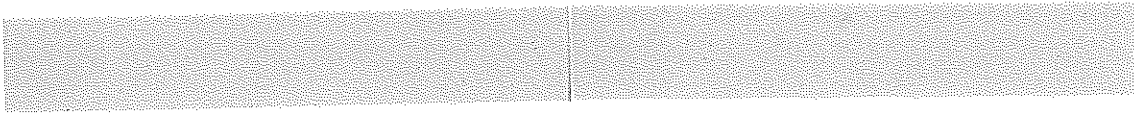


## Multiple endeavors for raising public awareness and partnership in Lake Kasumigaura basin after 6<sup>th</sup> World Lake Conference 1995 for the conservation of lake environments

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### Abstract

Lake Kasumigaura, the 2<sup>nd</sup> largest lake after Lake Biwa in Japan, is crucial as a stable water resource for local citizens and the Tokyo Metropolitan area. However, environmental problems, i.e. water quality, biodiversity etc. are still an urgent matter, due to high development in the catchment area including reclamation of wetlands, dyke construction, deforestation, non-point source increments and rapid urbanization.

Since the 6<sup>th</sup> World Lake Conference (WLC)1995 held on the Kasumigaura lakeside, near Kasumigaura, Tsuchiura and Tsukuba Cities, Ibaraki prefecture, as an embodiment of the Kasumigaura Declaration, the local citizens, researchers, industries and administration, formed a partnership to tackle the environmental problems involved, with an aim to improve the water quality and raise public awareness.

The Lake Kasumigaura Citizens' Association has enacted multiple projects including a water festival aiming to restore a swimmable Lake Kasumigaura, a summer-school for children, citizen-participation of wholesale monitoring of 56 inflowing rivers for water quality, a monthly examination of lake water and plankton, the preservation of bitterling fishes, reforestation of oak woods, a publication of a standard children's textbook on the lake, an annual scientific report and monthly news letter, a knowledge certification examination on the lake, nature observation meetings, and seminars about the lake environmental problems and so on.

The Ibaraki prefectural government established the Lake Kasumigaura Environmental Science Center in 2005 which was started to not only conduct lake water research and reduce various loads on the lake water but also to support environmental education for local school children and residents while fostering communication among the various sectors. The Ibaraki-Kasumigaura Prize encouraged the participation of promising young researchers from developing countries to the WLC and offered them a chance to present the fruits of their studies. This formed a truly substantial contribution from Ibaraki prefecture to international society and

improvement on world lake environmental problems. Thus the WLC in Kasumigaura 1995 planted a seed of public awareness and partnership which became a leafy fruitful tree.

**Key words:** citizen activities, monitoring, public awareness, partnership, , stakeholders

## Introduction

Lake Kasumigaura is a representative maritime lagoon lake located in Ibaraki Prefecture, Kanto basin, Japan. It is a typical wide and shallow lake (max.depth:7m, mean depth:4m, surface area:220km<sup>2</sup>, volume:0.85 billion m<sup>3</sup>, mean chloride ion:40mg/l, electro-conductivity:260  $\mu$  S/cm, mean transparency:60cm). It has 2157 km<sup>2</sup> of catchment area and 56 inflowing rivers. The water quality has deteriorated due to rapid eutrophication and desalination. Desalinated water due to the construction of a sea water barrier (Hitachigawa Water Gate, 1963), now provides a vital water resource utilized as agricultural irrigation water, industrial water and drinking water for the Ibaraki Prefecture and Tokyo metropolitan area. At the same time, the littoral zone is mostly reclaimed and a concrete dyke is constructed along most of the shore line. The lake has been completely enclosed by a dyke for the last four decades(Numazawa et al.2003, 2007a)

Recent values in water quality are approximately 7~8mg/l in COD (KMnO<sub>4</sub>), 0.1mg/l in total phosphorus, 1.0mg/l in total nitrogen. Water quality improvement is one of the important matters to be addressed not only by local residents using the lake water as tap water and industrial water but also by local or national government and the people who live in the Tokyo Metropolitan area.

However, once the water quality deteriorates in a big lake, improvement becomes a very difficult problem. Though many countermeasures and a large budget has been utilized on this issue based on the statutes against eutrophication or pollution of the lake water over the last four decades by national and prefectural government, the water quality has remained at the eutrophicated level.

The 6<sup>th</sup> World Lake Conference was successfully held in 1995 at Tsukuba Science City and Tsuchiura City near Lake Kasumigaura. Its main theme was "Harmonizing human life with lakes towards the sustainable use of lakes. Participants of 8203 person including 421 foreigners from 75 countries took part. Through active discussion in the conference, the current situation and urgent problems of lakes became clear and the importance of international cooperation among stakeholders concerned with conservation of lake environments was recognized. On the last day of the conference the "Kasumigaura 95 Declaration" was adopted as an action guide for the 21st century.

## Kasumigaura 95 Declaration

Preamble;

We, the participants of the 6<sup>th</sup> International Conference on the Conservation and Management of Lakes, and comprising citizens from many countries throughout the world and from all countries;

ACKNOWLEDGING that water is the basis of all life and that lakes and reservoirs, as an integral component of our planet's life-support system, essential for the maintenance of human life and represent resources and assets of enormous economic, cultural aesthetic and recreational importance;

NOTING that lakes are subject to many demands, to significant loss of biodiversity, and to increasing degrees of pollution and degradation, and that all such events are accelerating because of rising human pressures;

RECOGNIZING that the major issue for the management and conservation of lakes include those of regional and global, and current and future significance;

AND RESPONDING to the advice and comments of participants at the conference, MAKE THE FOLLOWING DECLARATIONS;

(omission in detail)

- I Declaration on Population and Biodiversity
- II Declaration on the Environmental Impact of Development Project
- III Declaration on Knowledge and Technology Transfer
- IV Declaration on Partnership
- V Declaration on Education
- VI Declaration on Integrated Catchment Management
- VII Concluding Declaration on Common Understanding

The last declaration said "we ask you all to listen to the sound of lakes, to the voices of the people, especially the women and children; to the wisdom of science; and learn from past lessons so as to avoid future mistakes, gain vision for the future, and thus achieve everlasting sustainability"

We, the citizens of Lake Kasumigaura basin, including researchers, industries and administration have launched the following vigorous activities aiming at the embodiment of the spirit of the declaration.

### Lake Kasumigaura Citizens' Festival towards restoration of swimmable lake water

Every summer for the last 16 years, we, the Kasumigaura citizens have the annual Lake Kasumigaura Festival. This festival was first held in 1995 as part of 6<sup>th</sup> World

Lake Conference on Kasumigaura lake side. In the 16 years that have passed, we Kasumigaura citizens have continued the festival to raise public awareness and keep the embodiment of the spirit of Lake Kasumigaura Declarations of the World Lake Conference alive.

In the Festival, about 3000 people of all ages enjoy various events, for instance yachting, boating, music live concerts, dancing, quiz rallies on Lake Kasumigaura, summer schools for children and so on. In particular, a very popular attraction is the food corner with Lake Kasumigaura products, such as fried fish and lotus root dishes.

There are various methods to raise public awareness towards the lake situation. Of these, the festival is one of the most effective and successful ways for ordinary people, children and young families. They enjoy the waterscape, touching the lake water and understanding the current situation of the lake water quality and living organisms. About 40 years ago, there were many sandy bathing beaches on Lake Kasumigaura, but they all closed due to water quality deterioration. Nowadays people have forgotten the fun memories of swimming in the lake, but we Kasumigaura citizens look forward to regaining a swimmable lake and continue the multiple endeavors of citizen activity.

#### **Official approval test for the knowledge on Lake Kasumigaura**

Three years ago, Kasumigaura Citizens' Association launched a new project named "Lake Kasumigaura Approval Test". This approval test is a certification examination to test how widely and deeply examinees understand the Lake Kasumigaura's environmental problems, including the history, culture, ethnology, fisheries, water transport, water control, water utilization, water quality, water organisms, limnology, geology, geography, legislation, governmental measures and so on.

The examinees challenge four levels of questions in paper and oral tests, 4<sup>th</sup> grade, 3<sup>rd</sup> grade, 2<sup>nd</sup> grade and prime grade. A certified prime grader is offered a post as a lecturer on Lake Kasumigaura, who can play an active part in environmental education for school children or lifelong education classes for senior citizens.

One of the 4<sup>th</sup> grade questions is as follows.

What is Lake Kasumigaura water mostly abundantly used for?

Answer a: drinking water    Answer b: industrial water    Answer c: irrigation water

The correct answer is c. Examinees have to answer 50 such questions. The pass mark is over 70 points out of 100 points.

This autumn we will hold the third approval test. The number of challengers is about 90. The ratio of successful applicant differs, depends on the grade. In the case of the 2<sup>nd</sup> grade, about 30% of the challengers are successful. People of all ages participate in this

approval test from primary school children to senior citizens.

The substantial cost for the approval test is fortunately covered by a grant from The Nippon Foundation.

### **Wholesale water quality monitoring by citizens and administration using a simple test carried out in all rivers inflowing into Lake Kasumigaura**

Water quality monitoring is essential for improvement of the lake water and inflowing river water. After the 6<sup>th</sup> World Lake Conference, the Ibaraki prefectural government launched a scheme to help water quality monitoring exercises by citizens and school children(Numazawa et al.1997, 1999, 2007b). Now, these water quality monitoring exercises have spread over the whole watershed of Lake Kasumigaura and provide numerous valuable data for analysis as well as raising the awareness of local residents including the young generation to become familiar with the water environment.

For the last 10 years, every June and October, over 300 persons have participated in these monitoring exercises at about 280 points in 56 inflowing rivers. The exercises are supported by the Council to Resolve Pollution Problems of Lake Kasumigaura, local municipality governments, the Ministry of Land, Infrastructure & Transport and the Kasumigaura Citizens' Association.

Through such activities, the citizens and younger generation including primary school children, junior and senior high school students have raised their interest in the water environment, learned scientifically the mechanism of water pollution and ecosystems.

### **Unique lake water quality monitoring by citizens**

In Lake Kasumigaura, the lake water quality has been monitored by professional researchers from Ibaraki prefectural government and the National Institute of Environmental Science for over 30 years. In addition, after the 6<sup>th</sup> World Lake Conference, the members of Kasumigaura Citizens' Association launched their own monitoring activities by hiring a research boat(Numazawa 2005). They have continued this monthly water quality monitoring for 10 years. The data gained includes transparency, electro-conductivity, chloride ion concentration, suspended solids, dissolved oxygen, chemical oxygen demand, phosphate phosphorus, ammonium nitrogen, nitrite nitrogen, nitrate nitrogen, phytoplankton and zooplankton are available on our website and recorded in an annual report. Thanks to such activities, the participating citizens realize not only the current lake water quality situation but

also enjoy the splendid off-shore waterscape of Lake Kasumigaura from a research boat.

#### **Reforestation of oak wood for multiple aims**

The Lake Kasumigaura watershed is used mostly as farmland, orchards and urbanized areas. Such land use emits a considerable pollution load on the lake water. The forestation rate around the Lake Kasumigaura catchment area is only about 20%. Obviously, forest is very important as the source of clean lake water. After the 6<sup>th</sup> World Lake Conference, the Kasumigaura Citizens' Association members launched voluntarily planting of about one thousand oak trees in the 0.3 hectare private land where a land owner permitted reforestation. After 15 years, the tiny oak trees have grown satisfactorily and become a wonderful forest. During the process, the members have continued to manage appropriately the planted trees with the advice of forestry researchers. Nowadays they hold insect observation meetings, guided by entomologists for the school children. Japanese children are very fond of insects like brilliant beetles, beautiful butterflies, noisy cicadas and magnificent dragonflies. Reforestation is very significant not only for the restoration of the lake water resource but also to provide a good field for environmental education for the next generation.

#### **Special cruises for children to learn the importance of lake water and lake environment**

Learning about the lake environment while riding on a cruise boat is a very special experience, especially for school children. Since 2008, the Ibaraki prefectural government launched a new educational project, the cost of which was covered by new earmarked tax for the conservation of forest and water environment.

About 30 pupils per one class took part and spent one hour on a sightseeing boat. After an explanation providing a basic knowledge on Lake Kasumigaura, for instance its geological shape, width, average depth, water utilization, eutrophication, household wastewater as pollutant load to lake water etc., the children have a unique experience of measuring water transparency, COD values using a simple test, collecting plankton and observing them microscopically. Through these activities, they are able to understand the actual current situation of the lake water.

Last year, a total of 7,429 school children and school teachers separated into 231 classes participated in these unique lessons. They were very pleased with these special lessons and enjoyed the excellent waterscape of a wide lake. Environmental education is essential for raising "Lake Kasumigaura conscious citizens" from the younger generation. This project sets a good example for them.

### **Promising Lake Kasumigaura Environmental Science Center**

The Kasumigaura 1995 Declaration Part III recommended that an international consortium of lakes and limnological research centers and institutes be established to ensure optimum transfer of appropriate technology from one region to another and between sectors of society. Accepting this recommendation, the Ibaraki prefectural governor Mr. Masaru Hashimoto proposed the new research center for the improvement of Lake Kasumigaura environmental problems. The Ibaraki prefectural government established the Lake Kasumigaura Environmental Science Center in 2005 as an embodiment of the Kasumigaura Declaration and the governor's proposal. The institute has four functions i.e. research and technology development, environmental education, partnership and support for citizen activities, and exchange of information between social sectors. Each aims at the most effective performance for partnership among the four public sectors i.e. citizens, researchers, industries and administration. Six years after its establishment, the center has grown up to be not only an important and firm base for citizen activities and information exchange but also as the leading research center for limnology in Japan. Projects include investigation into various fields, i.e. water quality, sediment analysis, plankton analysis, diminution of pollution load through catchment area management and so on.

### **Ibaraki Kasumigaura Prize as a substantial contribution to international society**

Resulting from the 6<sup>th</sup> World Lake Conference, Ibaraki prefecture set up the Ibaraki Kasumigaura prize for excellent researchers from developing countries to aid their presentations at following World Lake Conferences. Before this conference held in Austin, Texas, a total of 97 researchers have been awarded prizes. In detail, 29 researchers from 9 groups from 7 countries at the 7<sup>th</sup> conference in Argentina, 20 researchers from 9 groups from 9 countries at the 8<sup>th</sup> conference in Denmark, 10 researchers from 7 groups from 7 countries at the 10<sup>th</sup> conference in Chicago, USA, 18 researchers from 10 groups from 8 countries at 11<sup>th</sup> conference in Kenya, 13 researchers from 5 groups from 5 countries at 12<sup>th</sup> conference in India, 12 researchers from 4 groups from 4 countries at 13<sup>th</sup> conference in China. The prize winners came from Hungary, the Philippines, Argentina, Pakistan, Russia, Zambia, Lithuania, Ukraine, India, China, Estonia, Tanzania, Brazil, Egypt, Kenya, Bhutan, Indonesia, Uganda, Macedonia, Nepal, Thailand, Sri Lanka, Armenia, Nigeria, Zimbabwe, Turkey and Mexico. They have developed successfully into established researchers in each country. The Ibaraki Kasumigaura Prize performed a truly substantial contribution from Ibaraki prefecture,

Japan to international society for improvement on world lake environmental problems through supporting promising young researchers from developing countries.

#### **Further multiple endeavors toward lake water quality improvement**

The present water quality of Lake Kasumigaura has remained at a eutrophicated level, despite the various activities by citizens and administration. A very offensive massive bloom of *Microcystis* set in during the hot summer. We recognized again that once water quality deteriorated in a big lake, improvement becomes a very hard task. However, the transparency from time to time became slightly higher in the winter and early summer and spring blooms of diatoms, in particular, *Synedra* appeared periodically, promoting wishful thoughts of lake water quality improvement. We will continue our efforts towards the recovery of swimmable lake water, while responding to global warming and climate change (Numazawa et al. 2009).

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