

# Chapter 4-5

## Changes in Water Quality

### Abstract

While improvements have been observed in the water quality of Lake Biwa from the perspective of items such as transparency, total nitrogen (T-N) and total phosphorous (T-P), with the exception of total phosphorous in the North Basin, the water quality does not meet environmental standards. In addition, COD, an organic pollution index, still shows no signs of reduction. It is believed that this is caused by refractory organic matter, matter resistant to decomposition by micro-organisms.

**Keywords:** Water quality, Environmental standards

### 1. Environmental Standards

Environmental standards are set by entities such as governments based on Basic Environmental Law and define the goals of promotion of the conservation of water quality in lakes, rivers and other bodies of water. Environmental standards are divided into two types: “Environmental Water Quality Standards for Protecting the Human Health” (27 harmful substances such as cadmium. Hereinafter referred to as “Environmental Standards for Health Items”) and “Environmental Water Quality Standards for Protecting the Living Environments” (Hereinafter referred to as “Environmental Standards for Living Environment Items.”).

Environmental Standards for Living Environment Items are classified by environmental standard categories, factoring in considerations such as the status of used water and the potential for meeting standards. The government sets the environmental standard categories for Lake Biwa and substances such as COD were classified

as class AA in 1972, total nitrogen (T-N) and total phosphorous (T-P) as class II in 1982, total zinc (Environmental Standard for Aquatic Organisms Conservation) in 2009 in the North Basin as aquatic organism class A and special organism class B and organism class B and special organism class B in the South Basin.

### 2. State of Compliance with Environmental Standards

In Lake Biwa, four locations each have been set in the North and South Basins for compliance with environmental standards for COD, *etc.*, three locations in the North Basin and one in the South Basin for compliance with environmental standards for total nitrogen and total phosphorous, and seven locations in the North Basin and five locations in the South Basin for compliance with environmental standards for the conservation of aquatic organisms, and each of the water quality at each of these locations is examined once a month by the Shiga Pre-

Standard Value	pH	COD	SS	DO	Coliform count
	6.5 or higher 8.5 or less	1mg/L or less	1mg/L or less	7.5mg/L or higher	50MPN/ 100mL or less
North Basin (4 fixed locations)	34/48 (Standard not met)	2.8 (Standard not met)	35/48 (Standard not met)	48/48 (Achieved)	35/48 (Standard not met)
South Basin (4 fixed locations)	33/48 (Standard not met)	5.3 (Standard not met)	3/48 (Standard not met)	45/48 (Standard not met)	20/48 (Standard not met)

**Table 4-5-1**

State of compliance with environmental standards for life environment items (FY2012)

Standard Value	T-N (mg/L)	T-P (mg/l)
	0.20 or less	0.01 or less
North Basin (3 fixed locations)	0.26 (Standard not met)	0.007 (Achieved)
South Basin (1 fixed locations)	0.30 (Standard not met)	0.014 (Standard not met)

fectural Government.

Observation of the state of compliance with Environmental Standards for Living Environment Items for COD, total nitrogen and total phosphorous from the results of examination of water quality in Lake Biwa in 2012 revealed that, with the exception of total phosphorous in the North Basin, environmental standards had not been met.

It should be noted that all Environmental Standards for Health Items had been met.

### 3. Water Quality of Lake Biwa

Since the massive size of the area of Lake Biwa makes it difficult to gain a detailed picture of the lake's water quality, the Kinki Regional Development Bureau and the Japan Water Agency conduct water quality surveys once a month including locations not targeted for compliance with environmental standards.

From average values obtained from 28 locations in the North Basin and 19 locations in the South Basin during water quality surveys conducted by the Shiga Prefectural Government and these two organizations, seen in terms of changes in the water quality in the North and South Basins over the years, transparency has improved and

trends show a drop in the nutritive salt concentrations of total nitrogen and total phosphorous, indicating that the advance of eutrophication has been blocked.

However, COD, the organic pollutant index, has not decreased. It is believed that one of the causes of this is the effects of "refractive organic matter," organic matter that is resistant to decomposition by microorganisms, and investigations to elucidate the mechanism of this phenomenon are underway.

(Lake Biwa Policy Division,  
Shiga Prefectural Government)

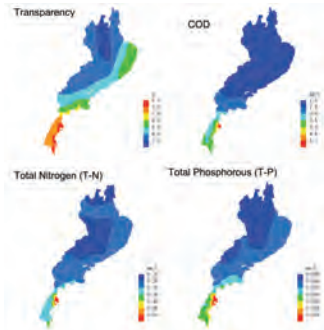


Fig. 4-5-1 Average distribution of transparency, COD, T-N, T-P (FY2013)

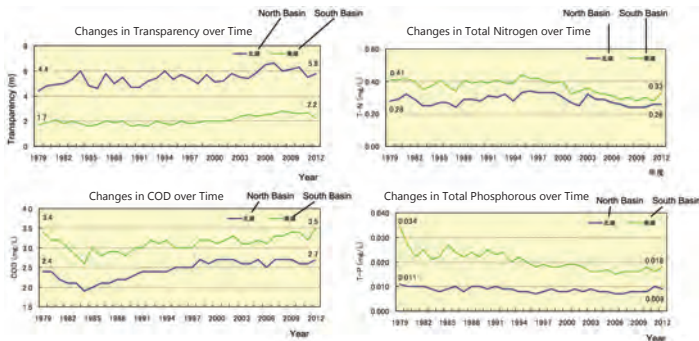


Fig. 4-5-2 Changes in the water quality of Lake Biwa over time

**COD (Chemical Oxygen Demand):** COD refers to the amount of oxygen required for chemical oxidation of organic matter in the water and is used as an index to measure the state of pollution of seawater or lake water by organic matter. The larger the numerical value, the greater the degree of water pollution. In Japan, potassium permanganate is used as an oxidizing agent.