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# **Comprehensive Framework for the Nature Restoration of Kami-Sarobetsu**

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February 2006

Kami-Sarobetsu Nature Restoration Program Council

The Kami-Sarobetsu region was on the verge of great change following the Second World War. Against the backdrop of post-war development throughout Japan, calls for the development of Kami-Sarobetsu began in 1949, leading to a decade of comprehensive environmental and socio-economic surveys exploring agriculture and other activities in the peatlands starting in 1961. There was much heated debate on how Sarobetsu should be developed, in a time when the mire was increasingly being recognised as a major tourist attraction.

Although the area was designated a Quasi-National Park in 1965, the Sarobetsu mire was initially excluded from protection because it was regarded as a potential site for development. But a rise in illegal harvesting of plants there led to increased calls for its protection. These would be answered with the 1974 upgraded designation of Rishiri-Rebun and Sarobetsu to national park status, which now included the mire. The desiccation of the mire was an issue of particular concern, resulting in long-term consideration of conservation measures. What remains today of the mire has become an invaluable "living classroom," where one can learn both the inner workings of nature and the interactions between the mire and the surrounding built environment. Even today, Sarobetsu mire abounds with change and new discoveries. One of these can be the emergence of Sarobetsu as a one of the leading dairy-producing regions in Japan. The pastures encircling the mire which support the industry are situated on the largest high-altitude mire in lowland Japan, a fact well-known locally and abroad. There are great expectations for the Sarobetsu mire, with its breath-taking landscapes, scientifically-important terrain, and co-existence between nature and agriculture.

It is on this land, surrounded by abundant nature that we experience daily life. It is this land that has yielded that abundant nature, on which we depend. But now it is our daily lives that are helping secure that nature for future generations. *Without nature we cannot live. But we cannot live on nature alone.* With these words in our hearts we will work towards the nature restoration of Kami-Sarobetsu.

February 2, 2006

Kami-Sarobetsu Nature Restoration Program Council

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# Comprehensive Framework for the Nature Restoration of Kami-Sarobetsu

## Chapter 1 Characteristics of Kami-Sarobetsu and Developments Leading up to its Restoration

### Section 1 The Kami-Sarobetsu Mire and society

#### 1. Natural history of Kami-Sarobetsu Mire

Formed over a course of four to five millennia in the lower reaches of the Teshio River and its tributary the Sarobetsu River, the Sarobetsu Mire is one of Japan's most well-known peatlands. The origins of the mire are thought to lie in what was once Lake Sarobetsu, a lagoon facing the Sea of Japan and surrounded by coastal sand dunes and the Soya Hills. It was through the interactions of Teshio River and its tributary flowing into the lagoon that peat formed and accumulated in low-lying areas.

In earlier times, the mire spanned 27 Km north-south, 8 Km east-west with an area of 14,600 hectares making it one of the largest peatlands in Japan, surpassed only by those in Ishikari and Kushiro in scale. However, with large-scale development of the region following the 1960s, the area of the mire was drastically reduced. Today, including ponds and lakes, the mire has an area of 6,700 hectares. Despite this figure, Sarobetsu Mire is the largest high-altitude mire in lowland Japan, of which 3,332 hectares is specially-protected within the national park<sup>1)</sup>.

#### 2. Social Characteristics of the Kami-Sarobetsu region

##### a) History of settlement

##### i) Pre-development phase

Archaeological evidence suggests that Kami-Sarobetsu was first settled in early Jomon period (approximately 4,000 BCE to 3,000 BCE). Although the Meiji period (1868-1912) saw the beginning of the development of Hokkaido, the harsh weather conditions of the Teshio region were regarded as inhospitable for settlement, and thus economic activity was restricted to fishing off the coast.

##### ii) Phase 1 of Development

(turn of the 19<sup>th</sup> century to pre-Second World War)

At the turn of the 19<sup>th</sup> century, free loans for undeveloped, government-owned land resulted in the fast-paced development of the region. The settlement of present-day Toyotomi Town first began with the arrival in 1903 by a group of settlers from Gifu prefecture at Kabutonuma on the northern end of Sarobetsu Mire. Cultivation during this time began in elevated, dry and fertile areas, which brought on further settlement by people from Yamagata prefecture.

##### iii) Phase 2 of Development (post-Second World War)

Following the Second World War, as a



Flooding during snowmelt

April 5, 1962

Wakasakanai Toyotomi Teishaba-sen Road  
(Near Maruyama Hill)<sup>2)</sup>

solution to the unemployment of demobilized servicemen and other returned nationals, an "urgent development initiative" policy was enacted, resulting in 350 additional households in Toyotomi Town. This policy would be followed by numerous others advocating the intensive development of the dairy industry. Starting in 1961 as part of the Comprehensive Hokkaido Development Initiative, coordinated development of the Sarobetsu Mire took place. Notable is the construction of the Sarobetsu Drainage Canal in Kami-Sarobetsu which greatly mitigated large-scale flooding in the region.

Development History of Kami-Sarobetsu

	1930	1940	1950	1960	1970	1980	1990	2000
Road linking Toyotomi and Toyotoku opened	<div></div>							
Urgent Development Initiative (5 years)		<div></div>						
Sarobetsu Drainage Channel			<div></div>					
Agricultural development			<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	
Peat extraction		<div></div>			<div></div>	<div></div>	<div></div>	<div></div>

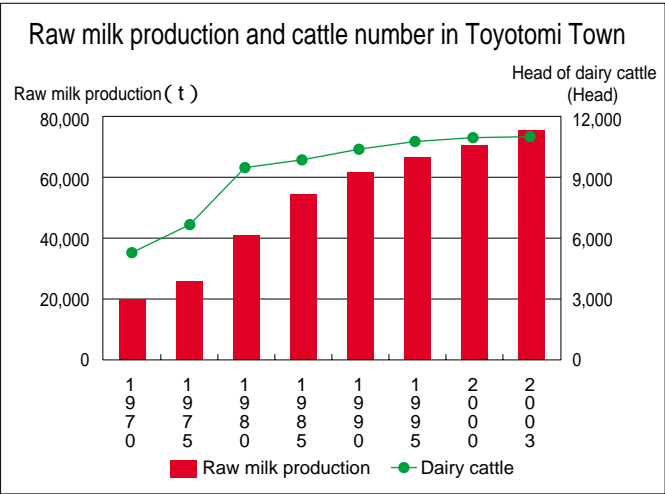
..... Although peat extraction in the site where the Sarobetsu Natural Flower Garden stands today has been confirmed, information is lacking.

b) History of use of Kami-Sarobetsu Mire

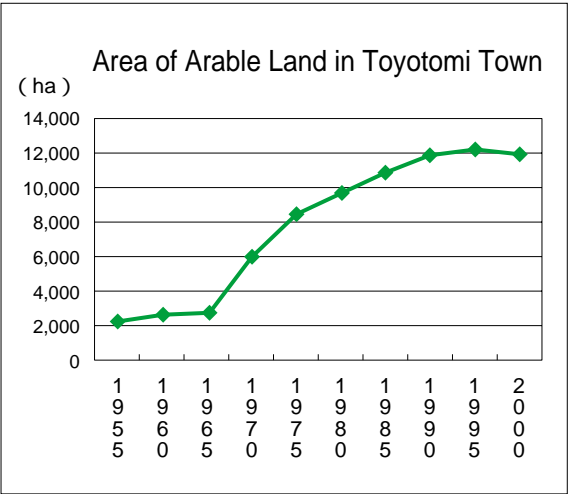
Use of Kami-Sarobetsu Mire was historically divided into agriculture, industry, and enjoyment and conservation, known as "three-pronged usage"<sup>3)</sup>, with each being organised and pursued separately. In 1974, the Rishiri-Rebun Quasi-National Park was expanded and upgraded to include the Sarobetsu Mire, thus becoming the Rishiri-Rebun-Sarobetsu National Park.

c) Agriculture

As the climate in Kami-Sarobetsu was well suited for dairy production, various reclamation projects preparing land for coarse feed production have been carried out in the region. Industrial expansion continues today, making Kami-Sarobetsu one of the leading dairy producers in Japan.



(Ministry of Agriculture, Forestry and Fisheries annual statistics report)



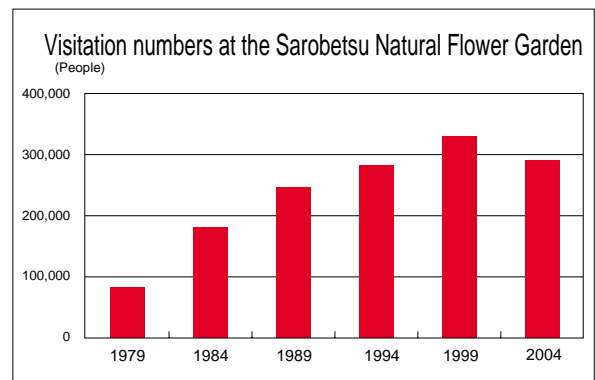
(Agriculture and Forestry Census)



As of 2004, 11,000 dairy cows grazing 12,000 hectares (data from 2000) in Toyotomi Town were producing 74,000 tonnes of milk annually. In recent years, head of cattle, milk production, and the area of grazing land has appeared to have plateaued.

#### d) Tourism

As the largest high altitude mire in lowland Japan, Kami-Sarobetsu is an invaluable tourist attraction. Drawn to its natural landscapes, the Natural Flower Garden alone attract 300,000 visitors annually from throughout Japan.



(Toyotomi Town)

#### e) Industry

Within the national park on the western side of Maruyama Hill, the Sarobetsu Natural Flower Garden Visitor Centre now stands proximate to what was once a peat extraction site. In preparation for World War II, the peat was used as adsorbents in gas masks. Between 1970 and 2002, on the south side of Maruyama Hill, peat moss for fertiliser use was extracted with a hydraulic dredge. Small-scale peat extraction is still seen today outside the national park boundaries in Ochiai District, Nishi-Toyotomi.



Hydraulic dredge for peat extraction<sup>4)</sup>

### 3. The Environment of Kami-Sarobetsu

#### a) Water environment

##### i) Hydrology

Situated in the lower reaches of the Teshio River hydrological system, the former Sarobetsu River and Shimo-Ebekorobetsu River flowed around, rather than through the Kami-Sarobetsu peatlands. A combination of flat, low-altitude terrain and low-gradient flow caused the rivers to often stagnate, characteristics that influenced peat formation. A cluster of ponds recharged through precipitation in the lower parts of the coastal forested sand dune area are believed to maintain the unique water environment of the region.

##### ii) Water quality

Peatlands are generally classified as either high-altitude peatlands recharged with precipitation or low-altitude peatlands recharged with inflow and floodwater. As a result, the former are often nutrient-poor environments while the latter, with their diverse water sources are comparatively nutrient-rich.

Influenced by the hydrology of surrounding areas, certain parts of the Kami-Sarobetsu

Mire have experienced change such as the in-flow of nutrient salts. Desiccation of the mire causes the peat to decompose, in turn increasing the density of nutrient salts. Furthermore at Penkenuma Pond and surrounding areas, river development projects are believed to have resulted in the inflow of sedimentation and nutrient salts. Open bodies of water at old peat extraction sites have attracted migratory birds, the organic wastes of which have caused eutrophication.

## b) Natural landscapes

Many types of environments can be found in Kami-Sarobetsu, from the vast grasslands of the mire to beaches, forests and ponds lining the sand dunes, among others. Consequently, the landscapes and ecosystems of the region support a diverse array of biota.

### i) Climate

The annual mean temperature of Toyotomi Town is 5.9 (based on data from 1974-2003), with the lowest winter temperatures dropping to -12 in February and the highest summer temperatures rising to 23.0 in August. The region is thus considered fairly cool. Mean annual precipitation is placed at 1,108mm, where between the months of April through November, and December through March, average precipitation is 796mm and 312mm, respectively. Toyotomi Town receives an annual 1,298 hours of sunlight, which peaks in March with 158 hours, in contrast to 32 hours in December. Annual mean wind speed is 2.2m/s, which predominantly blows south-east.

Meteorological Data for Toyotomi Town<sup>5)</sup>

observatory Toyotomi Weather Station			Period 1974 ~ 2003							Position N45 ° 10' E141 ° 08'					
Item	Unit		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	All year
T e m p	Avg T		-6.9	-7.1	-2.7	4.0	9.2	13.4	17.7	19.3	15.4	9.3	2.3	-3.5	5.9
	Max T	( )	-3.8	-3.3	0.9	7.7	13.4	17.6	21.7	23.0	19.8	13.3	5.3	-0.8	9.6
	Min T		-11.0	-12.0	-7.4	0.2	4.8	9.2	14.0	15.7	10.7	4.7	-1.2	-6.8	1.7
	Avg precip	( mm )	90.4	56.6	55.0	53.4	58.9	56.7	93.4	117.5	121.3	154.0	140.6	110.3	1,108.1
W i n d	Avg speed		2.2	2.2	2.3	2.3	2.3	2.2	2.0	1.9	2.0	2.3	2.5	2.4	2.2
	Max speed	( m/s )	10	9	11	9	9	9	8	11	10	12	10	15	15
	Direction		SE	SE	SE	SE	SW	ESE	ESE	ESE	SE	SE	SE	WNW	SE
	Avg sunlight	( h )	54.6	107.1	158.0	138.0	143.7	128.7	118.4	121.8	148.8	104.9	42.3	31.7	1,298.0

### ii) Landscape

Surrounded by major rivers on its margins, Kami-Sarobetsu Mire is characterized by Maruyama Hill in it centre, from which rings of high, mid and low-altitude peatlands spread out. Therefore, the mire is not only a scientifically important place to observe various stages of peat formation, but also holds immense value for the breath-taking views of the mire set against the backdrop of Rishiri



Kami-Sarobetsu and Rishiri Mountain<sup>6)</sup>

Mountain in the distance. Heading inland from the coastline, the landscape stretching north-south transforms from sand dunes to wetlands, forests and ponds exemplifying the diversity of environments found here.

### iii) Vegetation

A variety of vegetation can be found in Kami-Sarobetsu Mire such as sphagnum (peat) moss (*Sphagnaceae*) and the small cranberry (*Vaccinium oxycoccus*) in the high-altitude peatlands, and gradually shifting to *numagaya* (*Moliniopsis japonica*), *ezokanzo* (*Hemerocallis dumortierii* var. *esculenta*), tussock cottongrass (*Eriophorum vaginatum*) and broadleaf bamboo (*Sasa palmate*) in the mid-altitude peatlands. In and around the low-lying flood plains and ponds are the common reed (*Phragmites communis*), Langsdorf's reedgrass (*Calamagrostis langsdorfii*), and *mujinasuge* sedge (*Carex lasiocarpa* var. *occultans*) in addition to alder trees (*Alnus japonica*) in the wetland forests.



Small cranberry<sup>6)</sup>

The vegetation from the sand dunes gradually changes from the predominance of beach plants such as *hamaninniku* dune grass and the Asiatic sand sedge (*Carex kobomugi*) to coastal grassland species such as the Japanese rose (*Rosa rugosa*), wind-beaten *mizunara* oak (*Quercus mongolica* subsp. *crispula*), and planted forests of *mizunara* and todo fir (*Abies sakhalinensis*). In the ponds situated between sand dunes the *ezonohitsujigusa* (*Nymphaea tetragona*) and *nemurokouhone* (*Nuphar pumilum*) water lilies are found<sup>7,8)</sup>.

### iv) Animals

In addition to the *ezoyukiusagi* mountain hare (*Lepus timidus ainu*), ezo red fox (*Vulpes vulpes schrencki*) and sika deer (*Cervus nippon yesoensis*) and other animals commonly found throughout Hokkaido, Kami-Sarobetsu is also home to the least shrew (*Sorex minutissimus hawkeri*), one of the smallest mammals in the world, and the viviparous lizard (*Lacerta vivipara*).



least shrew<sup>13)</sup>

A variety of birds have also been confirmed here, which provides a stop-over for the white-fronted goose (*Anser albifrons*) and bean goose (*Anser fabalis middendorffii*) and breeding grounds for birds of prey such as the Eastern marsh harrier (*Circus aeruginosus spilonotus*) and white-tailed eagle (*Haliaeetus albicilla*) as well as the red-necked grebe (*Podiceps grisgena holboelli*) and blue-headed wagtail (*Motacilla flava*). In recent years breeding of the red-crowned crane (*Grus japonensis*) has been confirmed. In 2005, a portion of Kami-Sarobetsu Mire was designated as a wetland of international importance by the Ramsar Convention on Wetlands<sup>9,10)</sup>.

Sarobetsu River and its tributaries provide habitat and breeding grounds for the endangered Japanese huchen (*Hucho perryi*), as well as the ezo eight-barbell loach (*Lefua*



*nikkonis*), the carp *Phoxinus phoxinus* *sachalinensis* and the Sakhalin stickleback (*Pungitius tymensis*), among others<sup>11)</sup>.

Finally, numerous insects particular to wetland environments such as the damselfly *Nehalennia speciosa*, Ozeunka planthopper (*Megamelus flavus*), the pentatomid *Ommatidiotus dissimilis*, ezokogamushi (*Hydrochara libera*), scarce large blue butterfly (*Maculinea teleius*) and *Argynniini* butterflies are found here<sup>12)</sup>.



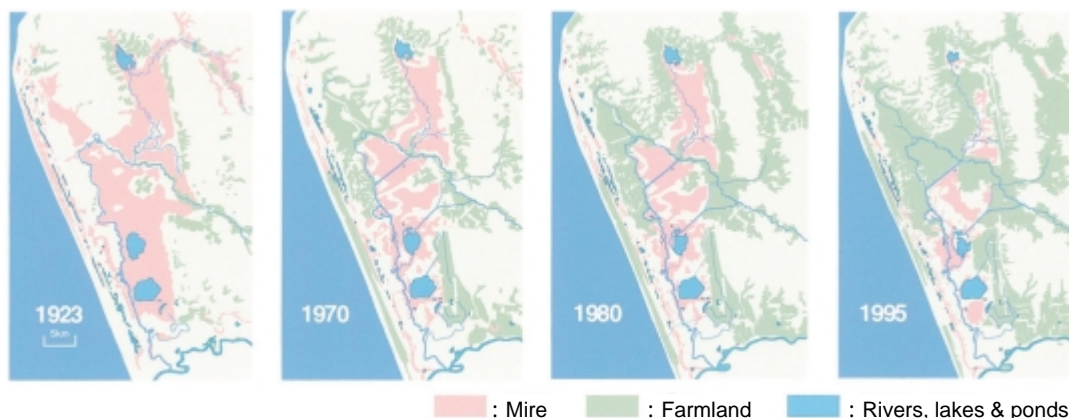
viviparous lizard<sup>6)</sup>

## Section 2 Social issues associated with Kami-Sarobetsu Mire

### 1. Issues

#### a) Desiccation of Kami-Sarobetsu Mire

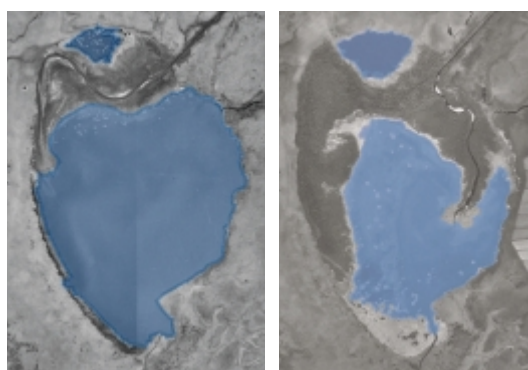
As a result of land reclamation, road construction, river development, peat extraction and other projects, groundwater has dropped in one part of the mire leading to its desiccation. Desiccation of peatlands changes peat structure, which in turn affects ground vegetation such as the encroachment of sasa bamboo.



Decrease in mire area and increase in arable land area in Sarobetsu<sup>14)</sup>

#### b) Inflow of sedimentation into Penkenuma Pond, and pollution of rivers

In the environs of Penkenuma Pond, river courses were changed by humans, resulting in an inflow of sedimentation and thus a decrease in both surface area and water level. Furthermore, the pond environment was polluted by contaminants and nutrient salts. The pollution of rivers and ponds inside the mire degrades the habitats of the freshwater salmonid Japanese huchen, etc.



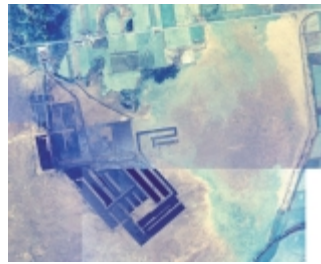
Surface 1947

Surface 2000

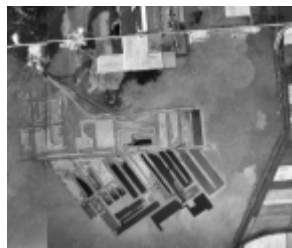
Blockage of Penkenuma Pond<sup>15)</sup>



1947



1977



1989



2000



Old peat extraction site (southern Maruyama Hill)<sup>6)</sup>  
July 2004

Transitions in peat extraction (southern Maruyama Hill)<sup>15)</sup>

### c) Restoration of old peat extraction sites

Although the growth of peat moss has been observed in an old peat extraction area developed in the 1940s and one on the south side of Maruyama Hill, areas still remain in the latter with large open bodies of water without restoration of vegetation.

### d) Declining water table level in the pond/forested sand dune area

In the pond/forested sand dune area, falling water table levels have resulted in the decline of pond areas, some to the point of disappearance.

It is probable that the unique water environment of the ponds is greatly affected by the construction of drainage channels, roads and river projects near the sand dunes and forested areas that maintain it.



Pond/forested sand dune area<sup>6)</sup>  
July 2004

## 2. Social Issues

### a) Agriculture

Arable land surrounding Kami-Sarobetsu Mire has long been primarily developed for dairy production. Measures to promote dairy farming in the region strive for self-sufficient procurement of coarse feed and lower production costs to develop an efficient and



Flooded fields near Seimei<sup>16)</sup>  
July 1999

stable industry.

Most of the arable land and drainage channels in the region were created during post-war agricultural and drainage projects. However, in recent years ground subsidence particular to peatlands has considerably decreased the function of channels. Drops in feed production have also been observed due to the encroachment of wetland vegetation into the overly humid fields. Furthermore, flooding following the rains affect both production and quality of grass for grazing. Flooding also hinders the use of farm machinery and thus lowers overall work efficiency.

## **b) Recreation and tourism**

Rich in biodiversity and vast landscapes, Kami-Sarobetsu attracts 300,000 visitors annually making it a major tourist attraction in northern Hokkaido. However, the majority of visits are transitory, suggesting that the region has yet to maximize its potential as a site for tourism and environmental education. At present, the shift to long-term and experiential tourism is under consideration.

### **Section 3    Developments towards nature restoration**

#### **1. Developments and conservation initiatives following national park designation**

In 1974, with an area of 21,222 hectares Rishiri-Rebun-Sarobetsu National Park was established. The mire, which had for approximately 30 years remained a reservation, was finally included in the park in 2003. From 1987 to 2004, conservation measures to mitigate the desiccation of the mire in the form of surveys and pilot projects were carried out.

In 2002, the Conference for the Formulation of a Restoration Framework for Sarobetsu was established comprising local stakeholder organizations and scholars. Through research and deliberation the Sarobetsu Restoration Framework was created in September, 2004. With the enactment of the Law for the Promotion of Nature Restoration in January, 2003, a Nature Restoration Policy was drafted and adopted in April of the same year. It was against this legal backdrop that the Kami-Sarobetsu Nature Restoration Program Council was established to promote consensus and action based on cooperation between stakeholder organizations.

#### **2. Locals and nature conservation activities**

Following the national park designation, locals and volunteer organizations from Toyotomi Town and elsewhere have promoted the nature conservation of the mire. In 2004, locals working towards the restoration of the mire and its surrounding areas, as well the co-existence between nature and agriculture came together to establish the NPO Sarobetsu Eco Network.

### **Chapter 2    Nature Restoration Zones**

Zones targeted for nature restoration are mainly situated in the national park-protected Kami-Sarobetsu Mire, which is found within the limits of Toyotomi Town. However, zones are not restricted to Kami-Sarobetsu Mire alone; Activities contributing to nature

restoration may also include areas whose environments directly impact the mire.

## Chapter 3 Goals for the Restoration of Kami-Sarobetsu

### Section 1 Goals for the nature restoration of Kami-Sarobetsu

#### 1. Setting goals for the restoration of Kami-Sarobetsu

##### a) Goals for the restoration of the high-altitude peatlands

At the core of Kami-Sarobetsu Mire are the high-altitude peatlands. The primary goal of this area is to restore the landscape back to its condition at the time of national park designation. Standards to be achieved were based on areas that currently remain in good condition. In order to achieve this goal, highest priority is given to the conservation of currently-existing mire vegetation, and taking measures towards particularly degraded and affected areas.

##### b) Goals to mitigate inflow of sedimentation into Penkenuma Pond, and pollution of rivers

Many rare species of plants and animals face the risk of extinction in Penkenuma Pond, and its surrounding areas due to blockage. As this area is rich with biodiversity, the goal is to maintain the current condition of the area and prevent further blockage.

##### c) Goals for restoration of old peat extraction sites

The goal is restoration and regeneration of mire vegetation at the old peat extraction sites where there is blockage of open water. Presently, areas are being considered for utilization as a field observatory where migratory birds can use the open water as a stop over, recovery of vegetation and ecosystems can be observed and current environment can be maintained.

##### d) Goals for restoration of the pond/forested sand dune area

In the pond/forested sand dune area, the goal is to limit the falling water level for the purpose of ecosystem conservation.

#### 2. Basic principles for achieving nature restoration goals

Activities for achieving nature restoration goals will be based on a sound scientific understanding of the current condition of biota and ecosystems, identification of the factors associated with temporal and spatial changes of ecosystems, projections for the future, and sufficient consideration of needs and methodology. Restoration will first prioritize the natural restorative function of ecosystems. In situations where this is deemed unlikely, sufficient time and consideration will be spent to devise methods that require minimum human intervention to yield maximum results. As the complexity of impacts on ecosystems following restoration make predictions difficult, individual projects will first be preceded by monitored, small-scale pilot tests, which will then be graded objectively for performance. Feedback and adaptation will be maintained throughout this process. Methods will be based on research results and local knowledge, use local natural resources as much as possible, and be conducted with care and attention.



Section 2	<b>Goals associated with the advancement of agriculture</b>
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The labors of the pioneers who cleared land in Soya for dairy production have since been rewarded with the development of the region's key industry. In order to maintain the prominence of, and further develop the dairy industry, the effective use of land resources and the promotion of recycling-based agriculture employing a mainly coarse feed/pasture approach will be necessary. This will first require consideration of the unique properties of peat, of which over half of arable land is composed, followed by appropriate land and drainage improvement schemes. Objectives for the advancement of agriculture thus involve achieving co-existence between the mire and agriculture.

Section 3	<b>Goals associated with regional development</b>
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As the heart of Rishiri-Rebun-Sarobetsu National Park, the Kami-Sarobetsu Mire is a place where nature restoration in progress and the unique characteristics of the local environment centered around the mire can be learned and experienced firsthand. The surrounding farmland and villages trace the history of the pioneer era, and tell of the inextricable links between humans and nature. Kami-Sarobetsu can also be enjoyed as a leisure destination; facilities such as the government-designated Toyotomi hot springs will be used to promote longer stays.

Realization of these objectives will require improvements in the national park and surrounding farmland. Greater cooperation with local communities will also be needed with respect to natural resource use, product development employing ecotourism principles and local farms, promotion of "rural tours", and development of the Sarobetsu brand.

Chapter 4	<b>Measures to Achieve Goals</b>
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Section 1	<b>Kami-Sarobetsu Mire desiccation countermeasures</b>
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**1. Desiccation countermeasures for the desiccation of high-altitude peatlands**

Long-term monitoring will observe for changes in groundwater levels and vegetation. Mitigation measures will be considered following a thorough understanding of the state of desiccation.

**2. *Sasa* bamboo encroachment countermeasures**

Investigations of the current state of encroachment will be continued. Based on the results, mitigation of water outflow from wetland and road-side ditches, and thus desiccation that leads to *sasa* encroachment, as well as other control measures will be explored.

**3. Desiccation countermeasures for wetlands on the south side of the Sarobetsu River Drainage Channel**

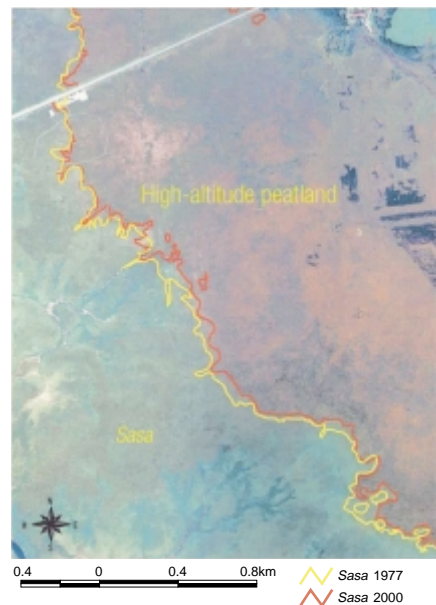
In order to raise and stabilize groundwater levels in the mire and thus curb desiccation, initiatives such as the occasional raising of the sluice gate (with due consideration to the



proper functioning of the channel) will be implemented. Furthermore, vegetation management will be explored based on surveys monitoring for changes in groundwater level and vegetation.

#### 4. Consideration of the co-existence between the mire and neighboring farmland

Calls for the moderate drainage of farmland neighboring the mire will necessitate the maintenance of high groundwater levels in the mire. Currently, the co-existence of agriculture and mire conservation and restoration is plagued with difficulties. Consensual pilot tests based on a better understanding of the farmland/mire interface, agricultural practices, land use and land ownership will be used to formulate methods for co-existence.



Sasa bamboo encroachment<sup>15)</sup>

### Section 2 Sedimentation control of ponds and lakes and water quality measures

#### 1. Surveys of the state of sedimentation of Penkenuma Pond and development of countermeasures

Upstream inflow of sediments has caused blockage in Penkenuma Pond. Despite this, the pond remains rich in aquatic vegetation making it an important habitat in the Sarobetsu Mire for the Japanese huchen, red-crowned crane and bean goose. In order for this balance to be maintained, measures will be devised in cooperation with relevant parties.

#### 2. Countermeasures for contaminant pollution in ponds and lakes in the mire

Measures to mitigate pollution by the inflow of contaminants will be considered. Furthermore, as the Sarobetsu River flows from Rishiri-Rebun-Sarobetsu National Park before joining with Teshio River, measures targeting the mire and watershed will also be devised.

### Section 3 Restoration of peat extraction sites, etc.

As many abandoned peat extraction sites now contain open bodies of water, these will be considered as sites for vegetation production and restoration. Measures starting with pilot tests will be conducted in sites where blockage has hindered regrowth of vegetation.

### Section 4 Measures to prevent water level decline in pond/forested sand dune areas

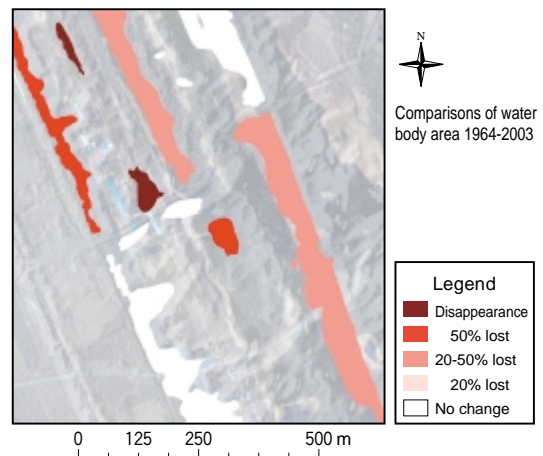
Despite the good natural condition of the pond/forested sand dune areas and other parts of the mire, for reasons unknown these areas are experiencing a decline in water level. A better understanding of the current state and reasons for the decline is urgently needed, followed by development of countermeasures.

### 1. Monitoring change in water levels

Currently, many aspects concerning the actual state of decline in water level and area in the pond/forested sand dune area remain unclear. Investigation of the actual state should be preceded by gaining a solid understanding of the pond formation process.

### 2. Ecosystem survey

The ecosystem composition of the pond/forested sand dune area and the impact of decreased water levels on it will be investigated.



### 3. Countermeasures for decreased water levels

Based on the results of the water level and ecosystem surveys, countermeasures will be explored.

## Section 5 Use of nature and resources and raising awareness

### 1. Use of local nature and resources

Through partnerships with locals and relevant organizations, ways to realize the potential of the region's nature and resources will be explored, such as environmental education and experiential tourism of nature and farming villages. Exchanging information with neighboring communities will allow for the development of strategies for nature and resource use that include surrounding regions. The advancement of agriculture based on principles of co-existence with nature will contribute to milk safety and developing the brand image of dairy products.

### 2. Establishing an information portal accessible to a variety of stakeholders

By enlisting the cooperation of interested parties, data and other information concerning restoration initiatives will be collected and placed in a database. This information will then be made accessible via the internet and PR campaigns targeting locals.

### 3. Promoting greater use of the visitor center, etc.

Plans are underway to move the Toyotomi Visitor Center and the pathway for the natural flower garden to the Maruyama Hill area. Multilateral negotiations will develop the center as a focal point to maximize the area's natural and tourism resources. In this new location, visitors will also be able to learn about the inextricable ties between humans and nature through the history of development and peat extraction, and how the two can co-exist. Finally, the center will be equipped with a variety of interpretive tools to introduce visitors to the wonders of the Kami-Sarobetsu Mire.

#### **1. Participation of locals and other stakeholders in the transmission and feedback of restoration information**

Sociological, scientific and technological information will be transmitted and shared by locals and other stakeholders through newsletters and the internet to promote transparency in restoration initiatives. Workshops, working groups and interviews will also promote participatory discussions that will reflect the opinions of a diverse array of stakeholders, from which consensus will be achieved.

#### **2. Implementation and continuation of surveys and pilot tests**

Relevant organizations will continue existing research and conduct small-scale pilot tests and state-of-the-art activities. Feedback on results will allow for further deliberation.

#### **3. Regional activities**

The restoration of Kami-Sarobetsu will inevitably be supported by the hard work of locals and other stakeholders. It is therefore necessary to provide mutual support for these efforts at the regional level.

#### **4. Collecting data from basic research and surveys**

Nature restoration and academic research are co-dependent; knowledge accrued from research should be reflected in restoration activities. Therefore, research conducted by universities and other research institutes should be actively supported, in addition to preliminary surveys and monitoring activities implemented by restoration practitioners.

#### **5. Environmental education**

Environmental education geared towards the wise use of natural environments that reflect both the historical perspective from the pioneer age to the present, and the spatial perspective of relationships between humans and the environment is important. It is thus necessary to collect and catalogue historical assets from the pioneer age and information on the natural environment, and make this readily available to people of differing origins and age to deepen understanding.

#### **6. Sustainable development of local industry in balance with nature**

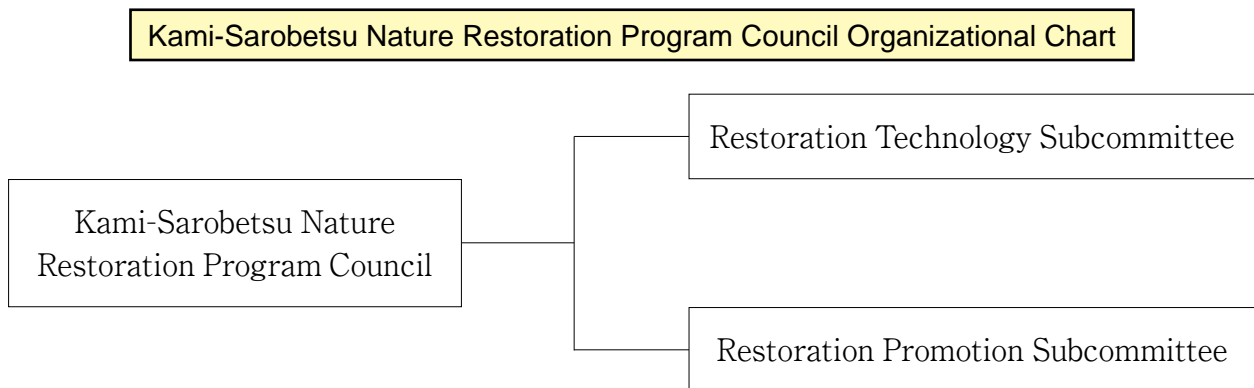
Continued, multi-faceted initiatives to ensure that restoration provides multiple stakeholders with the benefits of nature all while contributing to the local economy is of crucial importance. Thus nature restoration activities should also incorporate measures for the revitalization and advancement of local industry.

#### **7. Local and global perspectives**

Although it is important that nature restoration initiatives should respect and value the uniqueness of the local environment, a more global perspective which highlights the mire's international importance as a lowland high-altitude wetland (as recognized by the Ramsar Convention on Wetlands) and other aspects should also be noted.

## 8. Devising ways to sustain restoration initiatives

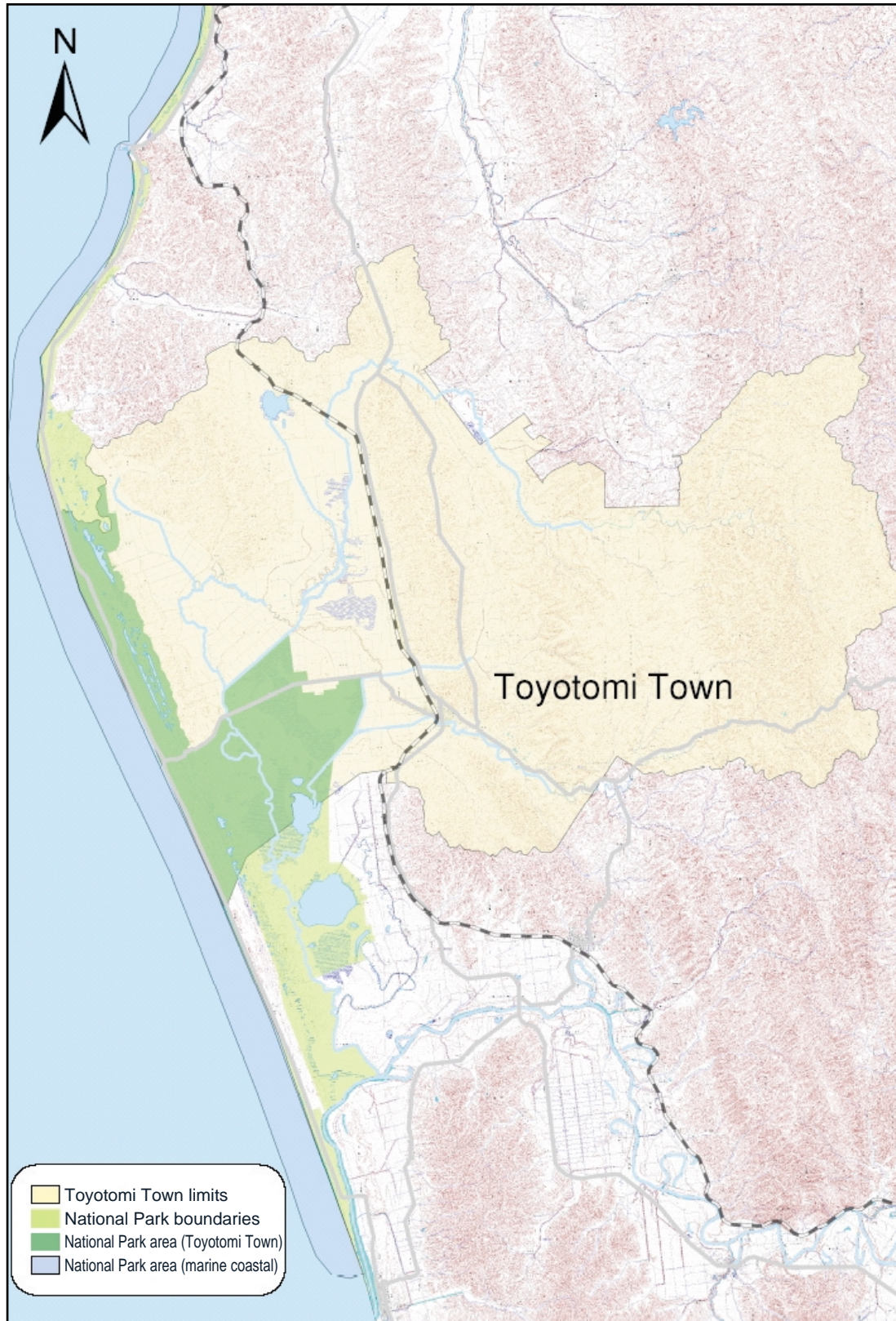
In order to achieve the long-term continuation of restoration initiatives, educational and recreational ways to spark interest and promote enjoyment should be devised, while being mindful of any limitations on the part of stakeholders. For instance, the brand image of Sarobetsu can be developed using environmentally-conscious, locally produced goods. Merging experiential tourism with eco-tourism can also potentially link nature restoration activities with other unique regional regeneration strategies. Finally, the important role that facilities associated with nature restoration play in sustaining restoration activities should not be undermined.





Reference

Map of Kami-Sarobetsu and surrounding areas





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More information on nature restoration may be found at:

<http://www.town.toyotomi.hokkaido.jp/>  
<http://sarobetsu.env.gr.jp/>



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