

Our foundation introduce “Nature and conservation in Lake Izunuma-Uchinuma”.

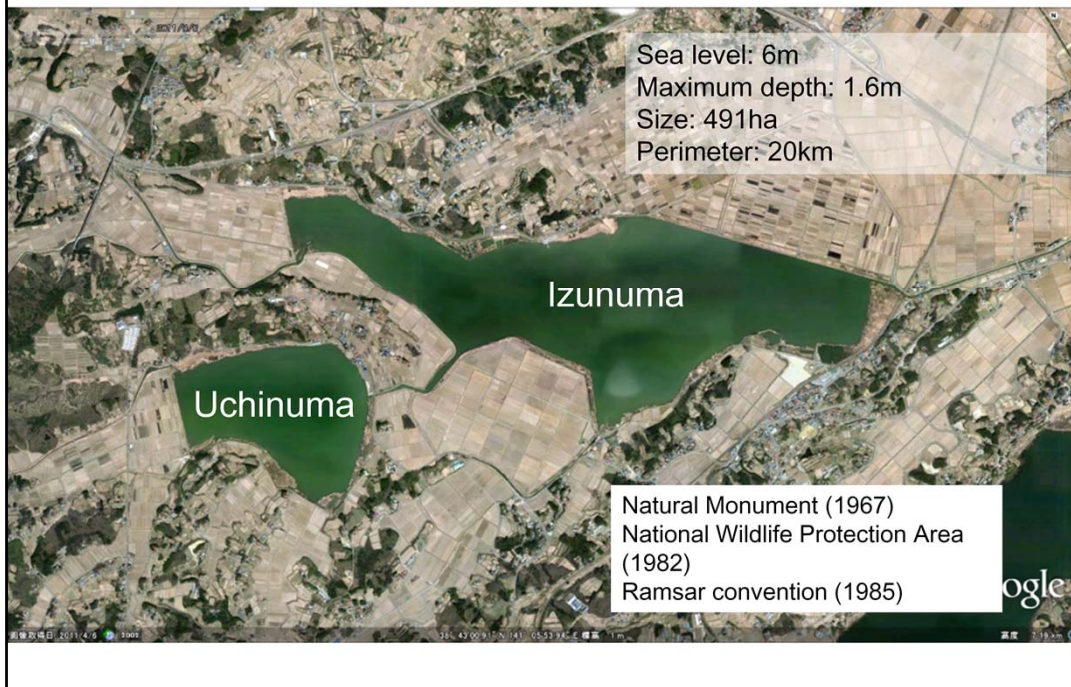
The photo shows morning flight of greater white-fronted geese. The geese leave their roosts for foraging at rice fields in the morning. This is one of the most famous scenery in Lake Izunuma-Uchinuma.

Location of Lake Izunuma-Uchinuma



This shows the location of Lake Izunuma-Uchinuma. The lake is at approximately 360 km north of Tokyo and lies by the branch of Kitakamigawa River in Sendai plain. The length of the river route from the lake to the mouth of the river is about 60km .

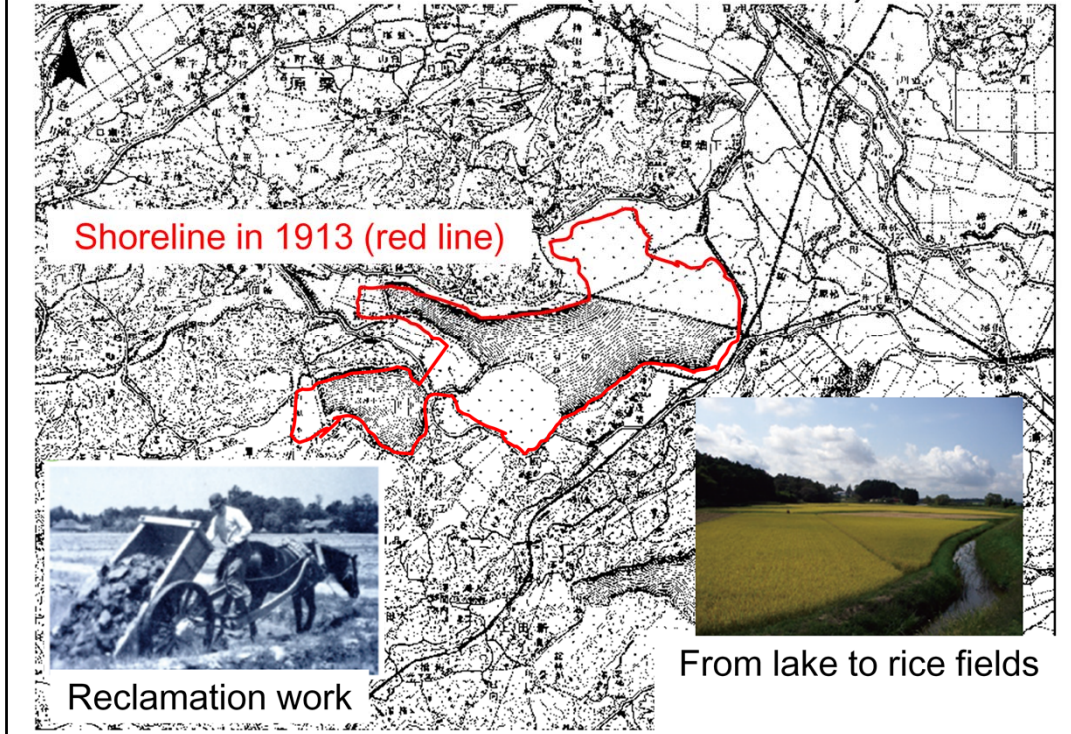
Lake Izunuma-Uchinuma



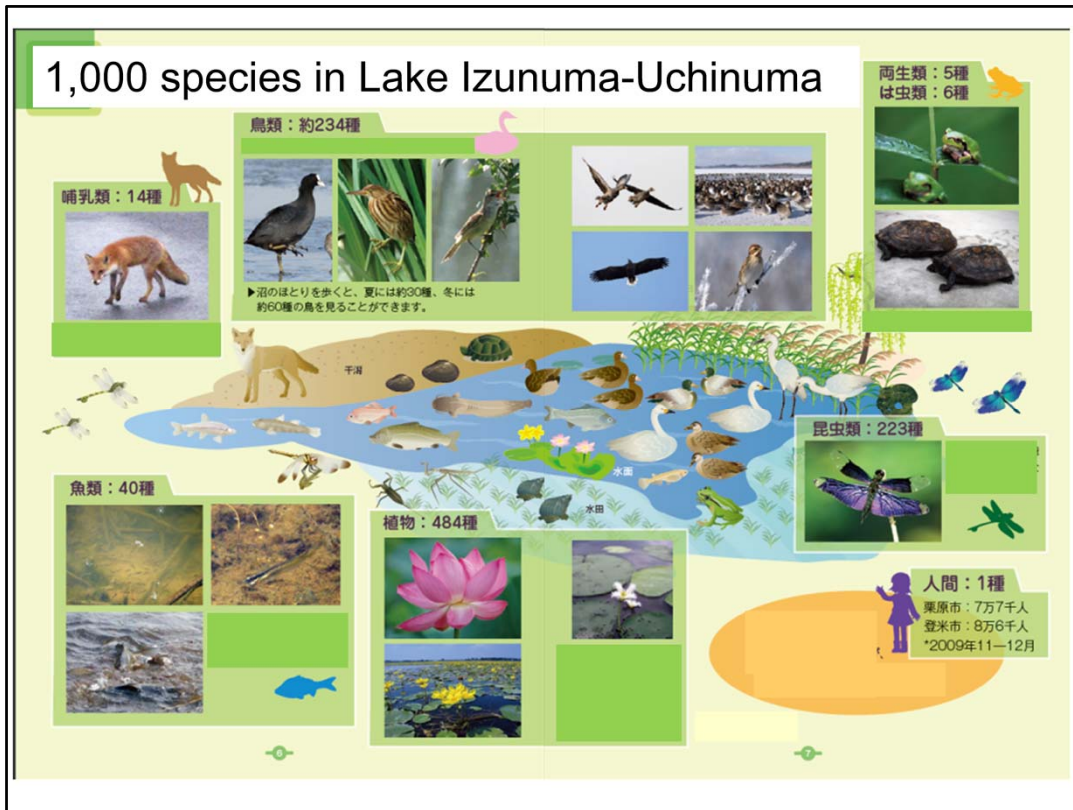
Lake Izunuma-Uchinuma is a very shallow lake surrounded by rice fields. Its maximum depth is 1.6m, the size, 491 ha, and the perimeter, 20 km. One of its important geographical features is its sea level as low as 6m. Such low sea level has resulted in considerably slow water flow, which in turn caused frequent flooding events to date.

Lake Izunuma-Uchinuma is protected by several laws and a convention; Natural Monument, National Wildlife Protection Area and the Ramsar Convention.

Reclamation (1927-1964)



Historically, major change of Lake Izunuma-Uchinuma occurred during 1927 to 1964 due to reclamation. Reclamation was conducted not only in the lake but also in many wetlands in Japan to increase food production in relation to population increase. During this period, many wetlands were lost in Japan. Red line shows the shoreline in 1913. Size of the lake was decreased by 50% from 1913 to 1965. A part of the lake was converted to rice fields by reclamation.



Lake Izunuma-Uchinuma have high biodiversity; mammals, birds, insects, plants, and so on. The total number of species inhabiting in and around the lake is about 1000.

Birds



Northern Pintail



Greater White-fronted Goose



Grey Heron



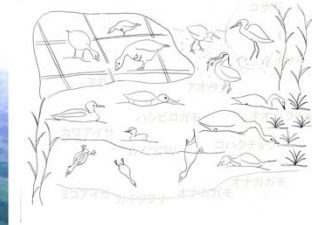
Great Egret



Smew



Common Merganser



Little Grebe



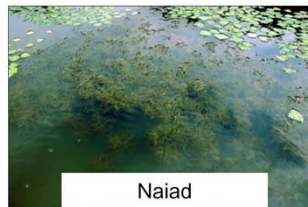
Mallard



Whooper Swan

The lake is particularly famous for geese in winter. We have recorded 235 bird species in the lake. Water birds such as geese, ducks, swans, and herons are abundant. The most abundant species is the greater white-fronted geese. Its population around the lake is 170,000 and occupies more than 90% of the whole population in Japan.

Plants



The number of plant species is 484. Aquatic plants are abundant in open water and reed is distributed in surrounding land area. Fringed water-lily and floating heart are endangered species and both are observed in open water where there is no lotus community. Lotus is increasing year by year and it occupied 75 % of the water area in 2012.

Fish



Small scale bitterling



Northern bitterling



Chestnut goby



Dwarf topmouth minnow



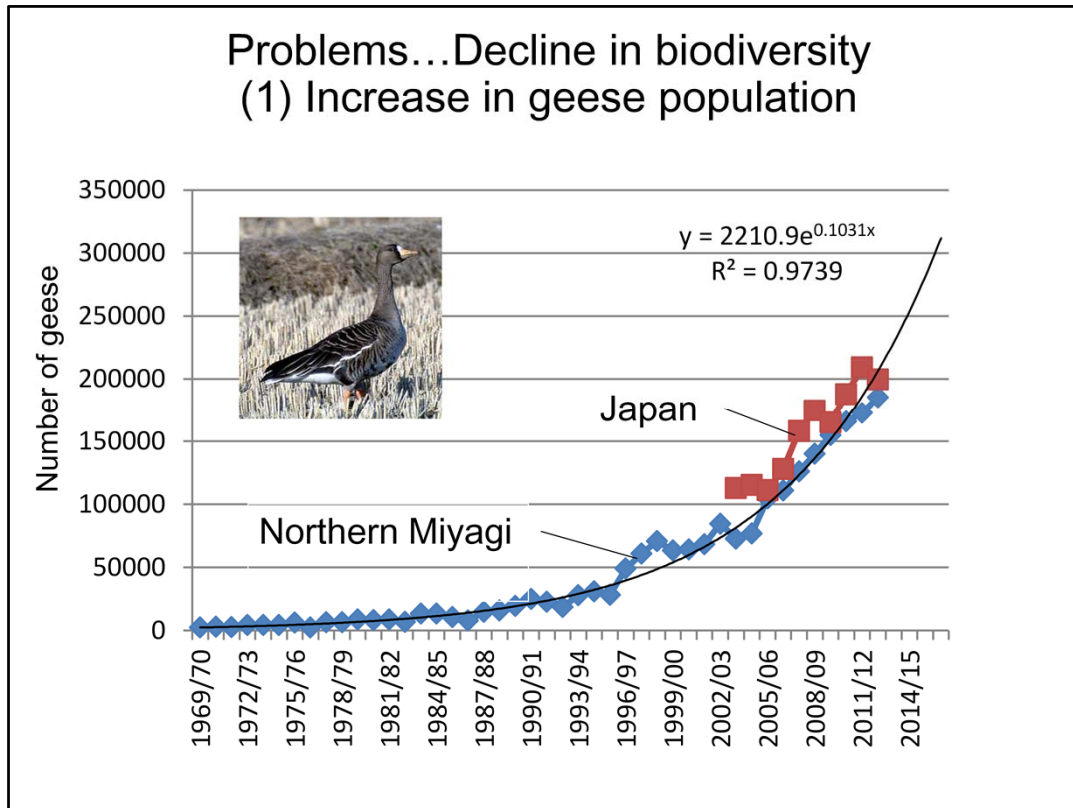
Silber crucian carp



Japanese eel

Forty fish species were recorded in the lake. Freshwater fish such as carp and crucian carp are abundant. Izunuma used to be one of the largest habitats for the small scale bitterling, an endemic species in Japan. However, the fish has gone extinct from the lake due to predation by the large-mouth bass.

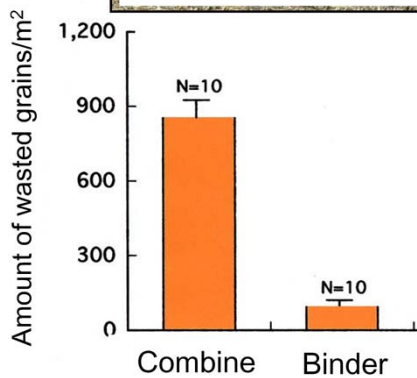
Problems...Decline in biodiversity (1) Increase in geese population



Lake Izunuma-Uchinuma has two major environmental concerns, that is, decline in biodiversity and eutrophication.

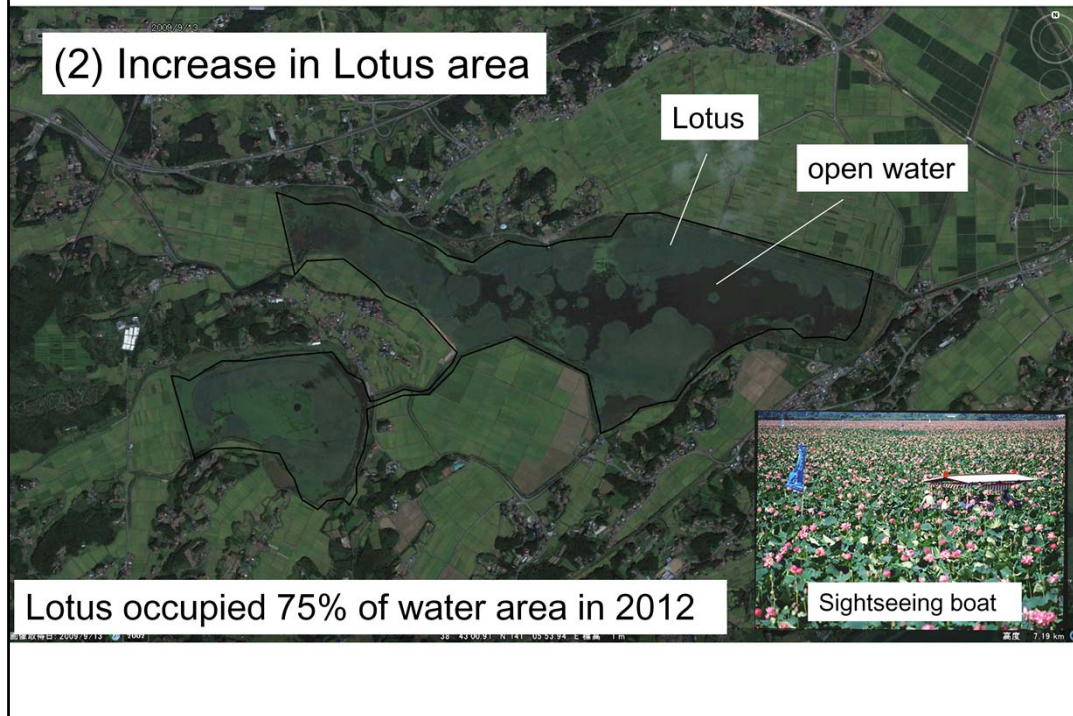
The former is represented by three issues. One of the issues involves the greater white-fronted geese that winter around northern Miyagi area including the lake. This figure shows fluctuation of the geese population. The number of geese in northern Miyagi are exponentially increasing now. The geese population in northern Miyagi occupies more than 90% of the whole population in Japan and they are of importance for tourist attractions. However, the increase in abundance of only one species would lead to decline in biodiversity.

Shift from the binder to the combine in light of farming modernization



These are the background factors for the increase in the greater white-fronted geese population. The geese forage on wasted rice grain left on rice fields after harvesting. There are two types of harvesting machines, that is, combine and binder machine. The combine machine conducts cutting of rice and threshing simultaneously, while the binder machine conducts only the cutting and rice is dried up naturally on the poles. When comparing the amount of wasted grains left between rice fields that had been harvested by the combine and those harvested by the binder, the former had larger amount than the latter. Since 1960s, farming modernization has proceeded in Japan. By farming modernization, one piece of rice field was extended and drainage system was improved. As a result, type of harvesting machine used shifted from the binder to the combine and such replacement has resulted in increased wasted grains, which is food for the geese.

Decline in biodiversity



Second issue is expansion of area inhabited by the lotus.

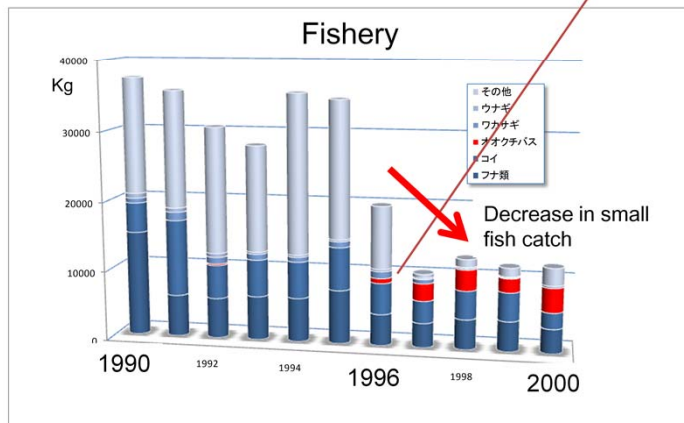
Historically, lotus has once disappeared in 1998 due to flooding. However, after that, lotus has been increasing year by year, and 75% of water area was occupied by lotus in 2012. While lotus is important for tourist attractions, dominance by the lotus has brought not only eutrophication but also extermination of aquatic plants such as fringed water-lily.

Decline in biodiversity

(3) Increase in large-mouth bass population (invasive species)



Large-mouth Bass
Micropterus salmoides



Dwarf topmouth minnow



Small scale bitterling

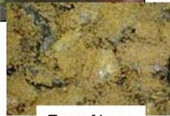
Finally, the third issue with regard to decreasing biodiversity is an increase in abundance of large-mouth bass which is an invasive species.

This figure describes fishery at Lake Izunuma-Uchinuma. The number of large-mouth bass fished has increased since 1996, while the total fishery yield has decreased rapidly. Especially, small fish such as minnow and bitterling largely decreased in numbers due to predation by large-mouth bass. The large-mouth bass is the most influential species regarding biodiversity of the lake.

Elimination of large-mouth bass



Artificial spawning bed



Egg of bass

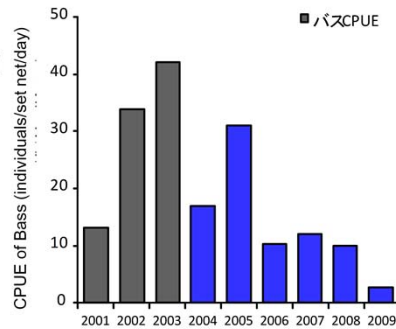


Captured adult bass by net

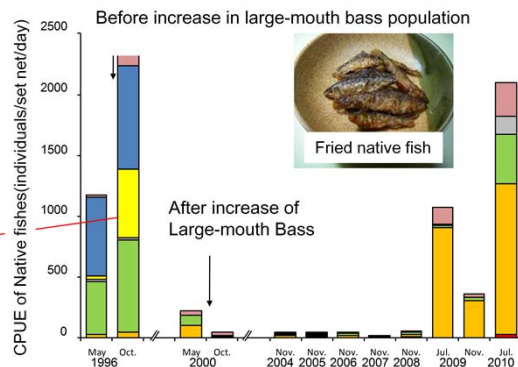
Elimination of eggs and adults protected nest by artificial spawning bed. Active of voluntary group called by “Bass Busters”.

We have been making efforts to eliminate large-mouth bass since 2003. We focus our efforts on breeding stage of the bass. An artificial spawning bed of 1m covered with small stones was developed to attract the bass. Four hundred beds are set on sandy bottom of the lake where it is used as the natural breeding area by the bass. The bass spawns on the bed and the adults protect the eggs. The number of eggs ranges from 20,000 to 30,000 per bed. The artificial bed traps the eggs. The adults protecting eggs are captured by nets set around the bed. These activities are conducted voluntarily by a group called by “Bass Busters”.

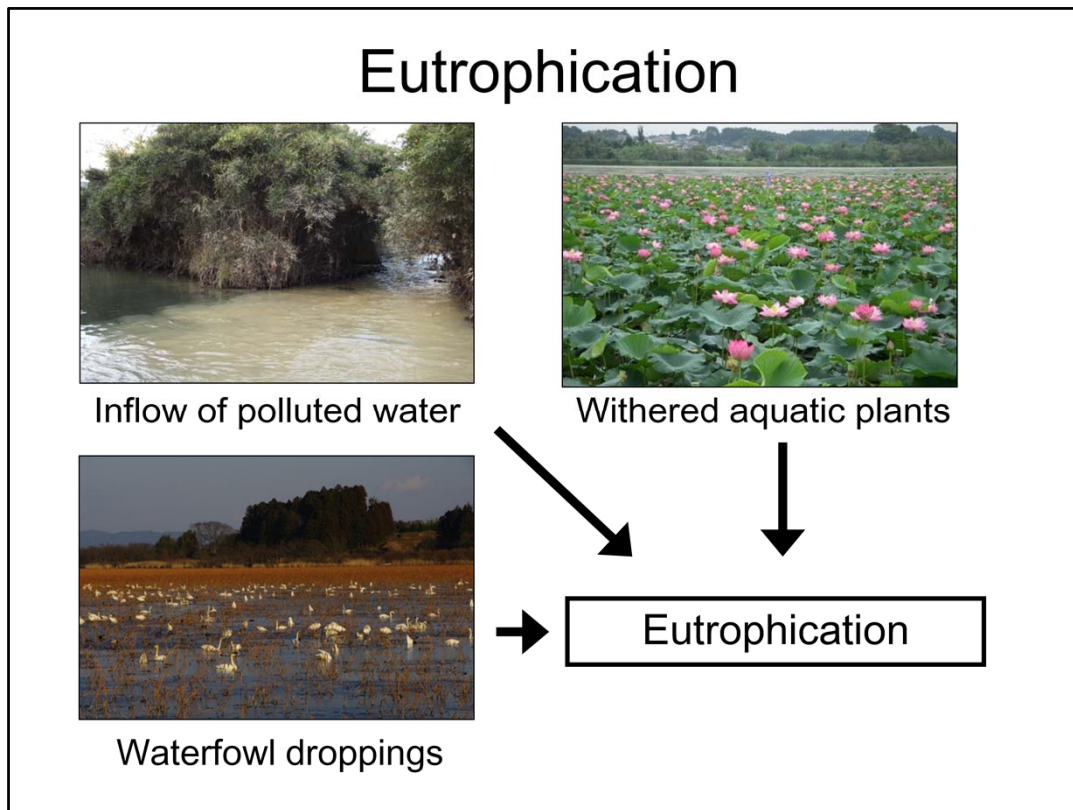
Decrease in large-mouth bass population



Increase in native fish population



Electric shocker is also used. The boat gives fish an electric shock of about 500V by two arms which do not kill the fish. We collect only the bass among all the floating fish. As a result of many efforts made for elimination of the large-mouth bass, the number of bass is decreasing year by year. However, although the bass abundance began to decrease from 2004, the number of native fish did not recover until 2009 when it started to increase rapidly. Fried native fish, a traditional local food around the lake, is now being sold again.



Another environmental concern at Lake Izunuma-Uchinuma is eutrophication. Three factors are considered as a source of eutrophication.

One is inflow of polluted water which consists of domestic and agricultural wastewater. Recently, because of improvement of drainage system and decrease in use of agricultural fertilizer and chemicals, inflow of polluted water has decreased than before.

Next is accumulation of dead aquatic plants in the lake. Especially, lotus is the largest in size among other aquatic plants and many dead lotuses are contained in mud at the bottom of the lake.

The final factor is waterfowl droppings. A total of 80,000 wintering geese, ducks and swans roost in the lake every day. It seems that waterfowl droppings cannot be ignored as a contributing factor to eutrophication of the lake.

Management of vegetation



Fire pan



Reaping of Lotus



Lotus paper



Reaping of Reed

Decrease in
nutrients

We have been taking some conservation actions to prevent eutrophication of the lake. We collaboratively conduct fire pan on the bank and reaping of the reed and lotus with farmers and fishermen. Reaped reed and lotus are used as a part of organic fertilizer, and some reaped lotus is used as materials for paper. We also make suggestions to local governments about improvement of the drainage system for domestic and agricultural wastewater.

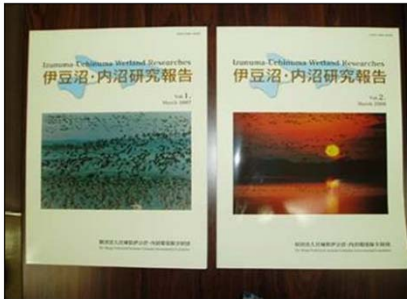
Education



Planting of Indian rice *Zizania latifolia*



Cleanup activity



Publication of journals



Research Meeting

These are education programs. Indian rice is one of the important aquatic plants in the lake, and we planted them with the elementary school students. This is a cleanup activity done by the volunteers. More than 1,000 people clean around the lake two times a year. Research works such as publication of journals and research meetings are also being conducted.

Nature observation



Spring

Summer

Seasonal nature observations are conducted every month. The contents of the observations in spring and summer are aquatic animals and plants, and insects, respectively. Targeted participants are families.

In spring, participants scoop aquatic animals and plants out of a pond by nets and collect them in the glass cases. Then, their species name and ecology are explained by the experts. In summer, participants collect insects; butterflies, dragonflies, and so on, by using the nets. Then, they make specimen of the insects by themselves.

Nature observation

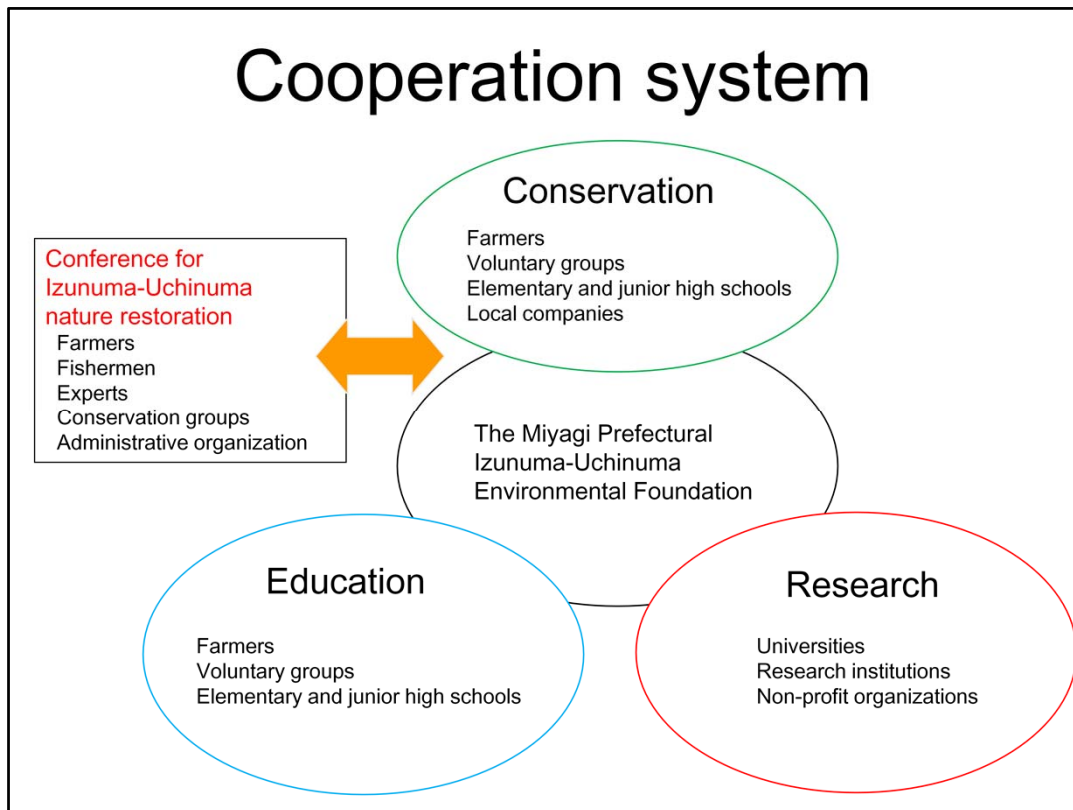


Autumn

Winter

Also, the contents of the nature observation in autumn are fishery and experiencing fish catching in a way like fishermen do. Content in winter observation is geese watching.

In autumn, participants go out to the lake on boat and catch fish by a traditional fishermen net. In winter, the morning flight of geese is observed. There are two Ramsar sites; Lake Kabukurinuma and Lake Kejonuma near Lake Izunuma-Uchinuma. After breakfast, we go out on bird watching at these two sites by bus.



This shows a cooperation system. Our foundation was established in 1988. Now, we have four regular staffs including two researchers specialized in ornithology and fishery science, as well as five non-regular staffs. Our foundation has three works, that is, conservation, research, and education and works are done with cooperation of many local people, voluntary groups, researcher s etc. At the conference on Izunuma-Uchinuma nature restoration, various agenda for Izunuma-Uchinuma were discussed. Financial supports are given mainly from the Miyagi Prefectural government, and we are now trying to get financial supports from the private enterprise.