

Chapter 4

A Japanese Experience with Stakeholder Involvement in Water Environment Conservation: The Case of Lake Suwa Basin

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Introduction

Water environment conservation in lakes and nature restoration in lake basins have become significant issues which compel us to rethink the sustainability of nature and our society. Now, we have come to realize that integrated water resource management (IWRM) in lake basins requires not only technological and financial measures but also policy and institutional innovations as well as stakeholder involvement (ILEC 2005, MEA 2005).

In Japan, rapid economic growth during the 1950s and 1960s exacerbated serious environmental problems all over the country. Since the late 1960s, the central government has carried out a series of countermeasures, while local governments have introduced stricter regulations than the national ones and other new initiatives. In addition to the central and local governments' initiatives, business and citizens groups have played significant roles in combatting environmental pollution. We can find many such cases in the field of water environment conservation in Japan (Fujita and Otsuka 2006, 2008; Otsuka et al. 2009).

This paper focuses on Lake Suwa, which is a small lake in an inland prefecture in Japan where local partnerships among the prefecture, municipalities, business and citizens groups have succeeded in stopping heavy eutrophication of the lake through over forty years of efforts. At the same time, there are ongoing efforts by all stakeholders to realize 'a lake where humans and other living things can coexist' as well as to provide basic information and to outline some implications for China and other developing countries.

In the first section, we will present an overview of the regional characteristics of the Lake Suwa Basin. Next, we will look into the basic indicators of water quality in the lake as well as the process of implementing countermeasures for lake water cleanup by local governments. In the third section, local stakeholder involvement in lake environment conservation in the region will be described by focusing on the progress of stakeholders' actions up to now. In the last section, we will mention some implications

for China and other developing countries as well as challenges for the Suwa region in recent times.¹

1. A Brief Introduction to the Lake Suwa Basin²

Lake Suwa is located at an elevation of 759 meters above sea level in Nagano, a mountainous inland prefecture (Yatsugatake is the highest peak, at 2,899 m) in the center of Honshu Island in Japan. The lake is the twelfth largest in Japan and the largest one in the prefecture. With a surface area of 13.3 km², its total water capacity is 62,987,000 m³, and its circumference is 15.9 km. Although the lake itself is not large, its basin area, at 531.8 km², is large compared to its surface area, in fact about 40 times larger than its surface area. The deepest part of the lake is 7.2 m, but the average is only 4.7 m. The Lake Suwa Basin has been a site of concentrated population and industry for many years, and the lake has disadvantages in its geographic nature for combatting water pollution, such as the large basin area and shallow water. Thirty-one rivers flow into the lake, and one only river, Tenryu River, runs from the lake into the Pacific Ocean. The basin has many hot springs from faults underground. Due to the complicated geographical structure and inland climate, the temperature oscillates widely; the climate is dry, and the four seasons are very clearly defined. In 2007, the highest temperature was 33.0 °C, while the lowest was -11.8 °C and total rainfall volume was 1,545.5 mm.

The wide basin area of Lake Suwa, called the Suwa Area or the Suwa Region, consists of three cities, two towns, and one village³, including Okaya City, Suwa City, Chino City, Shimosuwa Town, Fujimi Town, and Hara Village⁴ (Figure 1), and its area is 715.41 km². According to the national census conducted in 2005, 51.8% of the area is forests and wilderness, 11.0% of the area is paddies and dry fields, 6.0% of the area is

¹ We would like to express special thanks to Professor Tokio Okino, emeritus professor of Shinshu University, who has provided many valuable materials and much information concerning the Lake Suwa Basin through his presentations at our research meetings in Tokyo and at international workshops in Nanjing and Suwa as well as through informal communications with us.

² For the basic characteristics of Lake Suwa and its basin, please see the website of Nagano Prefecture, Suwa Wide-area Union and Okino and Hanazato (2005).

³ The local government system in Japan has two layers. The top layer is the 'prefecture' and the bottom layer is the 'municipality', which is also called 'city', 'town' or 'village'.

⁴ For basic information on the Suwa Area, see the websites of Nagano Prefecture and Suwa Wide Area.

residential and 31.2 % is others.

Due to the clean air and water, the natural environment and easy accessibility from developed coastal areas, manufacturing, agriculture, and tourism have thrived for many years in this area. From the 1950s to the 1960s, this area was called 'Eastern Switzerland' because it was home to many precision machinery industries. Also in recent years, high-tech industries such as information technology have become established here. In the agricultural sector, highland vegetables and flowers are grown. In the tourism sector, due to easy accessibility from the Tokyo Metropolitan Area and the Chukyo Area and bountiful natural features including hot springs and beautiful highlands, this area has developed many resort complexes and facilities to accommodate a high volume of tourists.

Also, there is a rich local traditional culture epitomized by the Grand Shrines which consist of the upper and lower shrines of Suwa, called *Suwa Taisha*, and which have over 10,000 branches in Japan and attract many tourists, and the local area also has flourishing local beliefs and customs. The most famous sacred event at the Grand Shrines of Suwa is the Onbashira Festival, which local residents have gathered to celebrate once every seven years since the eighth century or earlier. Thus, one can observe rich historical and cultural ties among people in this area.

The total population of this area as of April 1, 2010 was 205,758, or 9.6% of the prefecture's population (Figure 2). According to the national census conducted every five years, the population in the area was increasing constantly until 1985; however, the percentage of increase in recent years has been declining, and social mobility has been decreasing (Table 1). Also, it should be noted that the aged population over 65 years old has been increasing, while the young population under 15 years old has been decreasing (Figure 3).

In addition to the population figures, the change in job structure also reveals the trends of social change in the Suwa Area. During the past 15 years, the number and percentage of the population employed in primary and secondary industries have been decreasing; however, the same figures in the tertiary industry have been increasing. In 2005, the percentage of the employed population by industry was 6.9% in primary, 39.3% in secondary, and 53.4% in tertiary industry (Figure 4). Looking at the change in production value, the annual production values of agriculture and sales of commodities have been in a downtrend in recent years (Table 2).

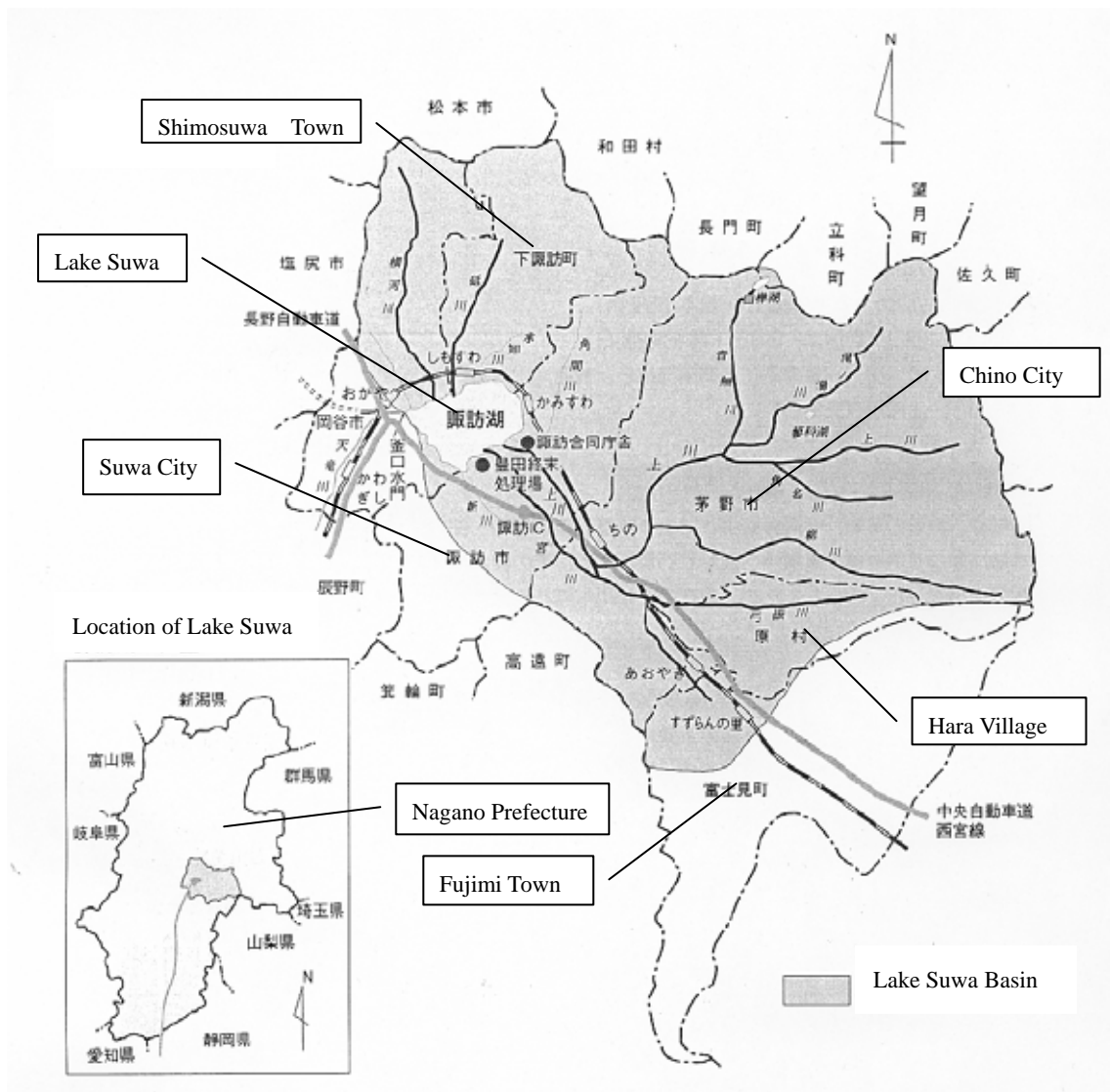


Figure 1. Map of the Lake Suwa Basin and its Wide Area

Source: Website of Nagano Prefecture:

<http://www.pref.nagano.jp/kankyo/mizutaiki/suishitu/kosho/suwa/suwa-map.pdf>

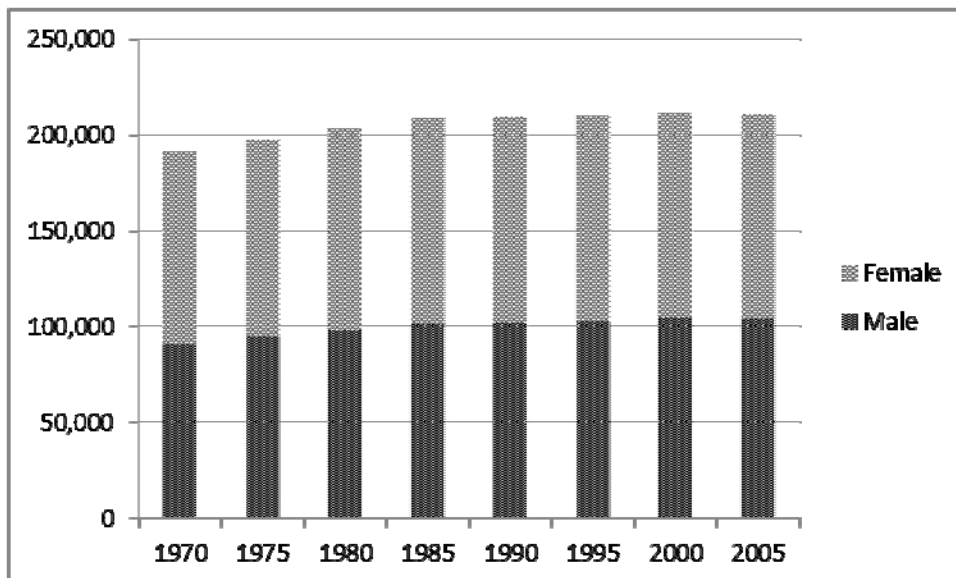


Figure 2. Population Trends in the Suwa Area

Source: www.wide-suwa.net

Note: These figures are based on the national census.

Table 1. Dynamic Population Trends in the Suwa Area

Year	Natural Dynamics			Social Dynamics			Change due to other factors	Net Increase
	Birth	Death	Change	In	Out	Change		
1997	2,126	1,671	455	10,677	11,443	-766	138	-173
1998	2,039	1,761	278	11,038	11,483	-445	124	-43
1999	2,177	1,786	391	11,367	10,956	411	95	897
2000	2,142	1,747	395	12,240	11,536	704	124	1,223
2001	2,110	1,802	308	13,083	12,661	422	84	814
2002	2,157	1,781	376	12,390	12,818	-428	105	53
2003	2,110	1,743	367	11,204	12,157	-953	132	-454
2004	2,041	1,754	287	11,549	11,864	-315	59	31
2005	1,924	1,896	28	11,490	11,243	247	-46	229
2006	1,927	2,084	-157	10,678	11,273	-595	-11	-763

Source: www.wide-suwa.net

Note: These figures are based on an annual survey of population dynamics.

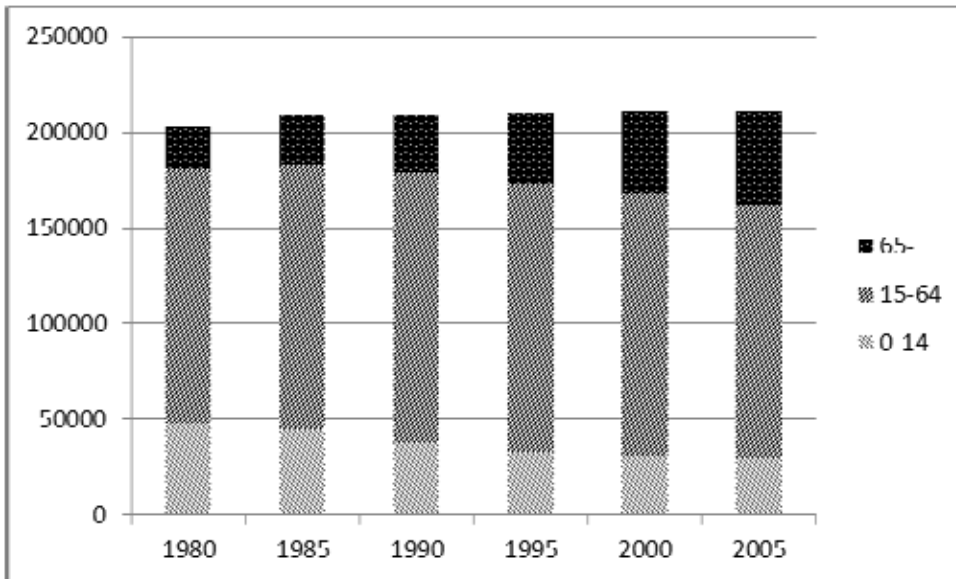


Figure 3. Change in Age Structure of the Population in the Suwa Area

Source: www.wide-suwa.net

Note: These figures are based on the national census.

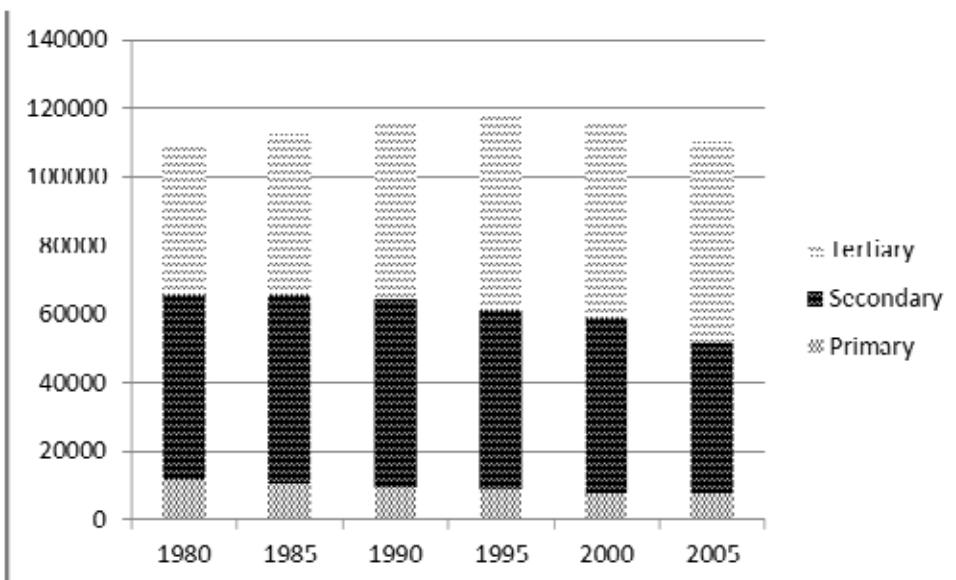


Figure 4. Change in Job Structure in the Suwa Area (persons)

Source: www.wide-suwa.net

Table 2. Change in Production Value in the Suwa Area
(JPY10 million)

Year	Agricultural Output	Manufacturing Output	Sales of Commodities
1996	1680	78819	-
1997	1740	83241	64727
1998	1726	82348	-
1999	1700	77426	63199
2000	1582	86566	-
2001	1518	80476	-
2002	1567	68636	50493
2003	1492	70589	-
2004	1551	82044	51081
2005	1440	82374	-

Source: www.wide-suwa.net

2. Historical Development of Water Pollution Control in the Lake Basin

In early 20th century, the silk thread industry became a leading industry, bringing prosperity to the Lake Suwa Area; however, non-treated wastewater from this and other industries and households in addition to soil erosion from mountains threatened the water environment in the lake basin. In addition to development of the silk thread industry, wastewater from local small-scale industries such as sake brewing, soy sauce manufacturing, and miso manufacturing which were present earlier in the basin may have had a certain impact on the water environment. The silk thread industry went into decline due to the world crisis just before the Second World War, while the precision machinery industries developed rapidly after the war. The Lake Suwa Area became a famous industrial area nicknamed Eastern Switzerland which realized rapid economic growth in inland Japan during the 1950s and 1960s.

Besides industrial development, concentration of population, agricultural development, and tourism development in highland areas in the era of rapid economic growth caused environmental disruption in the Lake Suwa Area. As the basin developed economically, Lake Suwa, where previously people could drink directly from the lake,

eat the fish, and swim, became the final disposal site for various pollutants including contaminated soil, nutrient salts, heavy metals, and other chemicals from industries, paddies and dry fields, households, and construction sites. In late 1960s, the water quality of Lake Suwa deteriorated, and it often appeared as if dark green paint were flowing on the surface, which indicates heavy eutrophication due to blue-green algae. In the late 1970s, major indicators of organic pollutants in the lake water, such as COD, T-N and T-P, reached their worst level (Figure 5-7).

Responding to water quality degradation in the lake, the first scientific survey on countermeasures for water pollution control in Lake Suwa was organized by Nagano Prefecture in 1965. Its final report, published in 1968, concluded that water pollution in Lake Suwa was not caused by dissolved material but by an epidemic of floating plankton mainly consisting of blue-green algae, and the report recommended three major countermeasures, i.e., development of a sewerage system in the basin to reduce the inflow pollution load, a dredge project to remove accumulated mud on the lake bottom to reduce the internal pollution load, and lakefront mitigation through greening. In those days when national control of environmental pollution was insufficient, this was a pioneering report which introduced the concept of control of the total amount of nutrient salts in the lake basin. Since then, sewerage system construction and dredging works have begun; however, lakefront mitigation through greening was left out of consideration until the 1990s.

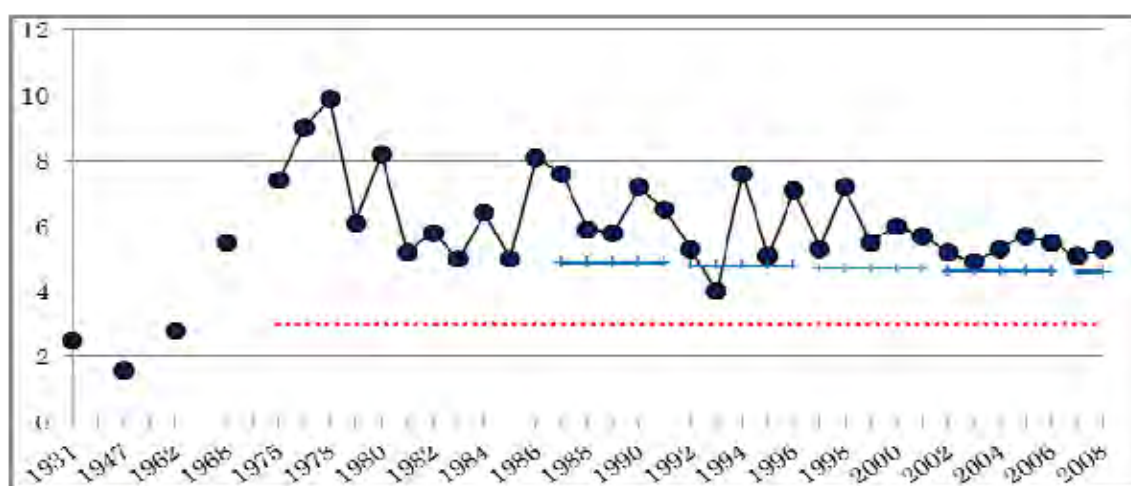


Figure 5. Change in COD Concentration in Lake Suwa (mg/l)

Source: Compiled by the authors based on Green Lake Suwa.

Note: The environmental quality standard for COD in Lake Suwa is 3 mg/l, and the environmental quality target has varied from 4.9 mg/l in the first plan, to 4.8 mg/l in the second plan, 4.7 mg/l in the third plan, and 4.6 mg/l in the fourth and fifth plans.

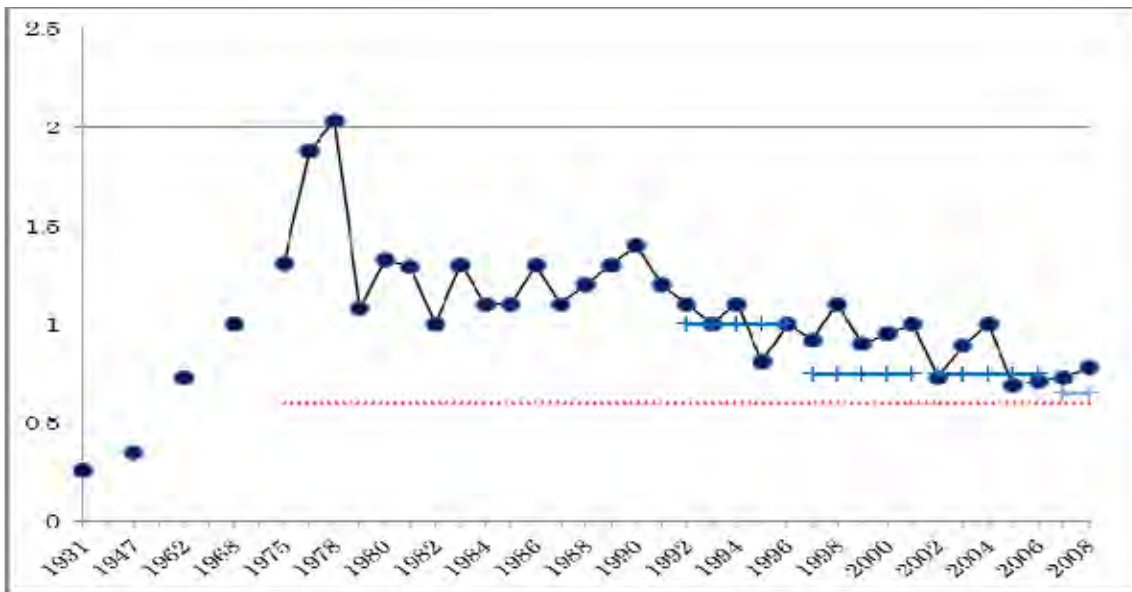


Figure 6. Change in Total Nitrogen (TN) Concentration in Lake Suwa (mg/l)

Source: Compiled by the authors based on 'Green Lake Suwa'.

Note: The environmental quality standard for TN in Lake Suwa is 0.6 mg/l, and the environmental quality target has varied from 1.0 mg/l in the second plan, to 0.75 mg/l in the third and fourth plans, and 0.65 mg/l in the fifth plan.

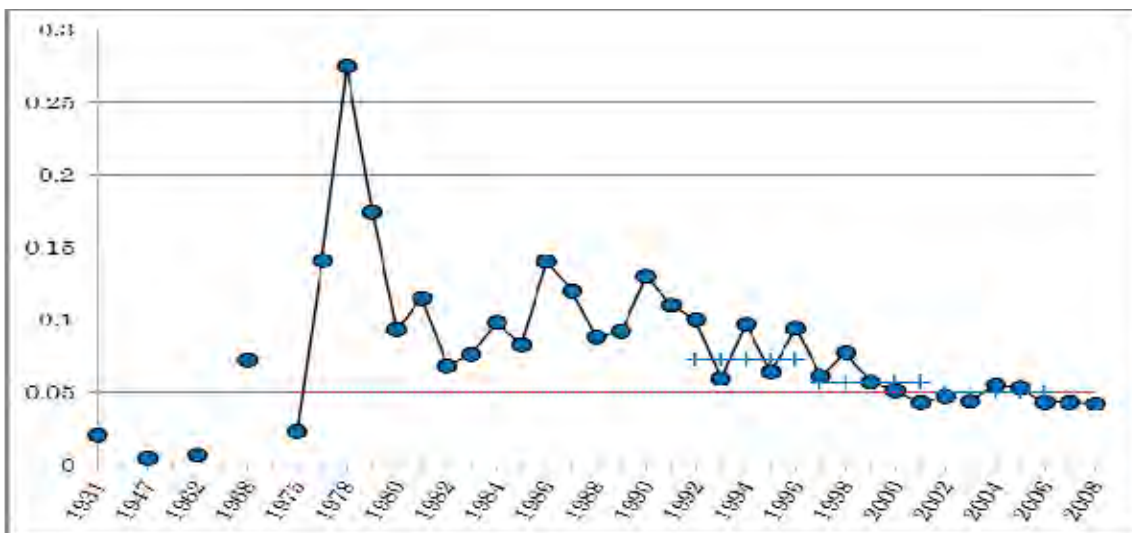


Figure 7. Change in Total Phosphorous (TP) Concentration in Lake Suwa (mg/l)

Source: Compiled by the authors based on Green Lake Suwa.

Note: The environmental quality standard for TP in Lake Suwa is 0.05 mg/l, and the environmental quality target has varied from 0.072 mg/l in the second plan, to 0.057 mg/l in the third plan, 0.05 mg/l in the fourth plan and a 'sustainable level' under the standard in the fifth plan.

Point source control by setting effluent standards in the lake basin has been adopted since 1970 (after the previous report), when the national government designated Lake Suwa as a regulated water body in the ‘Two Laws on Water Quality’ (the Law on Public Water Quality Conservation and the Law on Industrial Wastewater Regulation)⁵. In a special meeting of the National Diet held in 1970, the Sewerage Law was amended to stipulate water quality conservation of public waters as one of its aims, while the Water Pollution Control Law was newly legislated as a replacement for the Two Laws on Water Quality. In the Water Pollution Control Law, the article requiring coordination of environmental preservation with economic development was omitted, and the selective regulation system for water areas was also omitted. Environmental Quality Standards, which were introduced by the Cabinet in 1970, set a national minimum goal for public waters, while direct penalties were provided for violations of effluent standards by this new law. Furthermore, the law allowed prefectural governments to set stricter effluent standards than the national ones (Awaji 1995, Mizuochi 2009). In 1973, Nagano Prefecture elevated effluent standards for BOD, COD, SS and so on discharged into Lake Suwa, making them stricter than the national standards based on the Pollution Control Prevention Ordinance. In 1985, the Law Concerning Special Measures for Conservation of Lake Water Quality (Clean Lake Law) was enforced at the national level, and Lake Suwa was designated as a lake in need of intensive countermeasures according to the Clean Lake Law in the next year. In 1988, the first plan for water quality conservation at Lake Suwa (1986-1991) was instituted by the prefecture, and since then, considerable efforts to clean up the lake water have been conducted by both the local and the national governments. For major countermeasures and actions for water pollution control in Lake Suwa, see Table 3.

As seen in the previous figures, the water quality of Lake Suwa was improved to a certain degree due to the setting of strict environmental quality standards for lake water and effluent standards for point sources in the basin, dredge works in the lake, sewerage system construction in the basin, and other measures by local and national governments. However, blue-green algae did not disappear from Lake Suwa, and people in the lake basin have not been satisfied with the lake water environment for many years.

⁵ The Two Laws on Water Quality stipulated in 1958 had defects, such as aiming at coordination between industrial development and environmental conservation instead of giving precedence to environmental conservation, selection of regulated water (i.e., not all water was regulated), and other insufficient provisions (Otsuka et al. 2009).

Since the 1990s, new countermeasures for lake environment improvement have been tested by researchers, residents and the local government. An advanced treatment system was introduced in the sewerage treatment works in 1995 in order to improve treatment efficiencies for TN, TP and COD in wastewater. Lakefront ecosystem rehabilitation works to enhance its self-clearing function and restore its biodiversity have received investment from the government, while dredging works have been stopped due to their impact on lakefront ecosystem. A lakefront zoning plan designed for coexistence with community activities was also formulated in 1995 based on discussions by a committee consisting of local stakeholders. Thus, water environment conservation in the Suwa Lake Basin has been a process of trial and error to introduce different countermeasures step by step.

Now, we can see a clear improvement in the lake water environment (i.e., TP meets the standard); however, non-point source control for both urban and rural areas needs to be conducted effectively through partnerships among government, business and residents in the lake basin. In the fifth plan for water quality conservation of Lake Suwa (2008-2011), realization of 'Lake Suwa, where humans and other living things can coexist' has been set as a long-term target for the next twenty years, and stakeholders are still exerting large efforts (Box 1).

Table 3. Countermeasures for Water Pollution Control in Lake Suwa

Year	Countermeasures
1968	Research Committee on Lake Suwa Cleanup Countermeasures, organized by Nagano Prefecture, published its research results and recommended some countermeasures.
1969	The first project to dredge subsoil of the lake started.
1970	Effluent Standards Set by Two Laws on Water Quality were adopted for facilities that emitted over 20 tons of wastewater in the Lake Suwa Basin.
1971	Environmental quality standards for COD, SS, pH, DO, and coliform bacteria in Lake Suwa were adopted. The project to construct a sewerage system in the Lake Suwa Basin was launched.
1972	Full-time water quality monitoring in the lake started.
1973	Effluent standards for BOD, COD, SS and so on discharged into Lake Suwa were elevated by Nagano Prefecture, making them stricter than the national standards.
1979	A part of sewerage system in the Lake Suwa Basin began operation.
1981	The second project to dredge subsoil of the lake started.
1984	Environmental quality standards for nitrogen and phosphorous in the lake were adopted.
1985	Law Concerning Special Measures for Conservation of Lake Water Quality (Clean Lake Law) was enforced at the national level.
1986	Lake Suwa was designated as a lake in need of intensive countermeasures according to the Clean Lake Law.
1988	The first plan for water quality conservation at Lake Suwa (1986-1991) was instituted by Nagano Prefecture. The pollution loading amount control level for COD for specified lake facilities was adopted in the Lake Suwa Basin. 'Clean Rally in Lake Suwa' (renamed 'Clean Festival in Lake Suwa' since 2003) was held (and had been held every year since then)
1993	The second plan for water quality conservation at Lake Suwa (1992-1996) was instituted.

1994	Effluent standards for nitrogen and phosphorous in the lake were elevated to a level stricter than the national one, and the pollution loading amount control level for nitrogen and phosphorous for specified facilities located in the lake basin
1995	were adopted by Nagano Prefecture. An advanced treatment plant started to operate in response to stricter environmental standards which were elevated in the previous year.
1997	A waterfront improvement project started based on the ‘Master Plan for Waterfront Improvement at Lake Suwa’.
1998	Effluent standards for BOD, COD and SS were upgraded. The third plan for water quality conservation at Lake Suwa (1998-2001) was instituted.
2002	Liaison conferences on water quality conservation actions at Lake Suwa were constituted by the national government, the prefecture and municipalities.
2003	Research on a plan for non-point source pollution load reduction in the lake was conducted.
2006	The fourth plan for water quality conservation at Lake Suwa (2002-2006) was instituted.
2008	An amendment to part of the Clean Lake Law was enforced (including designation of the run-off water countermeasures districts) at the national level. The fifth plan for water quality conservation at Lake Suwa (2008-2011) was instituted.

Source: A History of Lake Suwa (2002 edition), Okino and Hanazato (2005) , An Overview of the 5th Plan for Water Quality Conservation in Lake Suwa and other materials obtained at the international workshop in Suwa City and fieldtrip on December 11-12, 2010.

Box 1. An Overview of the 5th Plan (2007-2011) for Water Quality Conservation in Lake Suwa

1. Policies for Water Quality Conservation in Lake Suwa

(1) Basic Policies

- (i) Long term target: 'Lake Suwa, where humans and other living things can coexist'; water quality shall be improved to the same level as the 1950s.
- (ii) Understanding and cooperation by the national government, municipalities, and residents,
- (iii) Steady and continuous implementation of previous water quality conservation projects, and
- (iv) Focus on countermeasures for water outflowing into the Kamikawa and Miyakawa river basins.

(2) Water Quality Target (mg/l)

	2006 (current)	2011(target)
COD 75% value:	7.4	4.8
COD average value	5.5	4.6
TN	0.71	0.65
TP	0.043	sustaining and improving

2. Projects for Water Quality Conservation

- (1) Rate of Population Covered by Sewerage System: 97.2% -> 98.6%
- (2) Construction of Septic Tanks: 390 tanks
- (3) Waste Treatment Facilities: Construction of incineration plants
- (4) Pollution Control of Inflowing Rivers: Study on salvage and removal of inflowing pollution load
- (5) Cleanup in the Lake: Study on control of nutrient salts dissolved into the water body from the bottom mud

3. Regulations and Other Measures for Water Quality Conservation

(1) Wastewater Treatment from Factories and Other Business Places

Regulations on Pollution Load Amount: Not only new plants but also old plants to adopt regulation standards stipulated by amendment of laws.

(2) Domestic Wastewater Treatment

Promotion of connection with sewerage system.

(3) Measures for Pollution Load by Livestock Farming

Guide to managing livestock barns properly.

(4) Measures for Inflowing Water

Focus on countermeasures for water outflowing into the Kamikawa and Miyakawa river basins.

(5) Natural Environment Protection on the Lakefront

Development of the lakefront, focusing on animals, plants, soil and so on to build the ecosystem on the lakefront.

4. Other Measures for Water Quality Conservation

(1) Water Quality Monitoring

(2) Promotion of Scientific Research

- (i) Technology for the natural environment to foster diversified fish,
- (ii) Removal of water chestnuts and their impact on the ecosystem, and
- (iii) Effectiveness of discharge at the lower mouth at Kamaguchi Gate.

(3) Education and Enlightenment

Holding of 'Restore Lake Suwa' High-touch Festival.

(4) Promotion of Study Activities

(5) Support for Cleanup Activities

5. Plan to Promote Countermeasures for Water Outflowing into the Kamikawa and Miyakawa river basins

(1) Policies

Focus on the Kamigawa and Miyagawa river basins, with 70% to 80% of the inflowing pollution loads as outflowing water control areas.

(2) Countermeasures

- (i) Urban Areas: Clean up roads and gutters
- (ii) Farmland: Promote advanced measures for 'environmentally sound agriculture'
- (iii) Natural Land: Conserve natural land to enhance the functions of water cleanup and cultivation

(3) Enlightenment concerning outflowing water control by holding briefings for residents

(4) Other Measures

- (i) Study on water quality cleanup function and groundwater cultivation function in paddy fields and rainwater suffusion facilities.
- (ii) Water quality monitoring to examine the effectiveness of countermeasures

Source: *An Overview of the 5th Plan for Water Quality Conservation in Lake Suwa*

3. Stakeholder Involvement for Water Environment Conservation in the Lake Basin

Public participation in environmental conservation activities in the Lake Suwa Basin was already seen during the era of rapid economic growth in the twentieth century.⁶ Along with water quality degradation in Lake Suwa, local junior chamber and community centers have organized public seminars and study meetings on environmental issues to raise people's awareness regarding lake water cleanup since the 1970s. Students at Kami-Suwa Junior High School have conducted cleanup activities on the lakeside since 1973, and these activities on the lakeside and along rivers flowing into the lake have been emulated by other primary and junior high schools.

However, as in other regions in Japan, cleanup countermeasures by the government did not get off to a smooth start in the Suwa Region. A local community of about 2,400 resident opposed the construction of a sewerage treatment plant on the following grounds: there had not been any dialogue between residents and the government in advance, they would lose a sizable area of good farmland to be occupied by the plant, and they were worried about a bad smell and other nuisances from the plant. Subsequently, the local government organized multiple roundtable meetings with residents and tours to advanced plants in other locations to build consensus on the construction. In addition to dialogue with the residents, the government negotiated concerning economic compensation issues with the land improvement district organized by the farmers and with fishery cooperatives, and the government also negotiated concerning nature conservation with other groups. In 1972, the government, communities and concerned groups reached an agreement on the construction at last. Roundtable meetings between the communities and the government were conducted twice a year starting in the twenty-first century.

Beyond some conflicts between the government and the communities regarding lake water cleanup, a new citizens' movement by citizens arose in the 1980s. The Shimo-suwa Junior Chamber originated from a nature conservation activity involving the counting of newly-moulted dragonflies, which are considered to be an indicator of the health of Lake Suwa, and one of its cleanup activities developed into the

⁶ See Okino and Hanazato (2005) and chapters 7 and 10 of *A History of Lake Suwa* (2002 edition) for details on information in this section. Also, the authors obtained updated information on stakeholders' actions in the basin through an international workshop in Suwa City on December 12, 2010.

‘Shimo-suwa Liaison Association on Lake Suwa Cleanup Promotion’ in 1980. There are other groups that were newly founded in 1980s (Box 2).

One of noteworthy activities involving a broad range of stakeholders for water environment conservation in the Lake Suwa Basin is a series of joint seminars by Japan and Germany on ‘community development’ which was conducted four times from 1988 to 2001. The first seminar was held in Suwa City during May 7-12, 1988. The executive committee of the seminar, headquartered in Suwa City Hall, was organized by residents, the Suwa city major, and other municipalities and prefectural regional offices. The German Cultural Center in Tokyo, known as the Tokyo Goethe-Institut, sponsored the seminar to which two experts from Germany were invited to hold discussions with local participants on six topics such as Lake Suwa and its lakeside, resort development, the road and transportation system, commercial streets, industrial areas, residential and historical community environment and parks. This seminar enlightened people in the basin about the importance of the environment and community development for the realization of lake water cleanup.

Following the first seminar, the Suwa Environment and Community Development Group was founded by core members of the executive committee of the seminar. The Meeting and Tokyo Goethe-Institut jointly held not only seminars in Suwa City, but also organized a tour to Germany to learn about German experiences and challenges in lake water cleanup and natural ecosystem rehabilitation of lakesides. They held two seminars in Suwa City and one seminar in Germany. The second seminar was held during October 31 and November 1, 1991, in Suwa City, the third seminar during June 15-21, 1993, in Bayern, Germany, and the fourth seminar during May 25-27, 2001, in Suwa City.

Through this series of the joint seminars, people in the Lake Suwa Basin have learned the importance of lakefront ecosystem mitigation and rehabilitation as well as consensus building based on deliberation by stakeholders. It should be noted that not only citizens but also administrative officers in municipalities in the Suwa Area and Nagano Prefecture have been involved in the seminars in Suwa City and the visiting program in Germany. These academic and cultural exchange programs between Suwa and Germany have contributed to the promotion of environmental mitigation and rehabilitation works on the lakefront of Lake Suwa, where 99.9% of the lakeside was covered with concrete that has kept out all living nature. The exchange programs also contributed to the design of a master plan for lakefront rehabilitation which zones the lakefront into eight different blocks which value both environmental conservation and community

development by emphasizing ecosystem mitigation, landscape, access to the waterfront by people, watersports and so on.

In the twenty-first century, a new type of cleanup activity at the lakeside, called Adopt Program was launched in 2002. This program originated in voluntary highway cleanup activities in the United States and was introduced to Japan in 1998. In the first year, this program on the lakeside of Suwa succeeded involving 5,550 persons in picking up garbage for 206 days in total. Under this program, the 16 km long lakeside is divided into 32 blocks, and one to three local groups 'adopt' each block. The 69 groups active in this program (as of April 1, 2010) include not only civic organizations but also companies and related business associations. Suwa Construction Office in Nagano Prefecture is the head coordinating office for this program, and it contracts with each group which will conduct cleanup activities more than three times a year. The office is responsible for purchasing accident insurance for all groups, preparation of cleaning tools, building signboards for Adopt Program in each block, and publicizing the program widely in the area, while the municipalities are responsible for the disposal of all garbage gathered by this activity. This is considered to be a new partnership among local governments and volunteers organized by citizen and business groups.

The Lake Suwa Group (subsequently renamed Lake Suwa Club) was founded in 2005. About 130 members including citizen groups and researchers joined the club. The club has inherited citizens' initiatives which are based on experiences struggling to cleanup Lake Suwa for many years. Box 2 shows a list of major groups active in water environment conservation in the Lake Suwa Basin. From this box, we can see that the establishment of business associations in the early stage was followed by the establishment of environmental groups in the 1980s and 90s and the regrouping of some activities in the 2000s. Lake Suwa Club is expected to open up a new age of civil movement involving a broad range of stakeholders in this area.

Box 2. Major Active Citizen Groups and Business Associations for Water Environment Conservation in the Lake Suwa Basin

1947	Suwa Branch of Business Managers Association in Nagano Prefecture
1949	Fisheries Cooperative in East Suwa
1954	Suwa Branch of Japan Society of Bird Watching
1964	Suwa Association of Education under the Committee on Land and Water of the Nature Study Division
1967	Hot Springs Hotel Union of Lake Suwa
1970	Fisheries Cooperative of Lake Suwa
1980	Shimo-suwa Liaison Association on Lake Suwa Cleanup Promotion
1983	Suwa Branch of the Youth Committee of the Architects Association of Nagano Prefecture
1984	Lake Suwa Swan Association
1985	Association of Suwa Cleanup
1985	Lake Suwa Rotary Club
1986	International Soroptimist Suwa
1988	Suwa Environment Conference
1989	Suwa Environment and Community Development Meeting
1990	Suwa Branch of Japan Association for Language Teaching
1990	Okaya Eco-Rotary Club
1993	Suwa Area Meeting on Beautiful Environment Promotion
1997	Lake Suwa Association for Soap Bubble Promotion
1997	Cleanup and Recycle Chino City
1999	Suwa Branch of Nagano Prefecture Association on Environmental Conservation
2000	Junior Chamber Suwa Region
2001	NPO Smart Lake
2001	Citizens' Conference on Environmental Community Development
2001	Suwa City Association on Water, Green and Environment
2005	Lake Suwa Meeting
2007	Lake Suwa Club*

**Lake Suwa Club was founded to reorganize the Suwa Environment and Community Development Meeting and Lake Suwa Meeting.*

Source: Compiled by the authors based on an international workshop in Suwa City on December 12, 2010, and A History of Lake Suwa (2002 edition).

4. Experiences and Challenges in the Lake Suwa Basin

The description in this chapter of the cleanup of the Lake Suwa Basin is one of success stories in Japan in which lake water was cleaned by eliminating blue-green algae through partnerships among local stakeholders. This story also conveys the importance of the inseparable relation between environmental restoration and community development.

In the first stage, the local government attempted to single-handedly conduct the cleanup since national regulation was not effective; however, after the stipulation of national policies, the local government has not only followed national policies but has also adopted standards that are stricter than the national standards and has also developed partnerships with business and citizens groups. In this process, residents have not only aired their grievances to the government on the deteriorating water environment in the lake but also have organized and participated in cleanup activities on the lakefront. Experts on environmental scientists and engineers have conducted scientific research and technological assessments to recommend proper countermeasures to local government and have also supported citizen group initiatives.

It should also be noted that residents, experts, and administrative officers in the Lake Suwa Basin have learned and sought together how to cleanup lake water in harmony with community development through seminars and meetings held by local stakeholders and international exchange programs with German experts. Cleanup of Lake Suwa is an adaptive learning process of building networks and partnerships among residents, researchers, and administrative officers with the goal of realizing a sustainable community in the basin. In this process, the stakeholders have shouldered their own responsibilities in water environment conservation according to their abilities. Also, an understanding of the experience of the region is important for boosting citizens' pride (Box 3) in their locality, including its historical and cultural treasures. Such local pride could motivate greater stewardship (Volk 2005) of lake environment conservation and restoration, while their actions on behalf of the lake environment could also foster new local culture to rebuild their ties with Lake Suwa.

However, some challenges can be still found in the Lake Suwa Basin related to lake water environment conservation and restoration. Like many other basins in Japan, non-point source control has just started, and more sophisticated and effective measures need to be developed as soon as possible. Also, the water environment as it is widely known nowadays should not be assessed only by the environmental quality standards

for water but also by the ecosystem status of living things in the lake, and the residents' awareness of and need for a natural environment and community development will evolve continuously through their learning and activities. Assessments of the ecosystem status and its changes require a long period of time, so sustainable adapted management with scientific research and stakeholder participation will be essential.

Like other local regions in Japan, the Suwa region is now confronting socioeconomic unsustainability as a result of de-industrialization and the aging of society. This local issue relates to the issue of how to encourage the next generation to shoulder burden of cleanup activities around Lake Suwa while developing new industries in the region. Creation of a sustainable community as well as a sustainable lake environment is a challenge in the Lake Suwa Basin.

Box 3. The Suwa Citizens' Charter

The Suwa Citizens' Charter instituted on August 10, 1991, states 'Our city has developed with the blessings of abundant natural beauty and a heritage rich in tradition. Cherishing the efforts of those who have gone before us, we hereby adopt this charter, pledging to always strive for: A City where the songs of birds can be heard in parks and forests around a beautiful lake; a City where the people enjoy bountiful lives amid flourishing culture; and a City where friendship is fostered among the people and extends to others around the world.'

Source: Suwa Municipal Office (2010).

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Map of the Lake Suwa Basin and Lake Suwa, Nagano Prefecture

<http://www.pref.nagano.jp/kankyo/mizutaiki/suishitu/kosho/suwa/suwa-map.pdf>

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<http://www.wide-suwa.net/suwakouiki/index.htm>

Wide Area Plan of Suwa Municipalities

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