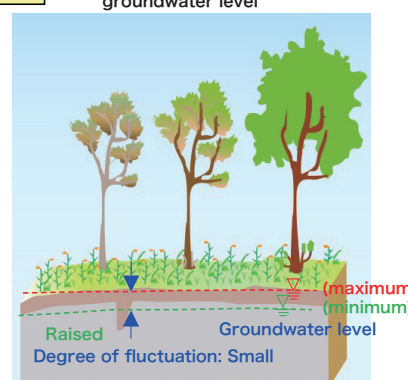
- Rise of the groundwater level near the unused drainage canal
- Reduction of the degree of fluctuation of the groundwater level
- Restoration of wetland vegetation

Restoration of unused land to wetlands

Section B Before



After



- Rise of the groundwater level near the unused drainage canal
- Reduction of the degree of fluctuation of the groundwater level

Suppression of the growth of Japanese alder

If drainage canals which are no longer used are backfilled, the section will have poorer drainage and the groundwater level will rise. As a result, unused land may become wetlands again and the growth of the Japanese alder may be suppressed.

Past results and future plans

The ground has been dug up and unused drainage canals have been backfilled with the use of earth dug out since 2012. Since the start of implementation, the number of giant goldenrods, etc. has decreased and wetland vegetation has been restored.

A tour of the project site for local residents was started in 2013 so that they could see the situation of restoration and experience planting reeds.



[For more information]

Implementation Plan for the Hororo Area Wetland Restoration
[Search] Wetland Restoration Subcommittee

[Responsible organization]

Kushiro Development and Construction Department, Hokkaido Regional Development Bureau,
Ministry of Land, Infrastructure, Transport and Tourism (For contact information, see the back cover)



Restoration of wetlands

Turning former farmland into wetlands again / Hirosato Area (Kushiro City)



Objectives

In the Hirosato Area in the southeast part of the Kushiro Wetland, vast wetlands disappeared due to the development of pastures in the past. This project is designed to reveal factors for the rapid growth of Japanese Alder forests and to develop technologies for turning the land into wetlands again.

Content of project implementation

(1) Restoration of former farmland to wetlands

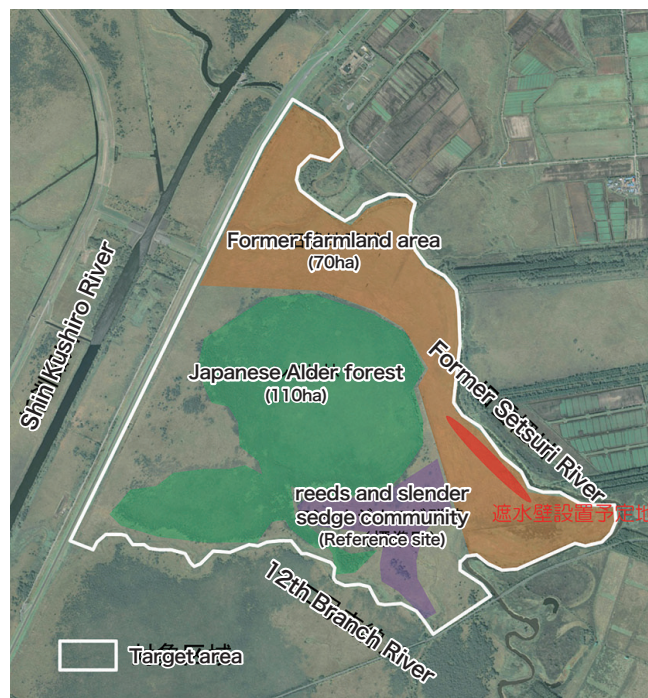
Methods for improving rivers and restoring the groundwater level that has lowered due to the development of pastures will be considered.

(2) Measures against Japanese Alder forests

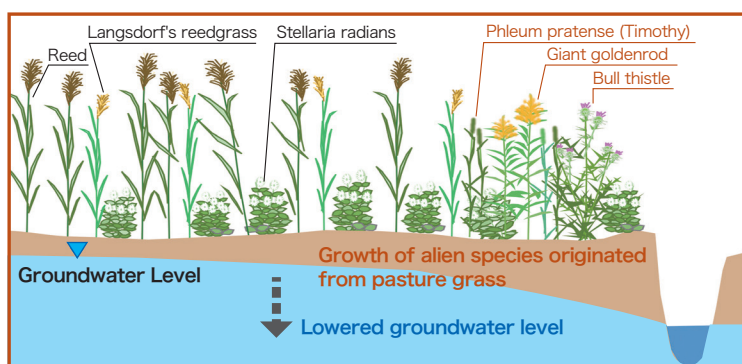
Reasons for the sudden expansion of Japanese Alder forest in the 1970s will be revealed and experiments will be conducted for suppressing the growth of Japanese Alder forests.

(3) Consideration for the natural environment

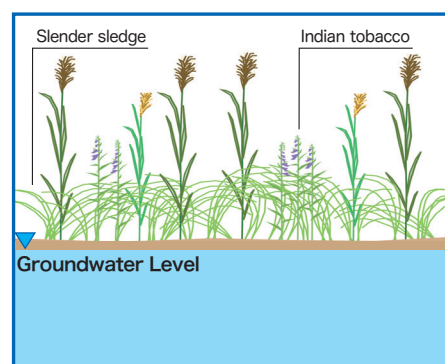
A project will be implemented in a manner that will not affect red-crowned cranes living in the vicinity of the project site. In addition, giving due consideration to effects on the vegetation, the use of heavy equipment will be limited to winter, when the ground is frozen.



Former farmland area



Reference site in the Hirosato area = the goal of restoration

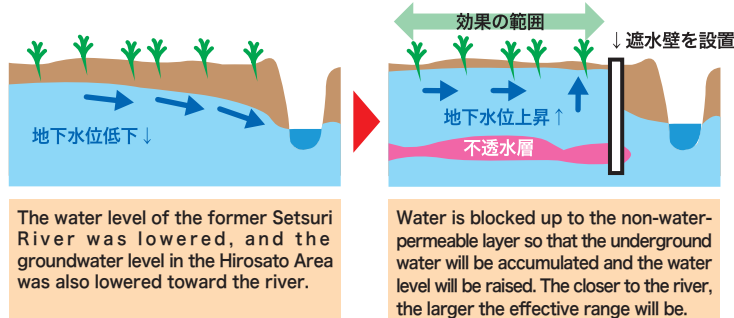


Past results and future plans

As for the growth of Japanese Alder forests, it has been revealed that an environment where Japanese Alder trees can easily grow was temporarily created due to the groundwater level lowered by the river improvement, and the fire in the wetlands in 1967. It has been confirmed that Japanese Alder forests can be reduced through repeated tree felling.

As for restoration of former farmland to wetlands, establishment of a "water insulation wall" along the former Setsuri River is being considered.

Image of the method for raising the water level in the Hirosato Area (Sectioned drawing)



[For more information]

Wetland Restoration Subcommittee [Search]

[Responsible organization]

Kushiro National Environment Office, Hokkaido Regional Environment Office, Ministry of the Environment (For contact information, see the back cover)



Recovery of rich growth of aquatic plants / Lake Takkobu (Kushiro Town)



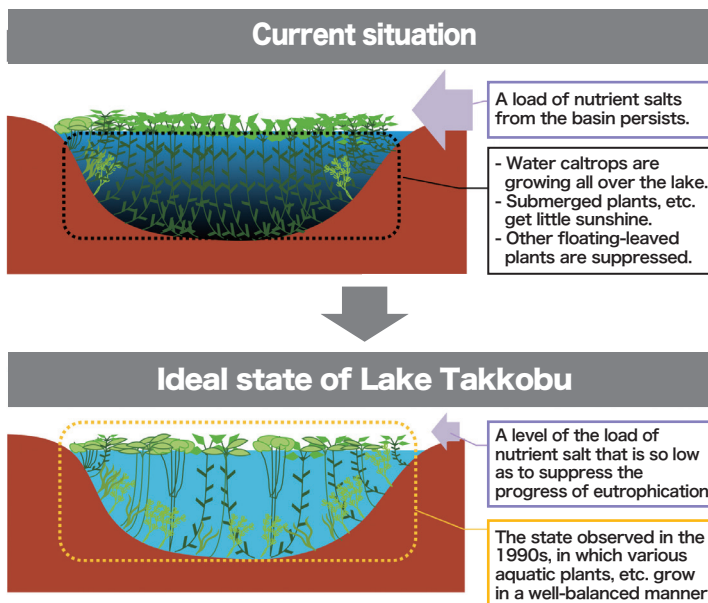
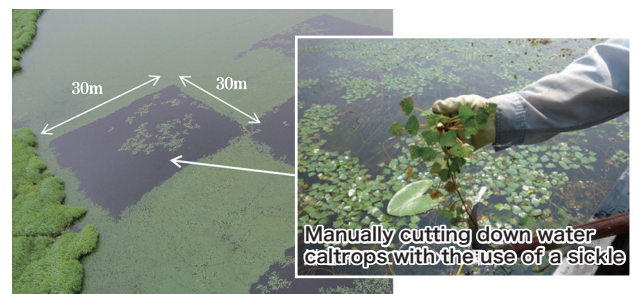
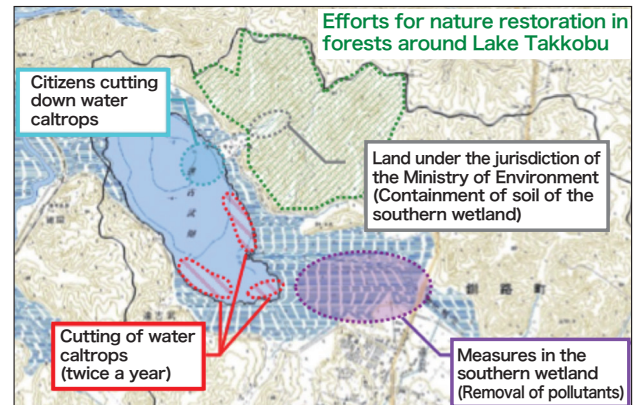
Objectives

Lake Takkobu, which is located in the eastern part of the wetland, used to be a rich repository of aquatic plants. However, due to an excessive inflow of nutrients from the river basin, the quality of the water has been deteriorated to such an extent that the lake has a huge outbreak of powdered green laver and its surface is covered with water caltrops. As a result, the number of species of aquatic plants has declined. In an effort to restore the living environment of various aquatic plants, upstream sediment, which is the source of nutrients such as phosphorus and nitrogen, will be removed so that the nutrients will not flow into the lake any longer, and water caltrops will be cut down because they are overgrown.



Content of project implementation

- (1) **Removal of nutrients in the southern wetland**
Soil that contains highly concentrated nutrients will be removed from the southern wetland located upstream of the lake.
- (2) **Control of the distribution area of water caltrops**
In an effort to restore various aquatic plants, water caltrops will be cut down experimentally and their growth will be suppressed.
- (3) **Nature restoration through citizen participation**
Water caltrops cutting events for citizens will be held as a part of the efforts for public relations and education of the nature restoration project.
- (4) **Measures against an inflow of nutrients from the entire basin**
Public relations and education for local residents will be promoted so that an inflow of nutrients from farmland and forests in the basin will be suppressed.



Past results and future plans

In 2015, soil of the southern wetland, which had been the source of nutrients, was removed.

From 2013 to 2015, the growth of water caltrops was suppressed as a result of their being cut down, and an increase in aquatic plants such as dwarf water lilies and *Nymphaea tetragona* var. *erythrostigmatica* (a rare species), as well as the *Nitella flexilis* family, was observed.

In 2014, public relations events in which participants cut down water caltrops while canoeing started to be held.

In the future, the nutritional portion in Lake Takkobu will be investigated and methods of recovery of aquatic plants will be examined through continued cutting of water caltrops.

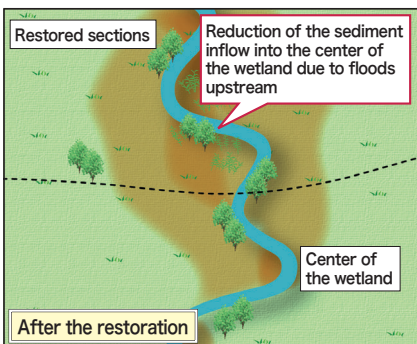
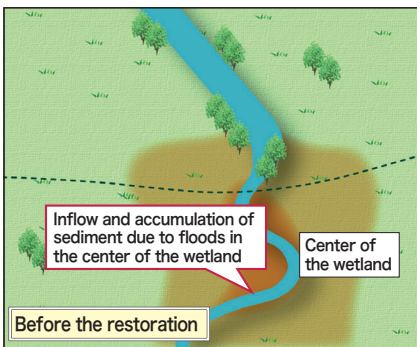
[For more information] ➡ Implementation plan for the nature restoration project in Lake Takkobu [Search]
➡ Wetland Restoration Subcommittee [Search]

[Responsible organization] ➡ Kushiro National Environment Office, Hokkaido Regional Environment Office, Ministry of the Environment
(For contact information, see the back cover)

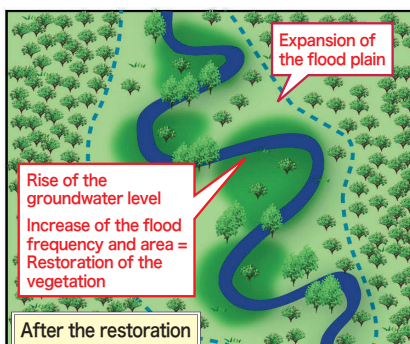
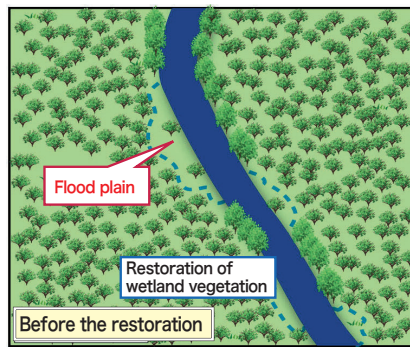


Anticipated Effects

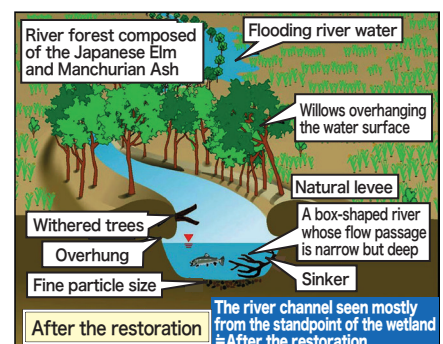
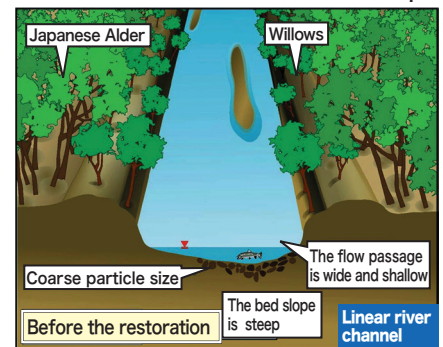
Reduction of an inflow of sediment, etc. into the center of the wetland



Restoration of wetland vegetation



Restoration of the living environment for fish, etc. Restoration of the wetland landscape

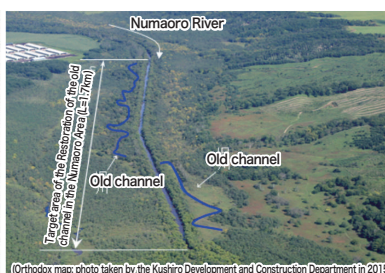
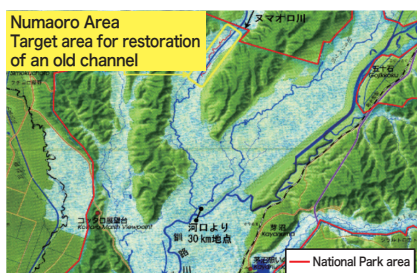


Past results and future plans

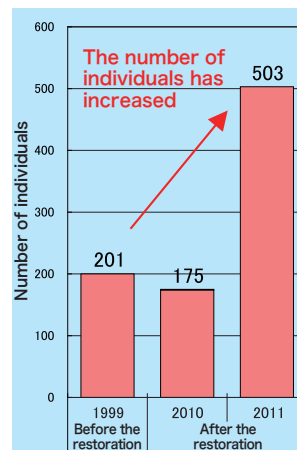
The investigation after completion of the project reveals that an inflow of sediment into the center of the wetland during floods has been reduced, that both the species and individuals of fish have increased in number, that even the Japanese huchen lives, and that wetland vegetation of approximately 30ha has been restored. The wetland landscape with a meandering river has been also restored. Being used for canoeing and fishing more often, the river is expected to be a new tourism resource in the region. With a wooden walkway for observing the restored area established in 2015, the river has started to be utilized as a place for nature observation and environmental education.

Restoration of the old channel in the Numaoro Area (planned)

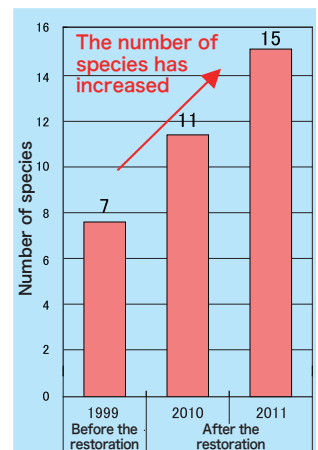
The Numaoro Area is being considered as the next site for restoration of an old channel.



Restoration of the living environment for fish, etc. that originally lived in the wetland river



Changes in the number of captured individuals



Changes in the number of species

[For more information]

Implementation Plan for the Old Channel Restoration in the Kayanuma Area [Search]
Old Channel Restoration Subcommittee

[Responsible organization]

Kushiro Development and Construction Department, Hokkaido Regional Development Bureau,
Ministry of Land, Infrastructure, Transport and Tourism (For contact information, see the back cover)



Restoration of forests

Preservation of forests upstream of Lake Shirarutoro / Raibetsu Area (Shibecha Town)



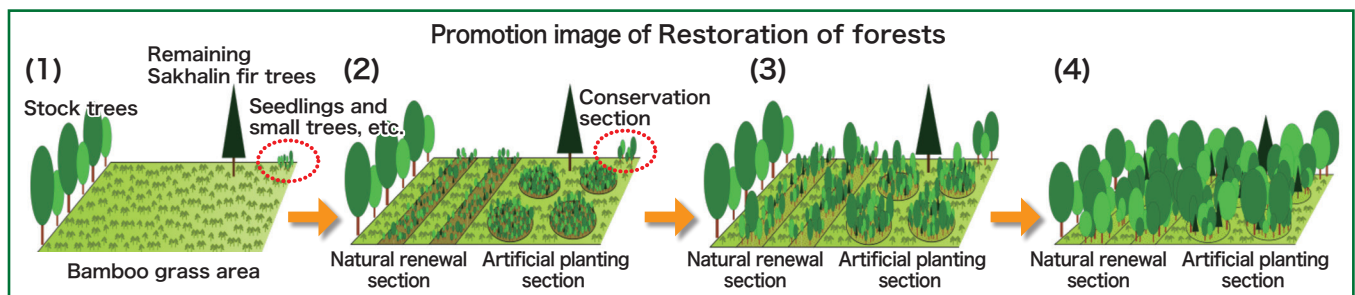
Objectives

In a part of the national forest in the Raibetsu Area at the source of the Shirarutoro River that flows into Lake Shirarutoro, one of the three eastern lakes in the Kushiro Wetland, artificial forests of Sakhalin fir approximately 70 years old died due to low temperature damage in 2000.

In order to restore the water quality conservation and water retention functions of forests, broad-leaved forests containing Japanese oak, Japanese elm and Manchurian Ash, which were originally peculiar to this region, will be regenerated.



Content of project implementation



○ Surface processing of bamboo grass areas

In the natural renewal sections, roots of bamboo grass will be removed to help seeds of broad-leaved trees that naturally fell to grow.

○ Planting of broad-leaved trees

In the artificial planting sections, roots of bamboo grass will be removed, and seedlings of broad-leaved trees will be planted with the cooperation of volunteers.

○ Protection of seedlings, etc.

Fences and tree shelters will be established to prevent seedlings from being eaten by wild animals such as Hokkaido Sika deer and Japanese hare.

Major past results and future plans

- In four out of 14 sites scheduled for the project, roots of bamboo grass were removed and approximately 4,300 seedlings of broad-leaved trees were planted.
- Seeds naturally fallen and planted seedlings have grown to a height no longer affected by bamboo grass, thanks to the effect of the measures to prevent them from being eaten.
- Based on the findings from the past activities, the restoration project will be continued in the remaining project sites.



[For more information] [Implementation plan for the nature restoration project in the Raibetsu Area \[Search\]](#)

[Responsible organization] [Kushiro Wetland Forest FUREAI Promotion Center, HOKKAIDO Regional Forest Office, Forestry Agency, Ministry of Agriculture, Forestry and Fisheries \(For contact information, see the back cover\)](#)



Conversion of artificial forests into natural forests / Takkobu Area (Kushiro Town)

Objectives

Deforestation and conversion to artificial forests have been conducted in the hills surrounding the Kushiro Wetland basin. In the Takkobu Area, forests surrounding the wetland have become a barren land or an artificial forest of the Japanese larch, with much less biological diversity than that of the original natural forests. This project is designed to restore artificial forests of Japanese larch into natural broad-leaved forests composed of Japanese oak and Erman's birch.

Content of project implementation

(1) Restoration of natural forests

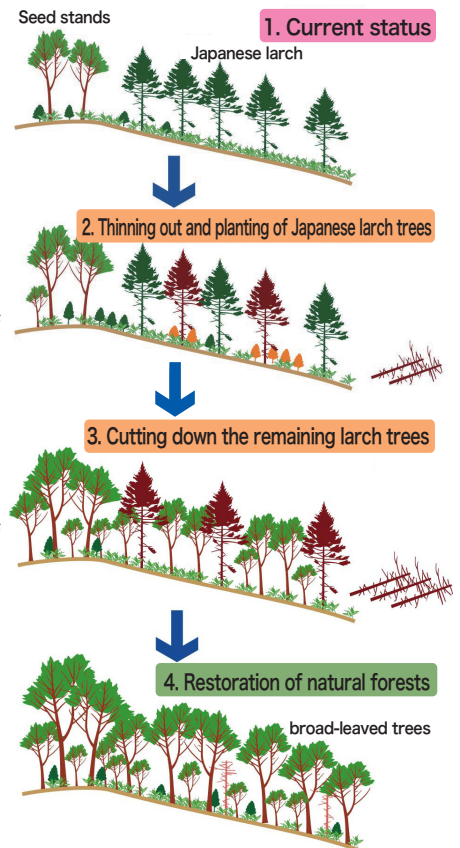
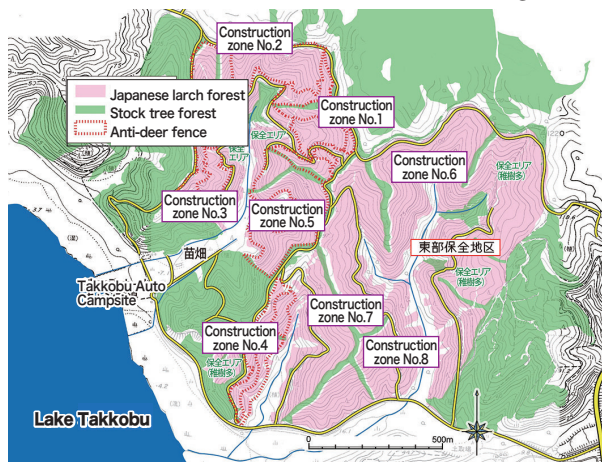
In order to realize a broad-leaved forest like the ones seen up the Takkobu River, efforts for forest restoration will be made in methods utilizing the natural recovery power. Bamboo grass will be removed to facilitate the growth of seeds of broad-leaved trees, seedlings grown out of seeds collected in the basin will be planted, fences will be established to prevent Japanese Sika deer from eating the seedlings, and Japanese larch trees will be thinned out.

(2) Measures against sediment inflows

In order to prevent an inflow of sediment from auxiliary logging roads and collapsed land into lakes and wetlands, measures including establishment of fences made of logs and straw mats will be taken.

(3) Environmental education

Hands-on environmental education, which also serves as citizen participation in nature restoration, will be conducted through investigations of animals which serve as a performance indicator for the status of forest restoration, and collection of seeds and cultivation of seedlings in natural forests.



Past results and future plans

By the end of 2016, the topsoil of approximately 2.42ha was cleared, and bamboo grass of approximately 31ha was mowed so that natural seeds could grow into seedlings. In addition, after Japanese larch forests of approximately 17ha were thinned out, local seeds of Japanese oak, Erman's birch and Japanese ash were collected and grown, and approximately 25,000 seedlings were planted in a fenced area of 8ha.

Since the start of this project 12 years ago, a total of 305 people have participated in the environmental education program utilizing the project site. In addition, the "Guide for Observation of Creatures in Takkobu" Series 1-4 were prepared in 2013.

Cutting of bamboo trees will be continued, and approximately 60,000 seedlings will be planted by 2020.



Forest restoration project site



Cultivation of local broad-leaved trees in seedbeds



Promotion of natural update through surface treatment (by cutting bamboo grass)



Trial session of research of animals which are indicators of the forest environment

[For more information] [Implementation plan for the nature restoration project in Lake Takkobu \[Search\]](#)
[Forest Restoration Subcommittee \[Search\]](#)

[Responsible organization] [Kushiro National Environment Office, Hokkaido Regional Environment Office, Ministry of the Environment \(For contact information, see the back cover\)](#)



Water circulation

Revealing the circulation of water and substances in the Kushiro Wetland



Objectives

In order to promote nature restoration, it is necessary to understand how water and substances move and change depending on changes in land usage in the basin and weather conditions.

Therefore, the mechanism of circulation of water and substances in the Kushiro Wetland basin will be revealed so that nutrients and pollutants flowing into wetlands, lakes and rivers may be suppressed.

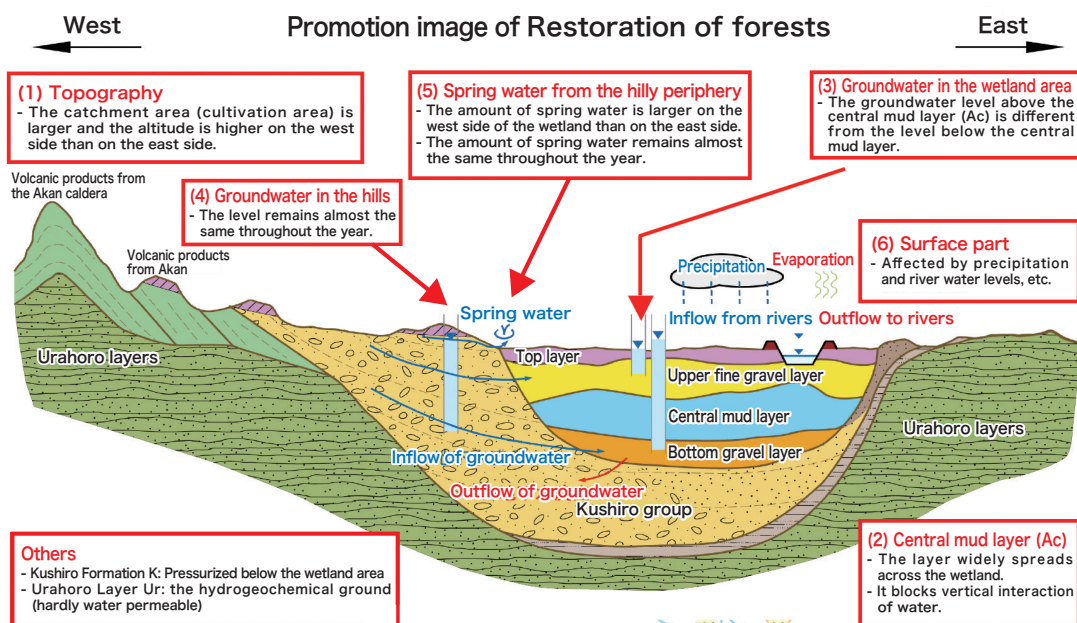
Content of project implementation

(1) Understanding water circulation

The geological structure of the Kushiro Wetland was understood, the movement of underground water was estimated and water balance and movement in the Kushiro Wetland were revealed.

(2) Understanding substances circulation

With the focus put on phosphorus and nitrogen that affect vegetation in the Kushiro Wetland, circulation of substances caused by water movement will be revealed.

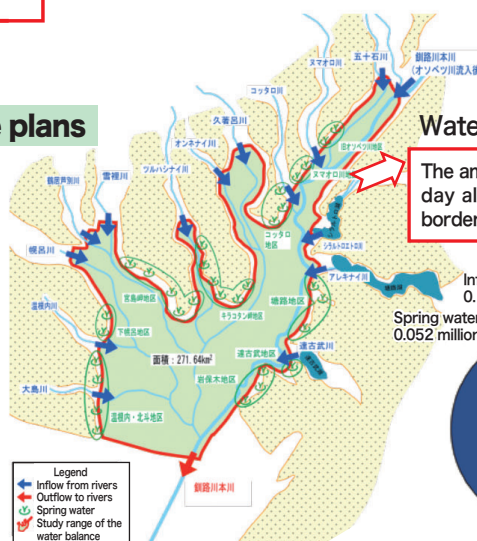


Major past results and future plans

It turns out that 88% of the water entering the Kushiro Wetland is from rivers, and 9% from precipitation. It turns out that 98% of the water leaving the Kushiro Wetland is through rivers, and 2% through evaporation.

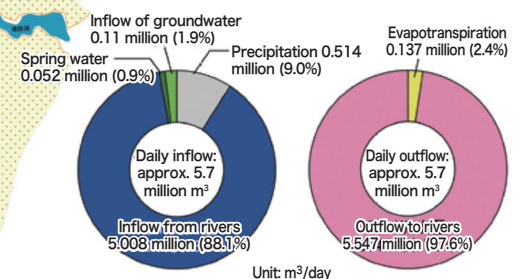
These findings were utilized to analyze the groundwater level and to estimate recovery after implementation of the project in connection with consideration of the implementation plan of wetland restoration in the Hororo Area (page 8-9).

In the future, in addition to movement of water, movement of substances such as nitrogen and phosphorus that are carried to the wetland along with water to affect vegetation will be revealed.



Water balance in the Kushiro Wetland

The amounts of water inflow and outflow in a single day almost equal 5.7 million m³/day in the area bordered with a red line.



[For more information] Hydrologic Cycle Subcommittee [Search]

[Responsible organization] Kushiro Development and Construction Department, Hokkaido Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism
(For contact information, see the back cover)



Reducing the inflow of sediment into the wetland Kuchoro River (Shibecha Town, Tsurui Village)

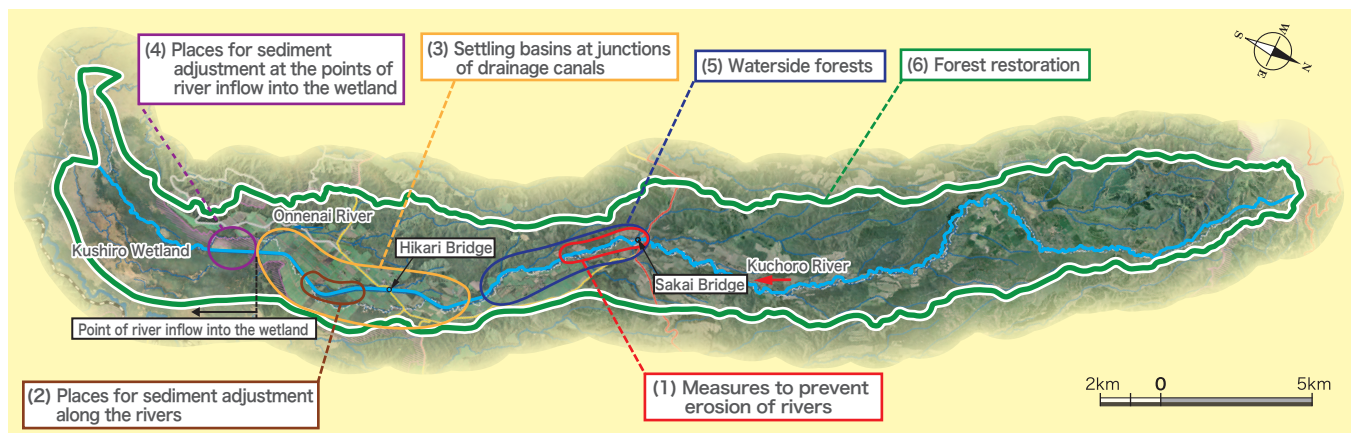


Objectives

Many rivers upstream of the Kushiro Wetland were straightened for development of agricultural land and measures against floods. In straightened rivers, the flow rate became faster, sediment was more easily carried away, and the river bed and river banks were eroded. As a result, a large amount of sediment started to flow into the wetland. An inflow of sediment into the wetland is believed to be a cause for an increase of Japanese Alder forests.

Thus, in Kuchoro River, which runs along the border between Shibecha Town and Tsurui Village and flows into the Kushiro Wetland, various measures are being taken with an aim to reduce sediment inflow into the wetland by approximately 40 percent.

Content of project implementation



(1) Measures to prevent erosion of rivers

In the middle reaches, where the river bed is remarkably lowered, the "bed fixing work" is established and the river is made wider to reduce the flow rate, so that the erosion of the river may be prevented and sediment inflow into the wetland may be reduced.

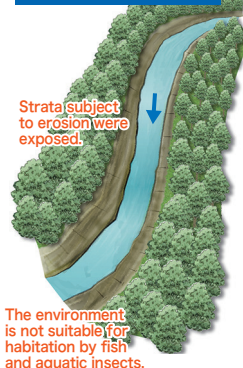
Issues before the measure

- Outflow of sediment
- The environment was not suitable for habitation by fish and aquatic insects.

After the measure

- Sediment inflow into the wetland has been reduced.
- An environment where fish and aquatic insects can comfortably live

Before the measure



After the measure

The river channel has been widened. The river is made wider, the flow rate is made smaller, and erosion is prevented.

Bed fixing work

"Bed fixing works" are established to prevent erosion of the river bed.

Conservation of waterside forests

With consideration given to the living environment for the flora and fauna, forests are preserved to the extent possible.

Generation of sandbanks

Accumulation of sediment leads to generation of sandbanks, which will promote recovery of the waterside environment.

Bank protection works

Based on observation of the status of erosion, bank protection walls will be established as necessary.

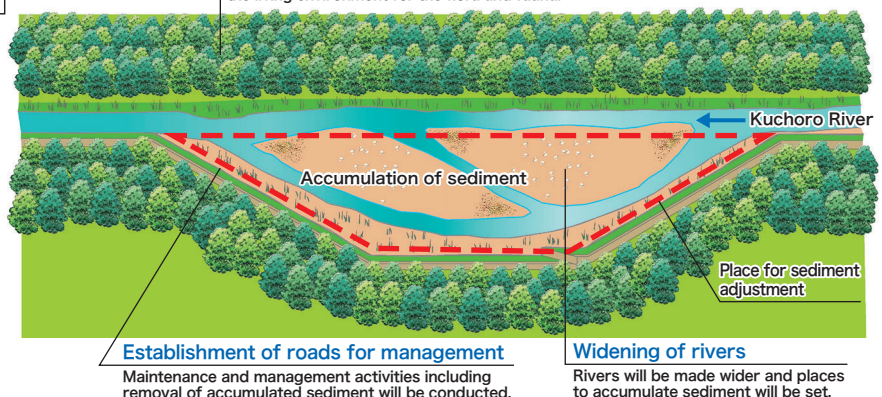
The environment is not suitable for habitation by fish and aquatic insects.

Conservation of waterside forests

The amount of sediment carried from farmland, etc. to rivers will be reduced, and forests will be protected to the extent possible with consideration given to the living environment for the flora and fauna.

(2) Improvement of places for sediment adjustment along the rivers

Places to accumulate sediment will be set along the rivers so that the amount of sediment carried to the wetland may be reduced.



Establishment of roads for management

Maintenance and management activities including removal of accumulated sediment will be conducted.

Widening of rivers

Rivers will be made wider and places to accumulate sediment will be set.

Measures against sediment inflow

(3) Construction of settling basins at junctions of drainage canals

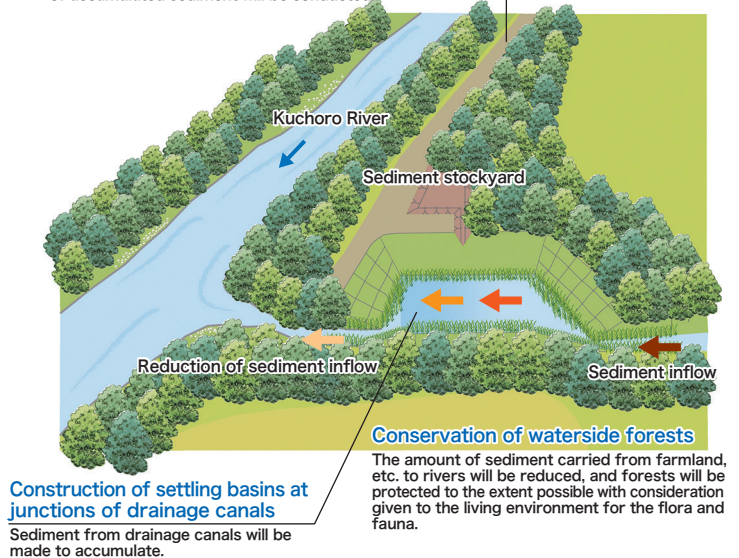
The pond will be improved at points before drainage canals join the river so that sediment inflow from farmland to rivers may be reduced.



Settling basin

Construction of roads for management

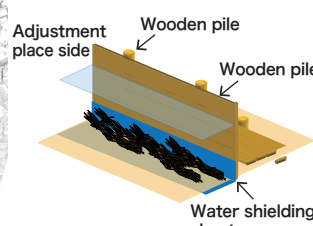
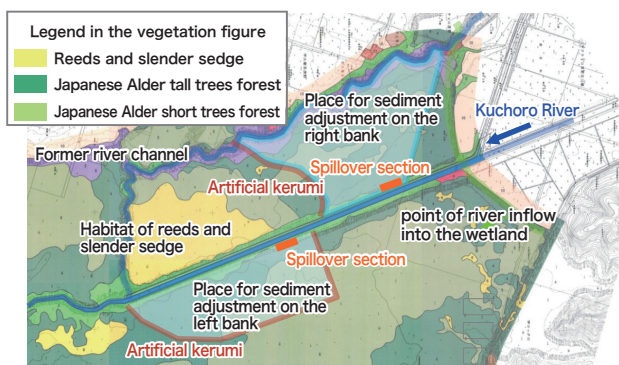
Maintenance and management activities including removal of accumulated sediment will be conducted.



(4) Construction of places for sediment adjustment at the points of river inflow into the wetland

Places for sediment adjustment will be established with the use of "artificial kerumi (*)" at the points of river inflow into the wetland to trap fine sediment carried from upstream and reduce sediment entering the wetland.

(*) Artificial kerumi: a kind of embankment that is established to hold back muddy water and accumulate sediment.



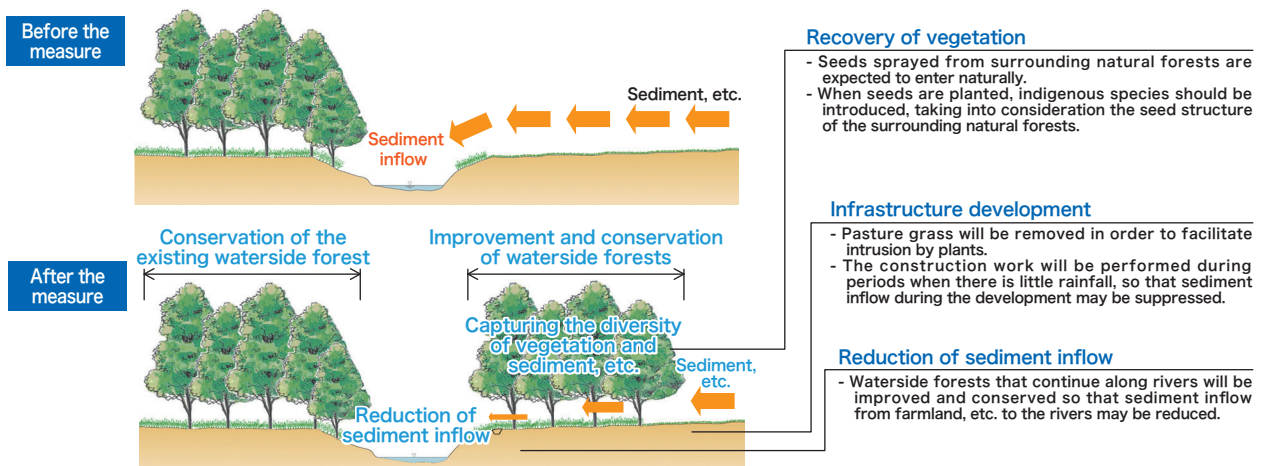
Structure of the artificial kerumi



Photo of the artificial kerumi

(5) Improvement and conservation of waterside forests

Waterside forests that continue along rivers will be improved and conserved so that sediment that flows from farmland, etc. to the rivers may be reduced. This measure will also be effective for restoration of the living environment of flora and fauna.



(6) Forest restoration

Trees will be planted in the waste river basin in order to suppress generation of sediment.

■ Past results and future plans

○ Measures to prevent erosion of rivers

(1) Prevention of erosion of the riverbed

There was a vertical gap of 5 meters created as a result of erosion of the riverbed below Sakai Bridge that crosses National Route 274, and the erosion was likely to spread further upstream. However, establishment of three "ground sill works" prevented the bridge and farmland from being affected.



Situations before and after the measure at the upstream end of the sector with the lowered riverbed



(2) Reduction of sediment outflow due to the lowered riverbed

In 2014, the amount of sediment flowing out to the wetland due to the lowered riverbed was 330m³ per year, an approximately 85% decline from 2,180m³ per year before the measure.



Situations before and after the measure in the sector with the lowered riverbed



(3) Restoration of the waterside environment

In the area where the measure was taken, the gravel was restored in the river bottom, the stream and depth of water have become diversified, and the river is becoming an environment easy for fish and aquatic insects to live in again.



Situation after the improvement of settling basins at junctions of drainage canals



Situation of carrying-out of sediment

○ Construction of settling basins at junctions of drainage canals

Settling basins were established at three junctions of Kuchoro River and drainage canals. It was discovered that approximately 60% of the incoming sediment accumulated in the settling basins and prevented an outflow to downstream. The settling basins will regularly remove sediment.

○ Construction of places for sediment adjustment at the points of river inflow into the wetland

An "artificial kerumi" was completed on the left bank, while another one is being developed on the right bank. According to the survey of the flood between September 16 and 18, 2013, there was an accumulation of sediment of 194m³.



Situation of the flood in August 2016

[For more information]

☞ [Search] with "Implementation plan for measures against sediment inflow" (Kuchoro River)



☞ [Search] with "Implementation plan for measures against sediment inflow (Settling basins)" (Minami-Shibecha area)



[Responsible organizations]

☞ Kushiro Development and Construction Department, Hokkaido Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism / Kushiro Department of Public Works Management, Kushiro General Subprefectural Bureau, Hokkaido (For contact information, see the back cover)

☞ [Search] with "Implementation plan for measures against sediment inflow (Settling basins)" (Setsuri and Horo areas)



☞ [Search] with "Sediment Control Subcommittee"



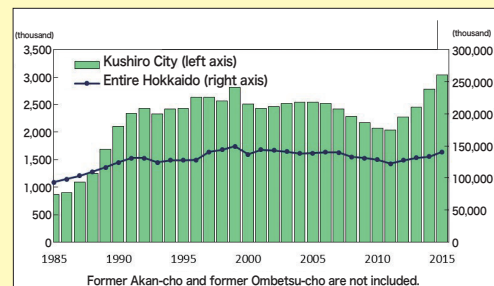
◆ Local industries and the Kushiro Wetland

— Balance between conservation and utilization through "Wise Use"

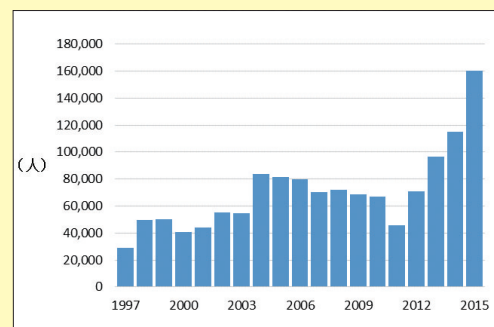
The number of tourists visiting the Kushiro Wetland began to increase rapidly when the wetland was designated as a national park in 1987. Instead of just watching the wetland, tourists have started to enjoy hands-on activities such as eco-tours, canoeing and bird watching, and the nature and landscape unique to the wetland fascinate both Japanese and international tourists. Not only the charm of nature but also the charm as a summer resort has attracted more long-term residents from outside Hokkaido to the Kushiro Wetland in recent years, and immigrants are also being actively invited. When asked "What do you want to do in Kushiro?", most tourists answer "Canoeing in the Kushiro River," and the answers "Kushiro Shitsugen Norokko Train", "Stroll along the wooden path" and "a tour of mysterious areas in the wetland and forests" follow.

In addition, the Kushiro Wetland is interacting with local industries in many ways, as seen in the agricultural business that has been carried out around the wetland since long ago, fisheries in lakes in the eastern part of the wetland, and food materials and products named after the wetland and a red-crowned crane.

Thus, as the Kushiro Wetland is a symbol that attracts many people and contributes to the local economy, it should be wisely utilized ("Wise Use") so that it will remain intact in the future. The Committee is working on the following projects through nature restoration.



Number of tourists coming to Kushiro City (total number)



Total number of stays of foreign guests within the Kushiro district



Kushiro Shitsugen Norokko Train



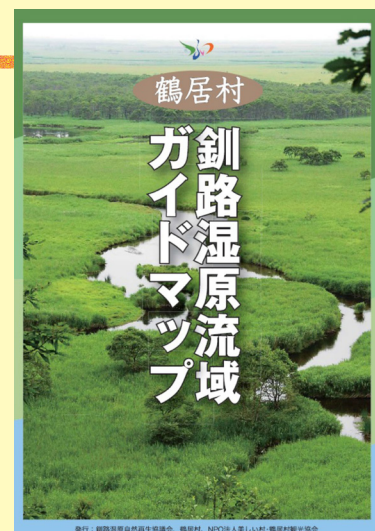
Crane observatory in winter

◆ Wise use of the wetland through tourism

— Planning the tourism menu based on nature restoration and eco-tourism

We will try to create a new tourism menu utilizing the Kushiro Wetland, such as eco-tourism in which visitors can experience nature restoration and local industries. In addition to the traditional observation events and guided tours in Visitor Center, etc., tours of sites of nature restoration and events limited to unmarried people participating in nature restoration are being planned these days. Such events represent a new way of enjoying the wetland.

In 2014, the Committee prepared a guide map for telling a story about the interface between the wetland and people's lives, using Tsurui Village as a model, and proposed a new style of tourism, for taking time to enjoy the area (for example, walking courses).



Kushiro Wetland Basin Guide Map

◆ Collaboration with local industries

— Balance between wetland conservation and industrial development

Local industries that do not exploit nature but wisely utilize natural blessings of the Kushiro Wetland basin while preserving them will be promoted.

We will support creation of local products based on nature and development of local brands, thereby contributing to local industries including agriculture, forestry and fishery. In addition, we will promote producers' and consumers' understanding of the connection between the wetland and local industries, encouraging them to keep balance between conservation of the wetland and industrial development.



Smelt fishing in Lake Toro

◆ Creation of guidelines and rules concerning the use of the wetland

— Creation of rules, and appeal for reduction of impacts on the wetland

The ecosystem in the wetland is so vulnerable that an increase of visitors may affect its delicate natural environment. To our regret some thoughtless people enter places that require permission or private land without permission, or throw away garbage. Therefore, it is necessary to investigate the impact of people's entry into the wetland on natural environments, prepare rules for the use of the wetland, and make the rules known to visitors with the use of signs and guidebooks.

The Committee has prepared the "Canoeing Guideline for Conservation and Use of the Kushiro River", asking canoers to observe the rules and manners for use and give consideration to water birds including red-crowned cranes.



Canoeing Guideline

◆ Consideration to the environment and landscape in industries and daily life

— Promotion of wetland conservation in daily life

All the rivers in the wetland basin flow into the wetland, carrying waste and dirt. Therefore, not only as visitors but also people living and working in the basin should take care of the environment.

In addition, wetlands and their surrounding landscape are the property of the region. Designated as a "Scenic Byway (road with beautiful landscape)" by the Ministry of Land, Infrastructure and Transport, this area is known as a scenic route representing Hokkaido. We hope that buildings and signboards will match the beautiful landscape in this area.



Kushiro Akan Cycling Road "Shitsugen-no-Yume (dream of the wetland) Road"

Efforts for nature restoration have been continuously made by communities and the private sector around the Kushiro Wetland since long ago. Some of such efforts will be introduced here.

◆ Trustsarun Kushiro, a corporation engaging in specified non-profit activities

— Conservation of the wetland and water resources through the national trust movement

Trustsarun Kushiro uses funds donated by citizens to acquire hills around the Kushiro Wetland and water resources that are not protected by the government and conserve the hills as nature conservation areas. It has been operating for 26 years since it was established mainly by residents near the Kushiro Wetland in 1989. It is managing 24 conservation areas (approximately 425ha in total) as of March 2017. It grows locally-produced seedlings in a nursery established in 2003 and has planted approximately forty thousand seedlings with the help of citizens. It has also achieved many results through its original survey on the situations of the wetland and recommendations to the government based on the survey.



Signboard of the tussock conservation area

◆ Wild Bird Society of Japan Tsurui-Ito Red-crowned Cranes Sanctuary

— Conservation and restoration of habitats of red-crowned cranes through citizen participation

This is an activity base for conservation of red-crowned cranes and their living environments, established by the Wild Bird Society of Japan in 1987 on a site donated by Mr. Yoshitaka Ito, a local resident who had been feeding red-crowned cranes for many years. Activities for feeding the cranes in winter, preserving the habitats, research and surveys, and public relations are conducted here. In conservation areas that are obtained with funds donated by citizens, Japanese alder trees have been grown to restore reed fields and red-crowned cranes have successfully bred there. In order to reduce cranes' dependence on feeding, development of natural eating areas was started in FY2008 with the help of volunteers. It is confirmed that all the 15 eating areas that were developed are used by cranes as of FY2014.



Development of a winter eating area for cranes

◆ Farmland/Water Conservation Team in the west Shibecha district

— Prevention of sediment outflow through maintenance and management of settling basins, and environmental education

As part of the State-owned Agricultural Land Disaster Prevention Project (FY2002-2008), seven settling basins, both large and small, were established along Kushiro River and Osobetsu River in the Minami-Shibecha area of Shibecha Town, in order to prevent sediment outflow to the wetland. The Conservation Team was established by local farmers in 2008 for the purpose of maintenance and management of said settling basins, and is cooperating with the town in drawing sediment accumulated in the settling basins and removing scattered shrubbery from drainage canals. The Team also conducts an annual survey on life in the river in collaboration with local elementary school students. The entire community is participating in environmental conservation activities.



Pumping sediment accumulated in the sand basin

◆ Tsurui Village Forestry Cooperative

– Forest management giving consideration to conservation of the Kushiro Wetland

The entire area of Tsurui Village is located upstream of the Kushiro Wetland, and 64% of the area is covered with forests. Approximately half of said forests (private forests of approximately 190km²) are managed by Tsurui Village Forestry Cooperative. Adopting technologies in Austria, which is advanced in forestry, the Cooperative started to use reasonable methods for suppressing sediment outflow without damaging the mountain, such as technologies for carrying out felled trees with the use of wires, without having heavy machinery enter the forest, and a construction method that elevates the center of work roads to guide rainwater to roadsides, for the first time in Japan in 2010.



Thinning the forest without using heavy machinery

◆ Hokkaido Shibecha High School

– Environmental education with the use of a mountain, forests and wetlands in the school

Shibecha High School puts education concerning "life" in practice by connecting people and communities in the three lines (cultural understanding, regional environment, and dairy and foods), and provides attractive lessons and activities with the use of a farm, a mountain, forests and wetlands in a vast site of 255ha.

Currently, high school students are trained to work as staff for nature experience activities, and a wide variety of activities based on local materials are conducted, such as planning and operation of hands-on environmental education for local elementary school students, serving as a red-crowned crane guide in the Tsurui-Ito Red-crowned Cranes Sanctuary, planning and operation of the Hokkaido Sika deer leather craft business, efforts to maintain footpaths within the school site, and an investigation of water quality. In addition, the high school accepts international students from Sophia University and trainees studying the Anzali Wetland in Iran, and interacts with high school students in Iran through Skype, attracting international attention.



Explanation given in the small wetland as a part of the JICA training

◆ Kushiro International Wetland Centre

– Monitoring of results of nature restoration projects by citizens

As citizens' validation of nature restoration projects, in the site of restoration of the Kushiro River to its meandering state in the Kayanuma area, the restored river and its surrounding environment have been surveyed twice a year (in summer and autumn) since 2010.

Aquatic life in the river that has been restored to its meandering state, vegetation in riverside forests and the status of sediment accumulation in the sand bank are surveyed in summer, while the river and the surrounding nature are surveyed in autumn, with participants canoeing in the river that has been restored to its meandering state. This survey is an opportunity for valuable experience, in which the general public can participate in the monitoring survey of the restoration projects under experts' guidance, and is so popular that acceptance of applications for participation is always stopped in a very short time because many people, both elementary school students and elderly people, apply.

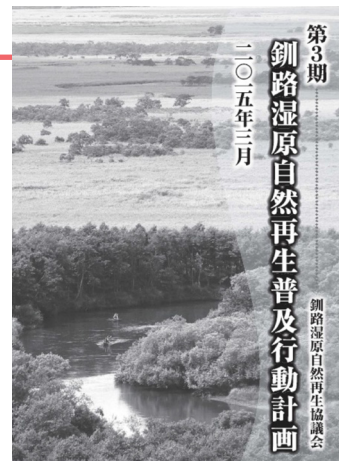


Survey of the restored river

Citizen participation in nature restoration

– Comprehensive Plan for Restoring Nature in the Kushiro Wetland

Nature restoration projects are different from traditional environmental policies and public undertakings in that they take dozens of years to produce results, and that they should be promoted, with the entire basin taken into consideration, while bringing out the recuperative powers of nature and repeatedly reviewing the projects based on monitoring and evaluation. In order to promote such projects, it is necessary for all people living in the basin to obtain correct knowledge on the Kushiro Wetland, get interested in the wetland, and try to involve themselves directly or indirectly in the wetland. Thus the Committee has focused on the spread of understanding and participation among many people since the outset. Under the "Comprehensive Plan for Restoring Nature in the Kushiro Wetland", a five-year plan for promoting nature restoration with the understanding, support and cooperation of members of communities and citizens, the Committee has implemented and supported various initiatives.



◆ "Wandagurinda Project"

This project is designed to register local activities directly or indirectly related to conservation of the Kushiro Wetland with the Committee and to support transmission of information and creation of opportunities for interaction. Thanks to this project, a wide variety of attractive activities (including the ones proposed by people outside of Hokkaido) have been deployed. The number of opportunities for experience of nature in the wetland and participation in conservation activities has steadily increased these ten years. A wider scope of activities has been recruited since 2015 under the slogan "Kushiro Wetland supporters".

(Note) "Wandagurinda" is a word coined from "Wonderful", "Only one", and "Green-da (It's green)", and was chosen as a nickname of the project by the participants in 2005.



Kushiro-Shitsugen National Park Volunteer Rangers Association



Sophia University



Waku-waku Expedition "Let's play with the forest 2014"

◆ Provision of study tours and opportunities for participating in nature restoration

Study tours are offered in the nature restoration project sites to explain what the wetland is like now, why nature restoration is necessary, how nature will be restored, and what results have been produced. In addition, opportunities to directly get involved in nature restoration, such as monitoring surveys for confirming the progress of projects and forest restoration, are offered. Support is provided to NPOs and corporations creating opportunities for participating in nature restoration (see page 18-19).



Reed grass seedling transplanting experience

◆ Provision of field workshops

A tour for learning about the Kushiro Wetland more deeply is provided to participants in the Committee and the Wandagurinda Project. This tour shows participants the situation of the wetland they would otherwise have no chance to see both in summer and in winter so that, being guided by an expert, they can obtain experiential knowledge on the mechanism and actual state of nature in the wetland and disseminate the knowledge in their own activities.



The 16th Field Workshop

It is very important for children living in the basin to know and enjoy the wetland, and learn about the wetland. However, though living near the wetland, children have few opportunities to directly experience the wetland, and seldom learn about or visit the wetland in school. This is why the Committee set up a working group for supporting school education utilizing the wetland, and is conducting the following activities in collaboration with teachers and education specialists.

◆ Introduction of examples of lessons using the wetland, and organizations/people that are expected to cooperate

— Connecting schools, the field and experts

Some schools in the basin allot dozens of hours per year to learning about the wetland, utilizing the integrated learning period. Information on such lessons is collected and introduced in the guidebook and on the website. In addition, facilities and organizations that cooperate with wetlands learning are introduced so that out-of-school learning and lessons by outside lecturers may be facilitated.



Wetlands learning near Onnenai Visitor Center

◆ Teachers training

— Supporting teachers who try to work on wetlands learning

A teachers training course that covers nature in the wetland and the actual field of local industries interacting with the wetland is offered so that school teachers themselves can obtain experiential knowledge on the wetland and use the knowledge for education.



Fieldwork in the site of the wetland restoration project in the Hororo area

◆ Provision of teaching and learning materials

— Promotion of wetlands learning as regional learning

Using the Kushiro Wetland as a learning theme in subjects such as Science and Social Studies will not only improve students' level of understanding but also make them proud of nature in their hometown. Materials such as pictures and videos displaying the wetland from upstream to the river mouth are offered on the website, and original teaching materials featuring the Kushiro Wetland are loaned out.



Illustration showing the food chain in the Kushiro Wetland



For our future children who will live together with the wetland

Guidebook for Nature Restoration in the Kushiro Wetland

Published in December 2017

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Forestry Agency

Kushiro National Environment Office, Hokkaido Regional Environment Office, Ministry of
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