

# **Approaches Toward Better Lake Water Environment in Japan with Reference to the Concept of Integrated Lake Basin Management (ILBM)**

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## **Abstract**

Integrated Lake Basin Management (ILBM) is recently introduced concept for the sustainable management of lakes and their basins. Various measures and policies implemented on the lakes in Japan was not entirely composed according to this sort of concept, however, in practice those measures correspond with the concept of ILBM. This paper aims to review the correspondence by taking up Lake Biwa as an example because of the comprehensiveness and the diversity of the measures and activities on it.

## **Introduction**

Lakes and reservoirs are very important property for people's life, industrial activities and so on. They provide various benefits to us, such as securing water resources for drinking, agriculture and industrial use, fishery resource, flood control functions and ecosystem integrities. However, because of the closed nature of lakes' water system, pollution tends to accumulate therein, and once water is polluted, it is difficult to improve the water quality. In addition, the situation is that a remarkable improving tendency of the water quality of lakes is not seen due to the increase of the pollutant load by the economic change and the increase of the population as well as the change in the lake environment, etc.

This paper takes up Lake Biwa because it is the biggest lake in Japan and holds metropolis, therefore, it has the flood control function as well as the role of the water reservoir for the 14 million people. This importance of Lake Biwa has concentrated various measures and policies around it ranging laws to citizens' participation, and those measures in the watershed have been implemented in a sort of integrated and systematic manner, which Integrated Lake Basin Management (ILBM) is going to promote. This paper tries to review those measures and policies with reference to the concept of ILBM.

## **The concept of ILBM approach**

ILBM is a concept which has been discussed in recent meetings of World Lake Conference held in Kenya (2005) and India (2007). "ILBM is a conceptual framework for assisting lake basin managers and stakeholders in achieving sustainable management of lakes and their basins." (How Can We Stop Degradation of the World's Lake Environments?: ILEC, 2007) The concept of ILBM consists of several pillars, that is, institutions, participation, policies, technology, information and finance. The measures and policies being implemented on Lake Biwa seem to be corresponding to those ILBM elements. The following parts are the review of the measures and policies according to these pillars of ILBM.

## **Institutions**

In the governance aspect, many governmental bodies are involved, i.e. some prefectural governments, municipal governments and ministries of the central government, that is, the

Environment, Land and Infrastructure, Agriculture and Forestry, and Health and Welfare. To facilitate the coordination among these many organizations, a coordination council was established with the aim of strengthening partnerships among members and facilitating implementation of Lake Biwa preservation programs.

### **Policies**

Both of the central and the prefectural government make policies for the lake environment preservation, mainly by establishing laws/ordinances, standards and zoning etc. The central government enacts the Water Pollution Control Law and the Law on Measures for Lake Water Quality Conservation and establishes standards on water quality of the effluent from factories and other commercial facilities, while prefectural government enacts ordinances for the specific aspect such as reed area conservation and prevention of the eutrophication in Lake Biwa.

### **The Law concerning Special Measures for Preservation of Lake Water Quality (reference)**

The main points of the law are as follows:

- a. The government establishes and publishes the basic policy to preserve the water quality of lakes and reservoirs throughout the nation.
- b. The Minister of the environment, at the request of the prefectural Governors, designates lakes in which the need of comprehensive measures to meet the Environmental Quality Standards
- c. Prefectural Governors establish plans for the preservation of lake water quality (the Water Quality Preservation Plan for Lakes), in keeping with both the natural and social conditions in the watershed areas.
- d. Measures are carried out to preserve the water quality of designated lakes in accordance with the Water Quality Preservation Plan for Lakes and Reservoirs. These measures include treatment of household wastewater and measures to purify lakes, such as dredging bottom sludge and aeration. And pollution quantity regulation of effluent is applied to the factory and the business place in addition to the pollution concentration regulation based on the Water Pollution Control Law. However, not only the effluent from the factory and household wastewater, the pollutant load from non-pointed sources such as the farmland and the urban areas are the major cause of the water pollution of lakes. Therefore, the clause of comprehensive plan for addressing non-pointed sources was added to the law.

### **Lake Water Quality Preservation Plan (reference)**

The main contents of the Lake Water Quality Preservation Plan are as follows:

- a. The basic policy concerning the preservation of the water quality, the plan period and the target water quality value at the last year of the plan period are shown in the Plan.
- b. The building and maintaining of drainage system, the other household wastewater treatment facilities, the animal manure waste treatment facility, the waste disposal facility, and the purification measures of lakes and reservoirs, and the purification measures of river water, etc. are shown as projects contributing to the preservation of the water quality in the Plan.
- c. The restriction to the pollutant load from the factory drainage, the household wastewater, and a livestock industry, fish culture, and the measures to control the non-pointed-source of pollution, and the conservation of green area and the other natural environment in the vicinity of the lake, etc. are shown as restriction measures for the preservation of the water quality in the Plan.

d. The measurement of water quality in public waters, promotion of the research study, and securing the cooperation with local residents, the adjustment with the related regional plans, and the promotions to the business sector, etc. are shown as concerning necessary measures in the Plan.

**Ordinance for Promotion of Environmentally Friendly Agriculture in Shiga Prefecture (reference)** (note: Lake Biwa is located in Shiga Prefecture)

The Shiga prefectural ordinance for Promotion of Environmentally Friendly Agriculture was enacted in March 2003 for the purpose of fostering sound development for agriculture in Shiga and conservation of Lake Biwa and other natural resources in order to provide consumers with better, safer agricultural products and to ensure harmony between the environment and agricultural production.

**Participation**

In promoting a wide variety of activities and creating extensive networks for Lake Biwa environmental preservation, it is necessary to involve citizens and enterprises as well as governmental agencies.

There was a cue or a trigger. In 1977, the first occurrence of red tide was confirmed, which had a significant impact on the citizens. This motivated them to take action to prevent further eutrophication. Increasing numbers of people participated in this environmental movement, resulting in a prefecture-wide campaign to stop using synthetic household detergents containing phosphorus. Driven by this campaign, Shiga prefectural government enacted an ordinance to control nitrogen and phosphorus in the waste water by imposing some measures including banning the marketing, use, and gifting of phosphorus-containing synthetic detergent.

Another incident is the diffusion of the introduced non-native fish species such as large-mouth bass and bluegill sunfish. Because of this, endemic fish species are rapidly declining. This issue raised public awareness on the environment in Lake Biwa and some measures have been introduced to eradicate introduced species, or at least control their reproduction, e.g. the prefecture enacted a fishing regulation which prohibits catch-and-release of large-mouth bass and bluegill sunfish.

One more case of involvement of citizens is promoting eco-friendly agriculture. In the Water Quality Conservation Plan for Lake Biwa, the measure for agricultural areas is stipulated to further promote the environmentally friendly agriculture in which the amount of chemical pesticides and fertilizers is well below conventional practice and consideration is made for maintaining harmony with the environment such as appropriate management of agricultural wastewater.

**Technology**

In the Water Quality Conservation Plan for Lake Biwa, various measures were stipulated to improve the water quality of Lake Biwa. Some of them are listed below.

- Reducing environmental impact of domestic wastewater, by sewage systems, domestic wastewater treatment systems (known as Johkasou in Japanese)
- Purification of rainwater in urban districts, reducing influent load from non-point sources by rainfall filtration and holding capacity in urban area with permeable pavements and roadside trees
- dredging of the sediment contamination on the lake bottom and water purification by

means of vegetation

- agricultural water management systems featuring irrigation water circulation and water recycling systems
- restoration of the lake's original landscape to regain the lakeshore's functions of flood prevention, ecosystem preservation and providing access to the water
- promoting the creation and conservation of reed colonies by designating several areas as reed colony conservation areas which provide ideal nesting and resting places for some 100 wild bird species and spawning habitats for fish
- Restoration of attached lakes directly connected to Lake Biwa by waterways (Many attached lakes have been reclaimed to create paddy fields for increasing food supply, but they had potential to retain and purify pollutants and excessive nutrients.)

### **Information**

There are a couple of facilities around Lake Biwa for promoting information and indigenous knowledge. The Lake Biwa Research Institute is established recently to study various environmental challenges in Lake Biwa and its catchment as well as continuous environmental monitoring. And the Lake Biwa Museum was opened in 1996 to provide opportunities of exchanging and sharing information.

### **Conclusion**

Various approaches toward the better lake water quality have been taken for Lake Biwa. Some of them were systematically organized and some were not, but as a whole, they comprise a sort of integrated approach for the lake management. And with the laws and some coordinating bodies, the cooperation amongst the local residents, the municipalities and the related ministries has been deepened.

These days, peoples' interests in protecting biodiversity, ecosystems, scenery, and historical and cultural heritage have become stronger. Therefore the conservation of a healthy water environment has come to involve the conservation of aquatic life, waterfront areas, etc. as well as the conservation of the water quality/quantity and an environmentally healthy water cycle. The conservation of a healthy water environment remains a critical issue, and hence the measures to addressing water environment problems should be integrated and promoted further.

### **References**

International Lake Environment Committee Foundation (ILEC), "How Can We Stop Degradation of the World's Lake Environments? -- Integrated Lake Basin Management", ILEC, Shiga, Japan (2007).