Evolving Issues toward Improvement of the Lake Biwa – Yodo River Basin Governance

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Additional Reading Materials

1. Nakamura, M. (1995) Lake Biwa: Have sustainable development objectives been met?, Lakes and Reservoirs, Vol.1, No.1, pp3-29, Lake Biwa Research Institute, Otsu, Japan

2. Nakamura, M. et al. Evolving History of Lake Biwa and Yodo River Basin Management, Hiroya Kawanabe et al. (eds.), Lake Biwa: Interactions between Nature and People, Springer Science+Business Media B.V. 2012

Acknowledgement

This Power Point presentation has been prepared making use of the slides presented in earlier ILEC meetings by the following organizations and individuals of the Shiga Prefectural Government.

- Water Policy Dividiosn, Department of Lake Biwa and Environment. "Towards Integrated Basin Managementin Lake Biwa and Yodo River Basin - Past and Future - : Bridging Upstream and Downstream, Flood Control, Efficient Water Use and Ecosystem Protection by All Stakeholders" presented at the International Forum on ILBM-G Project, Kusatsu, 7 Mar. 2007
- River Basin Policy Division, Watershed Policy Bureau (Katsuki Matsuno). "The Evolving History of Lake Biwa Weir", presented at the ICOLD Conference, Bali, 4-5 Oct. 2014 (Coauthored by M. Nakamura)

Lake Biwa and Yodo River Basin

Three Rivers (Seta-Uji, Kizu, Katsura) make Yodo River

Lake Biwa Key Facts

- Largest Lake in Japan (670 km2)
- Approx. 460 rivers flowing into Lake Biwa, only one outflow from Lake Biwa (the Seta River)
- One of the oldest lakes in the world (4 million years)
- 1000 species, incl. more than 50 indigenous species

Yodo River Basin Key Facts

- Japan's second Mega-city area in downstream (Kyoto-Osaka-Kobe) (17 million population)
- Lake Biwa Basin occupies half of the basin (Yodo River water depends much on outflow from Lake Biwa)
- Water is utilized many times

Lake Biwa Key Facts

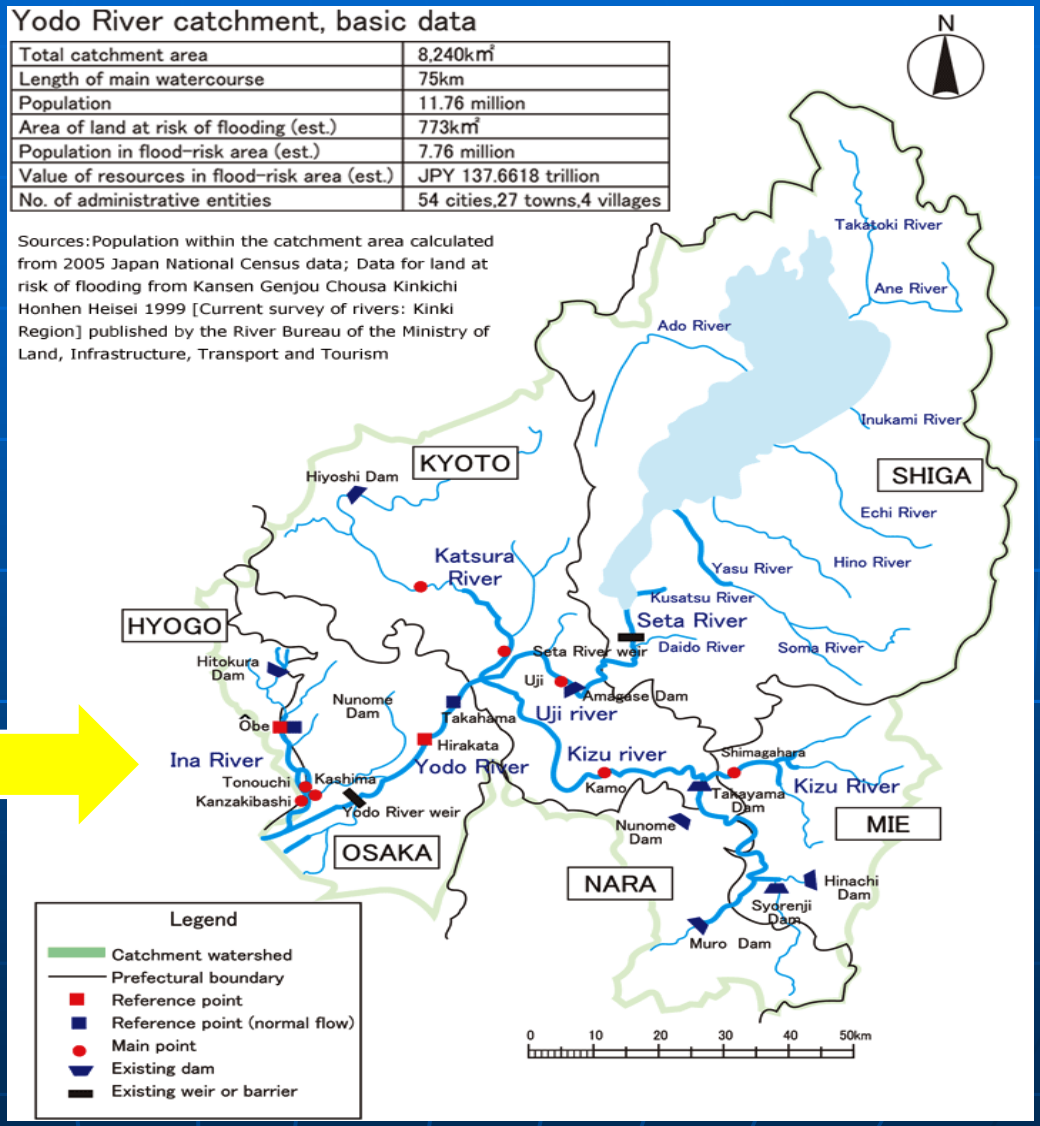
• Altitude	85.614 m asl (at low tide in Osaka Bay)
• Surface area	670.25 km^2 (Approx. 1/6 the area of the prefecture)
• Shoreline	235.20 km
• Catchment area	3,848 km^2
• Maximum Length (North-Soutn)	63.49 km
• Maximum width (East-West)	22.80 km
• Minimum width (East-West)	1.35 km
• Mean depth	41.20 m
• Maximum depth	103.58 m
• Water volume	27.5 billion m^3
• Water temperature	Max 29.9C(Jul2004) Min 4.4C(Feb2005)

The Biwa – Yodo Region

Yodo River catchment, basic data

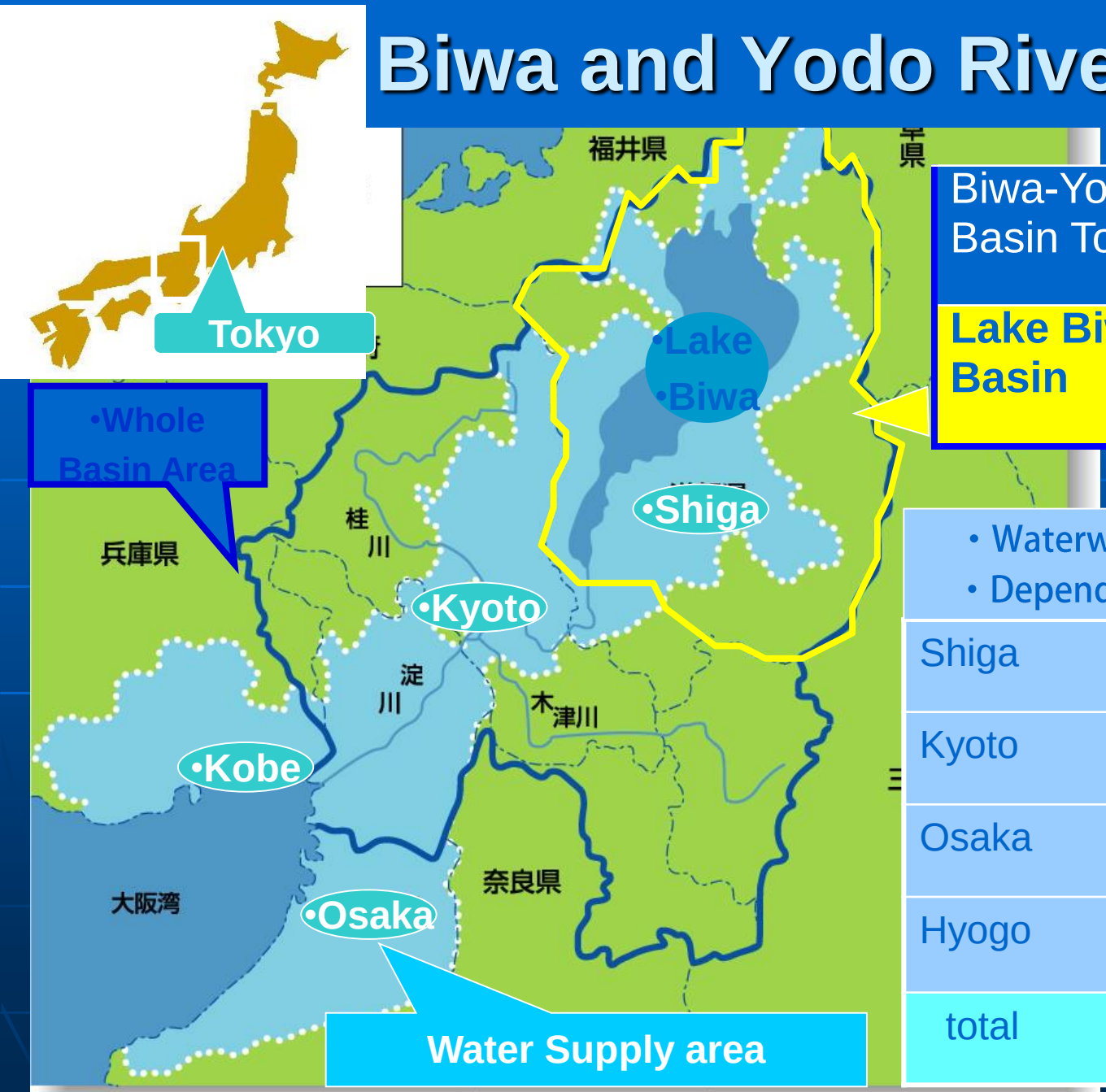
Total catchment area	8,240km²
Length of main watercourse	75km
Population	11.76 million
Area of land at risk of flooding (est.)	773km²
Population in flood-risk area (est.)	7.76 million
Value of resources in flood-risk area (est.)	JPY 137.6618 trillion
No. of administrative entities	54 cities,27 towns,4 villages

Sources:Population within the catchment area calculated from 2005 Japan National Census data; Data for land at risk of flooding from Kansen Genjou Chousa Kinkichi Honhen Heisei 1999 [Current survey of rivers: Kinki Region] published by the River Bureau of the Ministry of Land, Infrastructure, Transport and Tourism



- Biwako River Office, Kinki Regional Development Bureau, M L I T

Biwa and Yodo River Basin



Biwa-Yodo Basin Total	8,240 Km2
Lake Biwa Basin	3,848 Km2

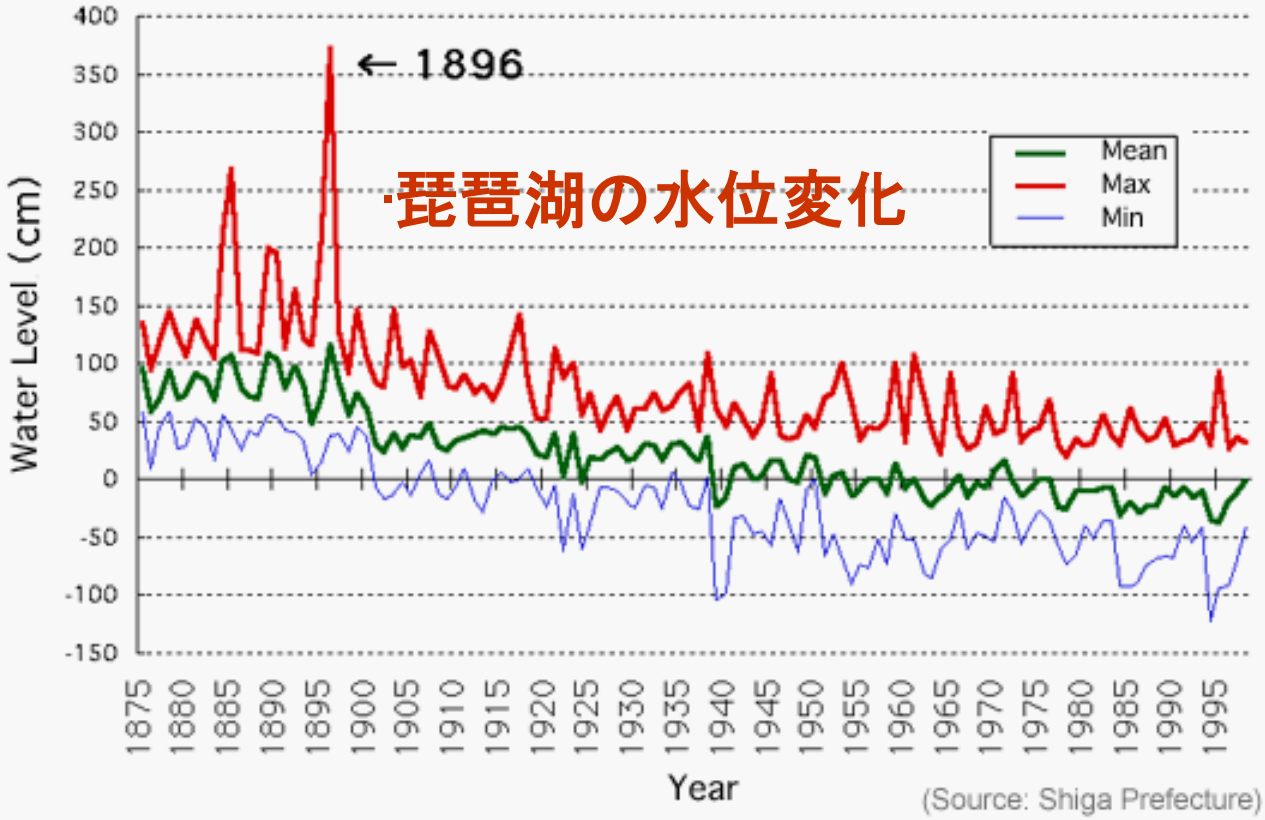
- Waterworks Supply Population
- Depending on Lake Biwa water

Shiga	1, 102, 737
Kyoto	1, 814, 201
Osaka	8, 772, 470
Hyogo	2, 667, 211
total	14, 356, 619

Landscape of Lake Biwa - Yodo River

Mother Lake
Shiga Prefecture JAPAN

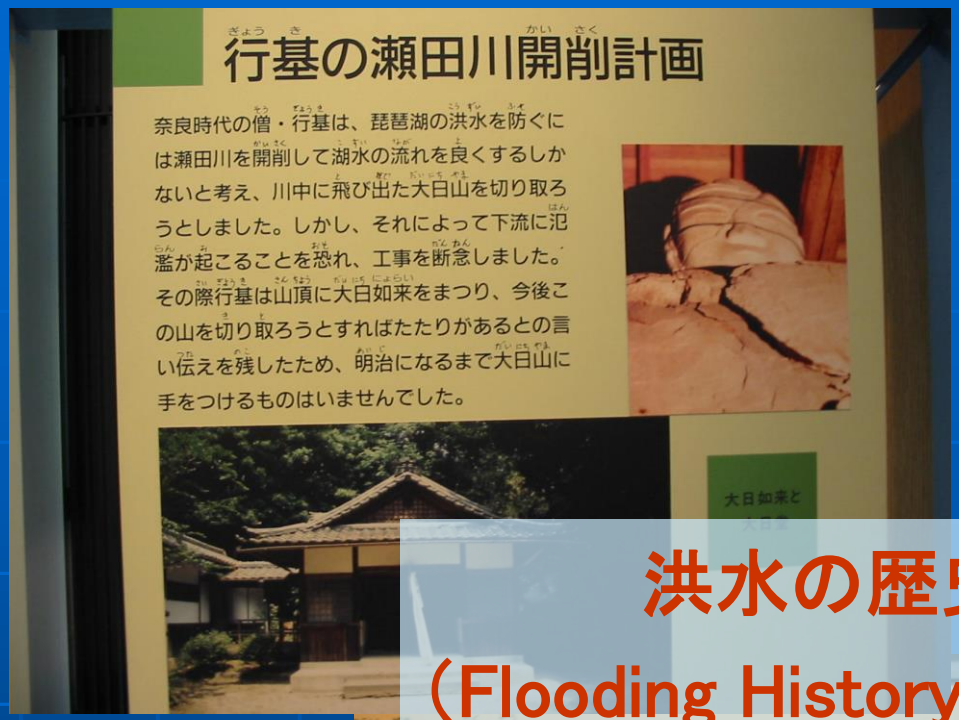
FC2. Water Level Control



(Source: Shiga Prefecture)

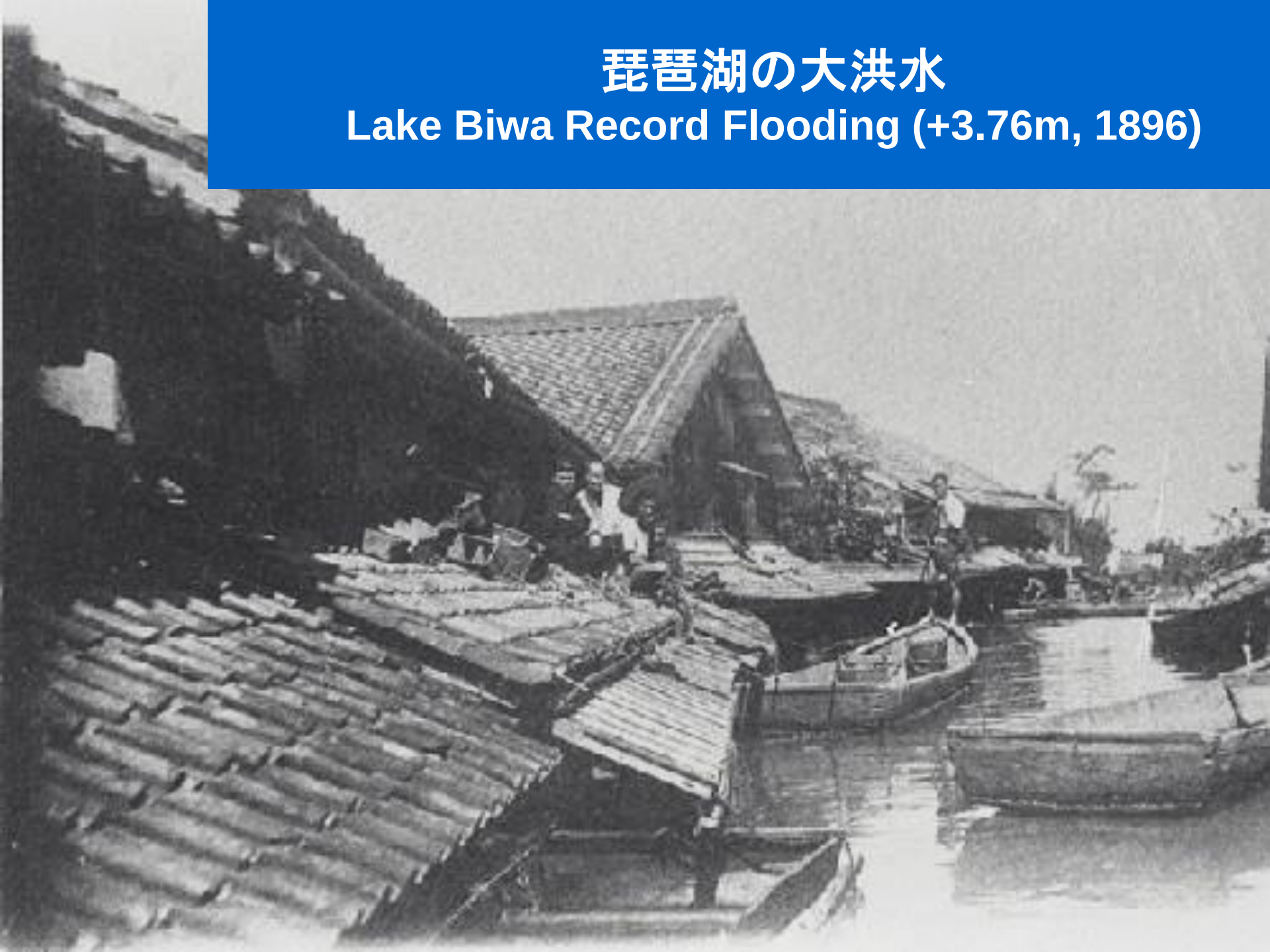
Control of the Water Level:

Occurrence of floods has been contained after the construction of three weirs: the Nango Weir in 1905, replaced by the Seta Weir in 1964, and yet again replaced by the newest weir (the New Seta Weir) in 1994. Control of water levels at the weir has facilitated the control of water supply to downstream areas.



洪水の歴史記録
（Flooding History　Record）

琵琶湖の大洪水
Lake Biwa Record Flooding (+3.76m, 1896)



FC1. Water Levels

Severe Floods:

The Lake Biwa climate sometimes leads to extreme weather. Throughout history, the residents of Lake Biwa communities suffered from severe floods and droughts. For example, a record rainfall in September 1896 caused major flooding, with a water level rise of 3.76 m that immersed the entire Lake Biwa lowland area (part of deep color in a map) for over 220 days.

1896年の琵琶湖大洪水

(Source: Shiga Prefecture)

Serving for Downstream Needs

- First Lake Biwa Canal completed in 18
- 8.35/sec for Water Supply and Hy power

- Second Lake Biwa Canal co pleted in 191 年

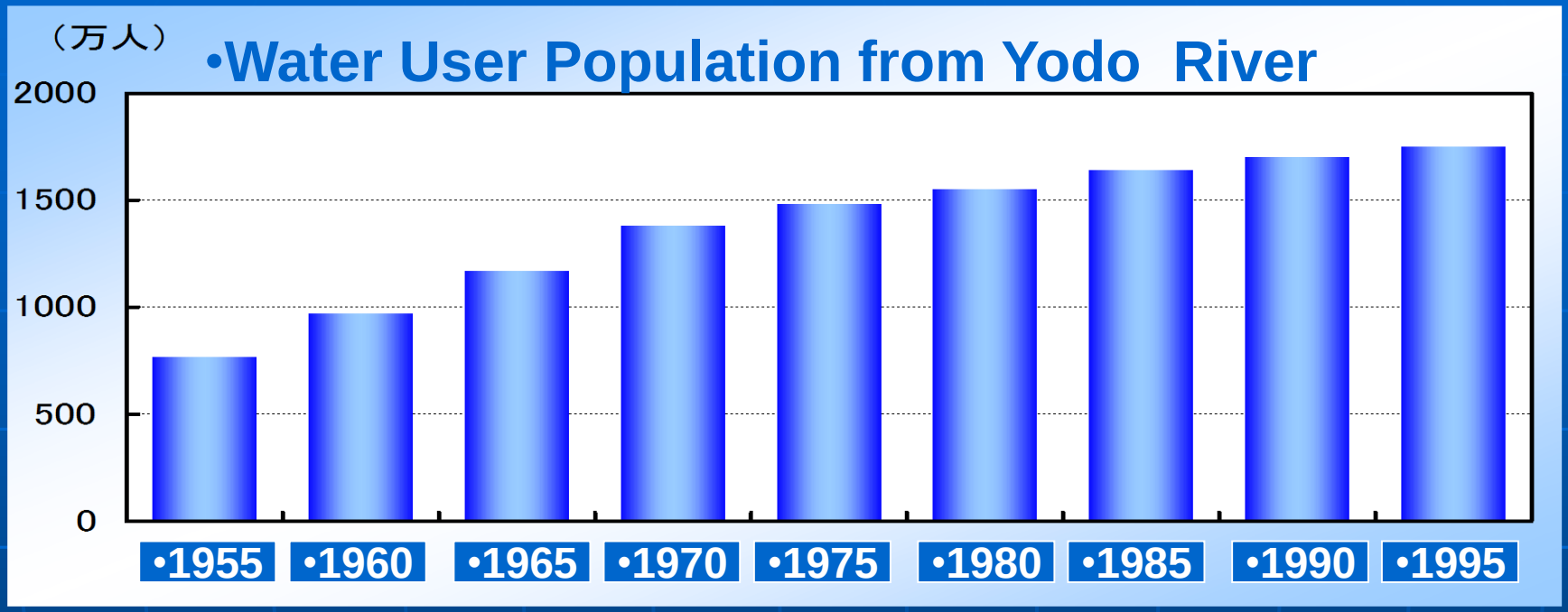
- Consultative Council ehensive De
- (downstream) water o popula tion
- (upstream) flood con gement need
  levy construction ar desires

- Lake Biwa Comprehensive Development to start in 1972 (up till 1997)

·Nango Weir at Lake Biwa Mouth down at Seta River, in 1906

丹生ダム
高時川
姉川
愛知川
日野川
野洲川
園部川
鴨川
大戸川ダム
余野川
安威川
大川
青蓮寺ダム
比奈知ダム
青蓮寺川
比奈知川
室生ダム

Needs of Downstream
Water Demand Growth



Land Subsidence by groundwater overuse

·（大阪市水道局蔵）

Needs in 1960s

- **Downstream area(Osaka, Kobe)**
  - **Water Demand for human/industry use to meet population/economic growth**
    (avoiding groundwater overuse)
- **Upstream area (Lake Biwa (Shiga))**
  - **Flood Control in the shores**
  - **Lake water conservation**
  - **Infrastructures to use lake water and area's Development**
    (waterworks, irrigation, sewerage, road, etc.)

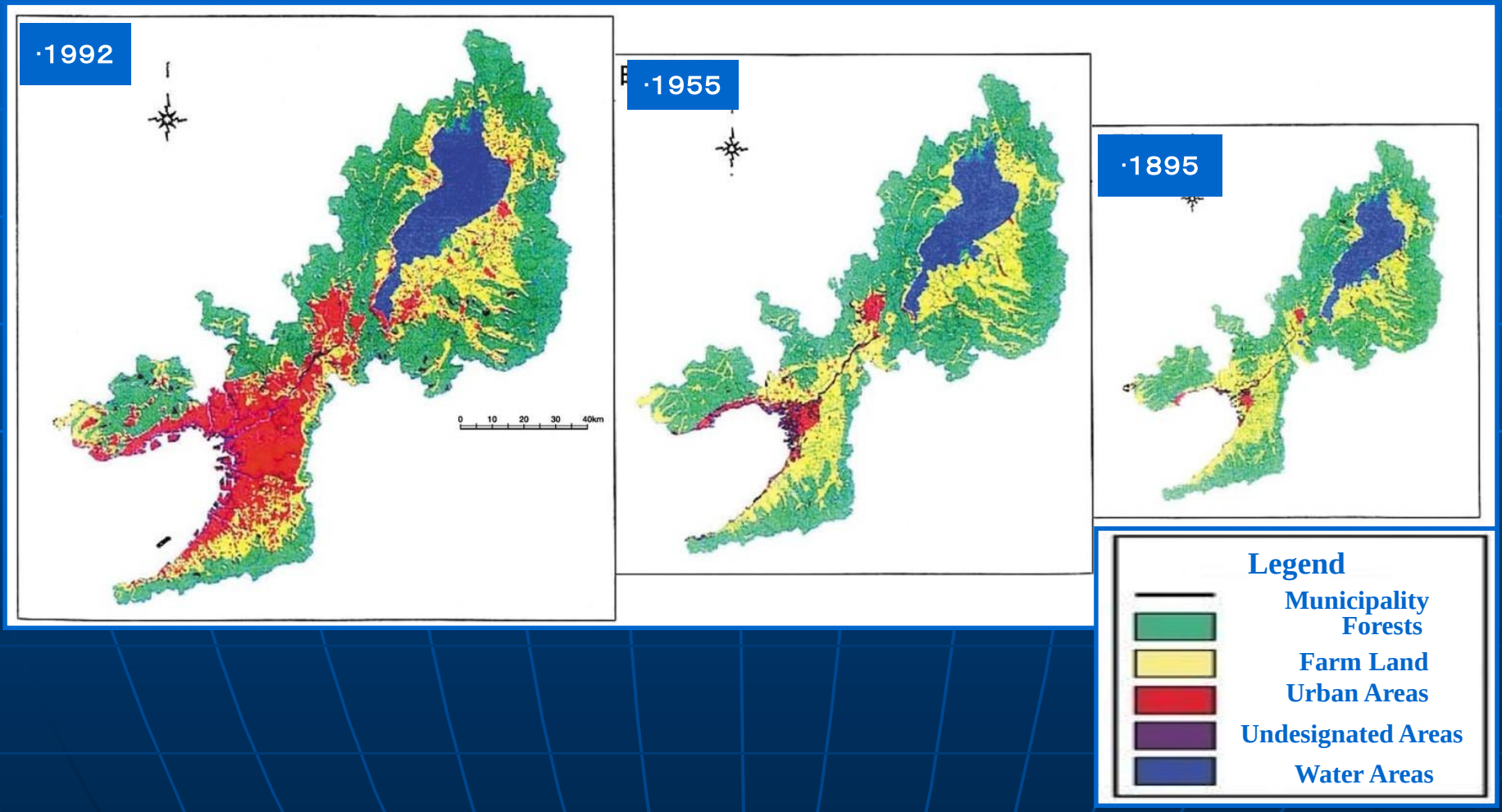
The Lake Biwa Weir

Weir History: Original one (1905)

Rplaced with a new one (1961)

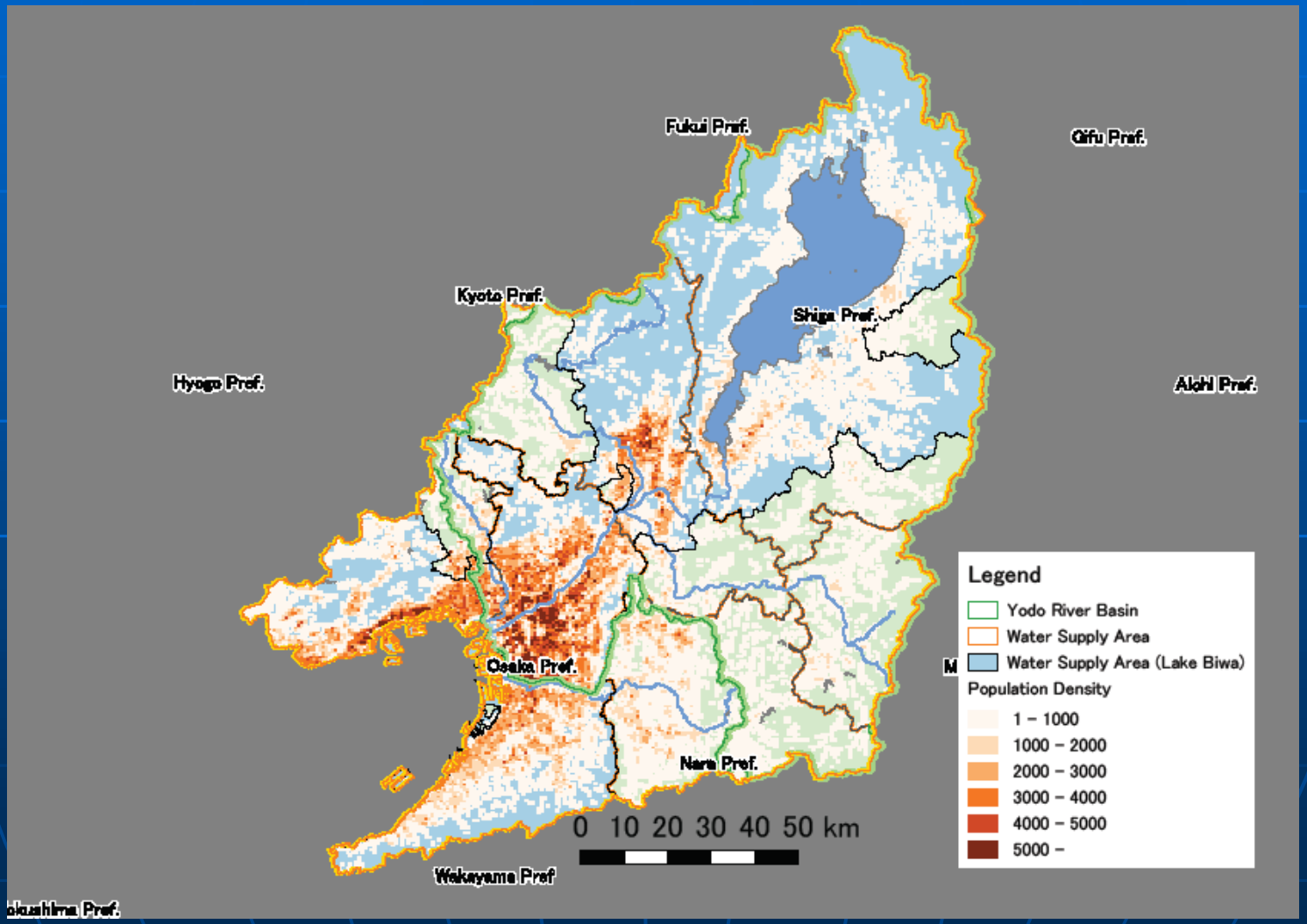
Improved with a bypass(1992)

Land Use Changes in Lake Biwa and the Yodo River Basin



·(Lake Biwa Museum

The Biwa - Yodo - Osaka Bay Basin, Population Distribution (as of 2018)



Results-1 (Lake Biwa Comprehensive Development – LBCDP, 1972-1997)

4. WATER RESOURCES AND REGIONAL DEVELOPMENT NEEDS

4.1. Lake Biwa Comprehensive Development Project (LBCDP)

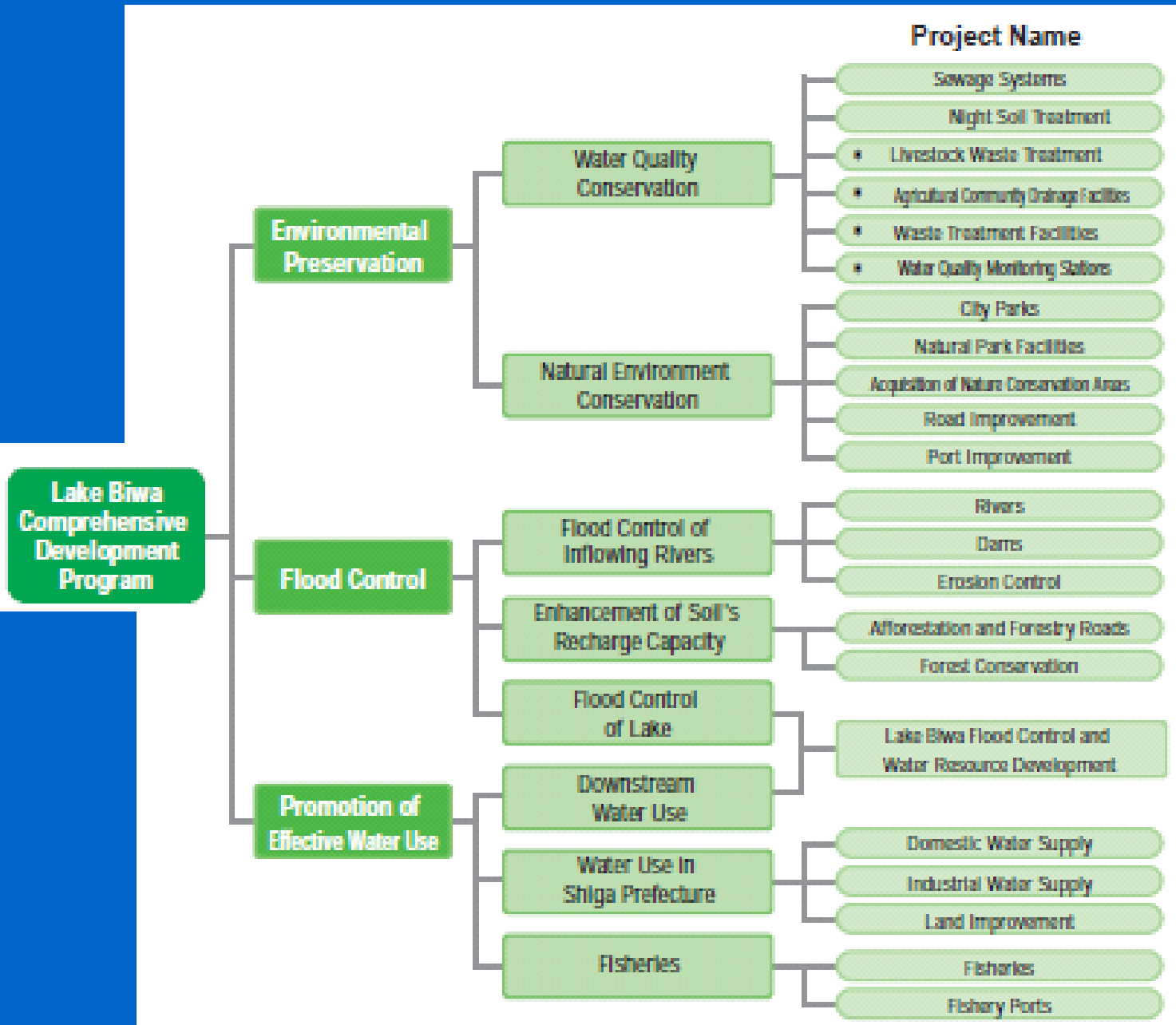
- 1972-1997, 25 years
- Basically for Downstream water needs

4.2. Policy Framework of LBCDP

- Special Law
- Upstream and Downstream Governments
- Ministry of Construction (then) was the lead agency

4.3. Implementation Schemes of LBCDP

- Lake Biwa water Level
- Seta River dredging and Shoreline flood management
- Weir operating principles
- Development of the Yodo River Basin Management Plans



*: Projects added at the time of revision of the appropriate law in 1982

Systems of Lake Biwa Comprehensive Development Program

LBCDP viewed as an IWRM

- **Integrate Demands of Upstream & Downstream**
  - **Sending more water from Lake Biwa to downstream by lowering the Lake Biwa water level**
    (With Compensation for lowering water level: Port, water intake renewal, etc.)
  - **Upstream region (Shiga) development by special financial arrangement including covering cost partly by downstream governments**
- **Integrate Needs of Flood Control, Water Use, Environment**
  - **Diverse water resource area improvement projects in upstream (Shiga)**
- **Integrate Water Conservation Programs in Lake Basin**
  - **Afforestation, River Improvement, Sewerage, etc.**

Water Quantity Management

	Average	Annual
	m3／s	mill.m3／y
Seta River	136	4,423
Uji River	177	5,572
Katsura River	46	1,453
Kizu River	51	1,561
Yodo River mainstream	267	8,453

SetRiver 4,423

Kizu River 1,561

Uji River 5,572

•Katsura River 1,453

Yodo River 8,453 mill.m3／y

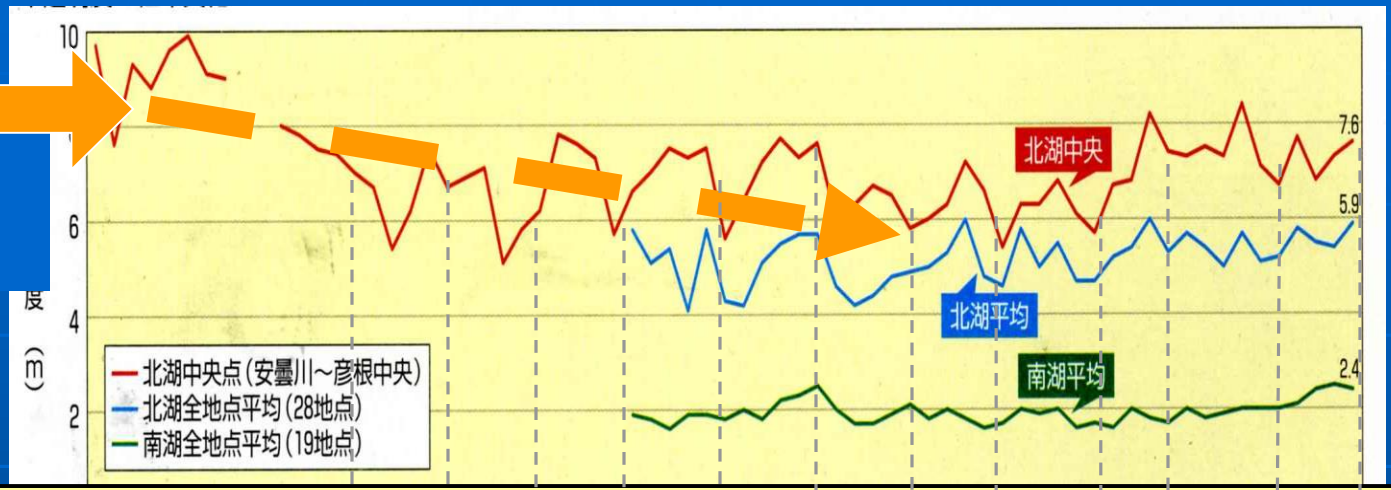
Soucce: Lake Biwa-Yodo River Water Quality Preservation Organization


2

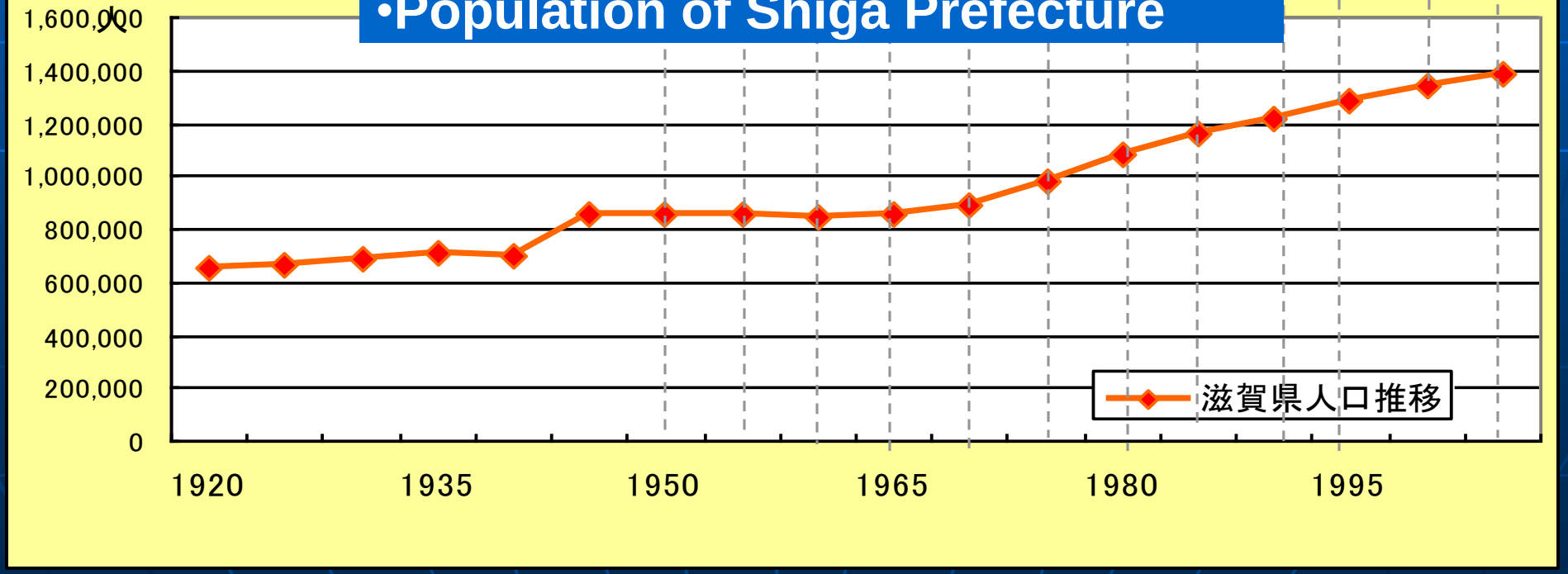
Seta River Weir controls the lake water level and the Seta River flow (only outflow river from Lake Biwa) (built 1905, renewed 1961)

Needs of Upstream/downstream
Water Quality Degradation in Lake Biwa

Transparency degree (m)

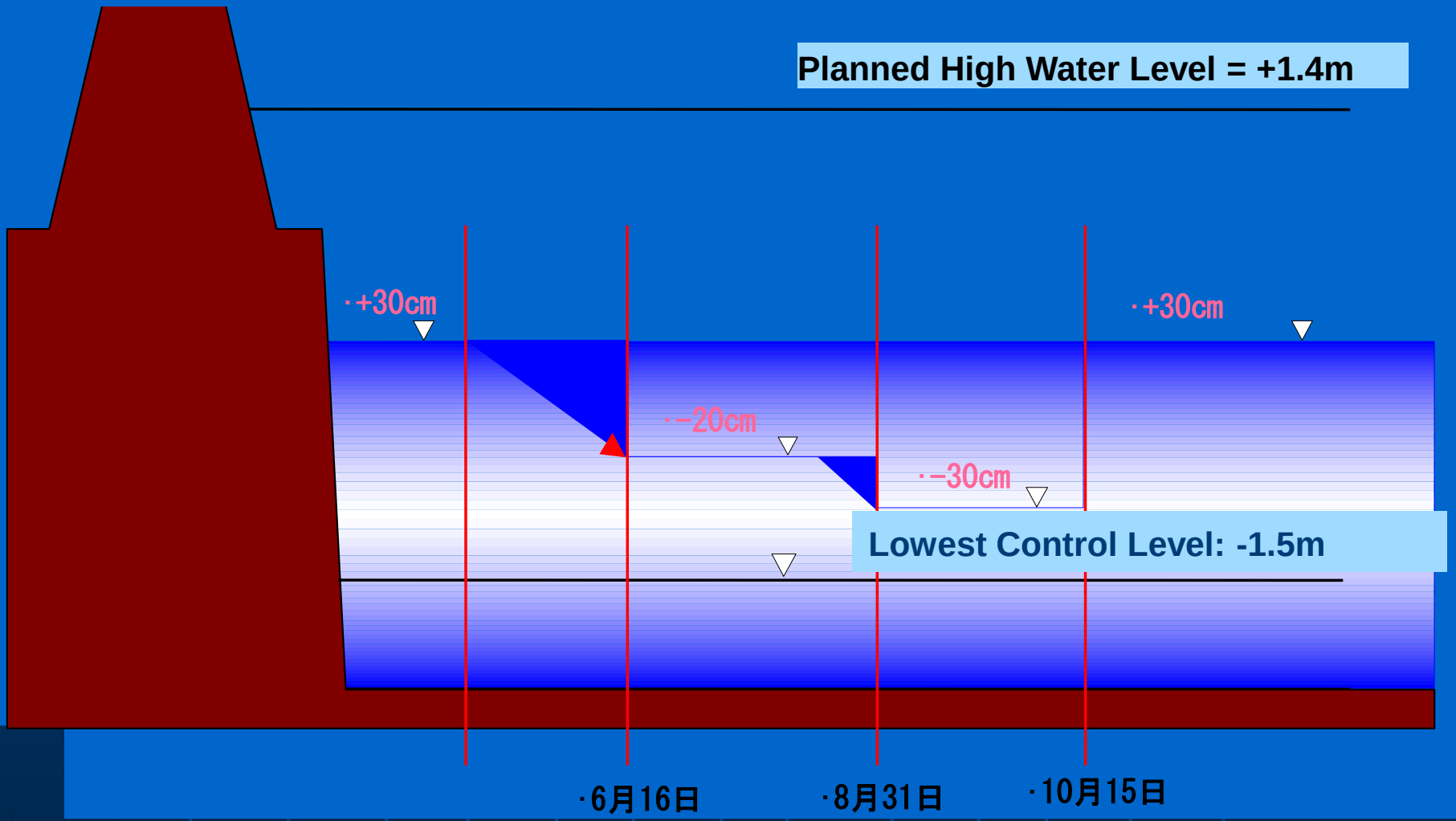


•Population of Shiga Prefecture



New Water Level Control

- Utilize water of Lake Biwa down to -1.5m
- Give additional 40t/m3 water supply to downstream

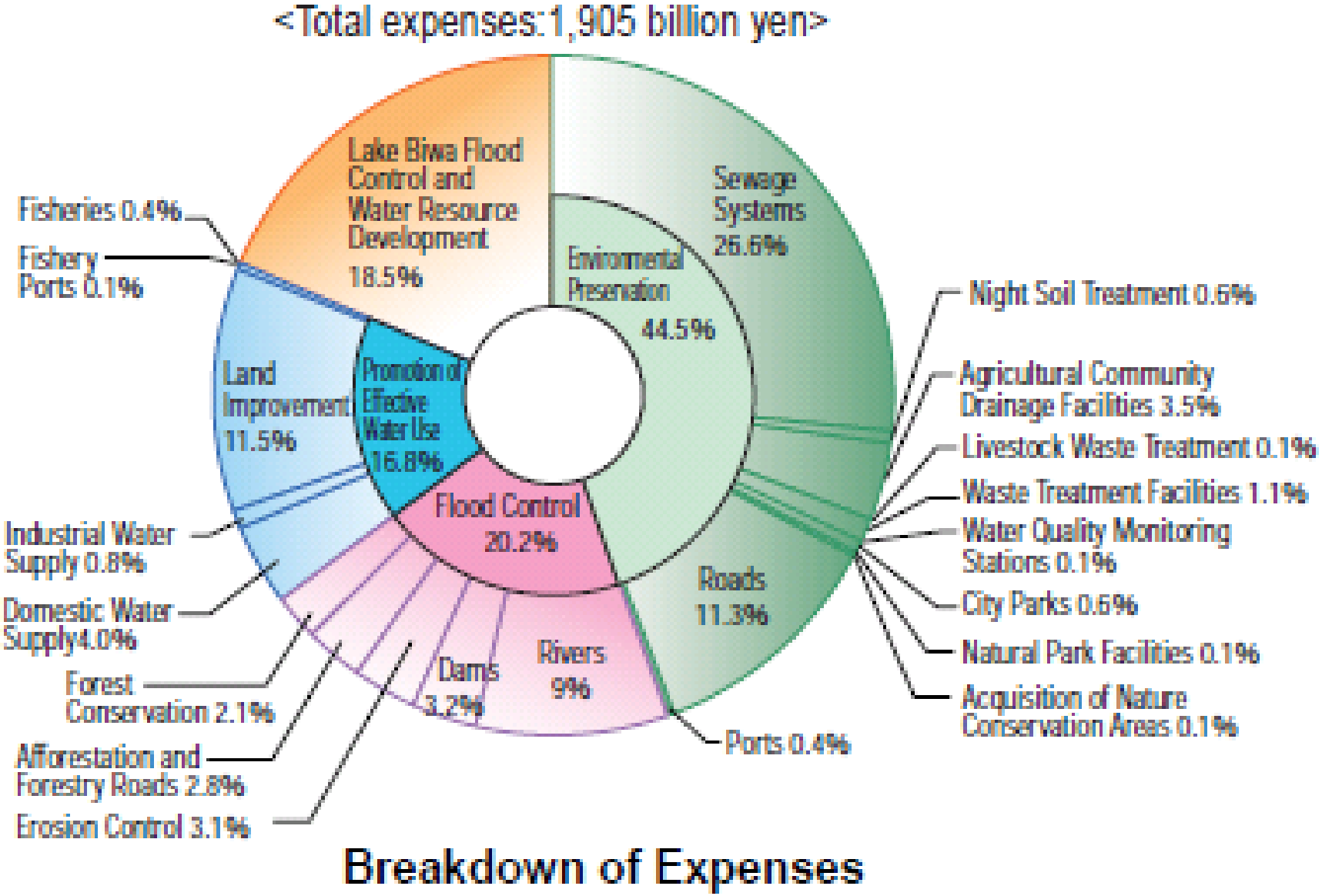


LBCDP Features

- Coordination of up/downstream's needs by national government
- National Project supported by special legislation and long-term plan framework
- Special Financing Arrangement

  (National government subsidy, fund transfering from downstream government to upstream government)

LBCDP expenses



Breakdown of Expenses

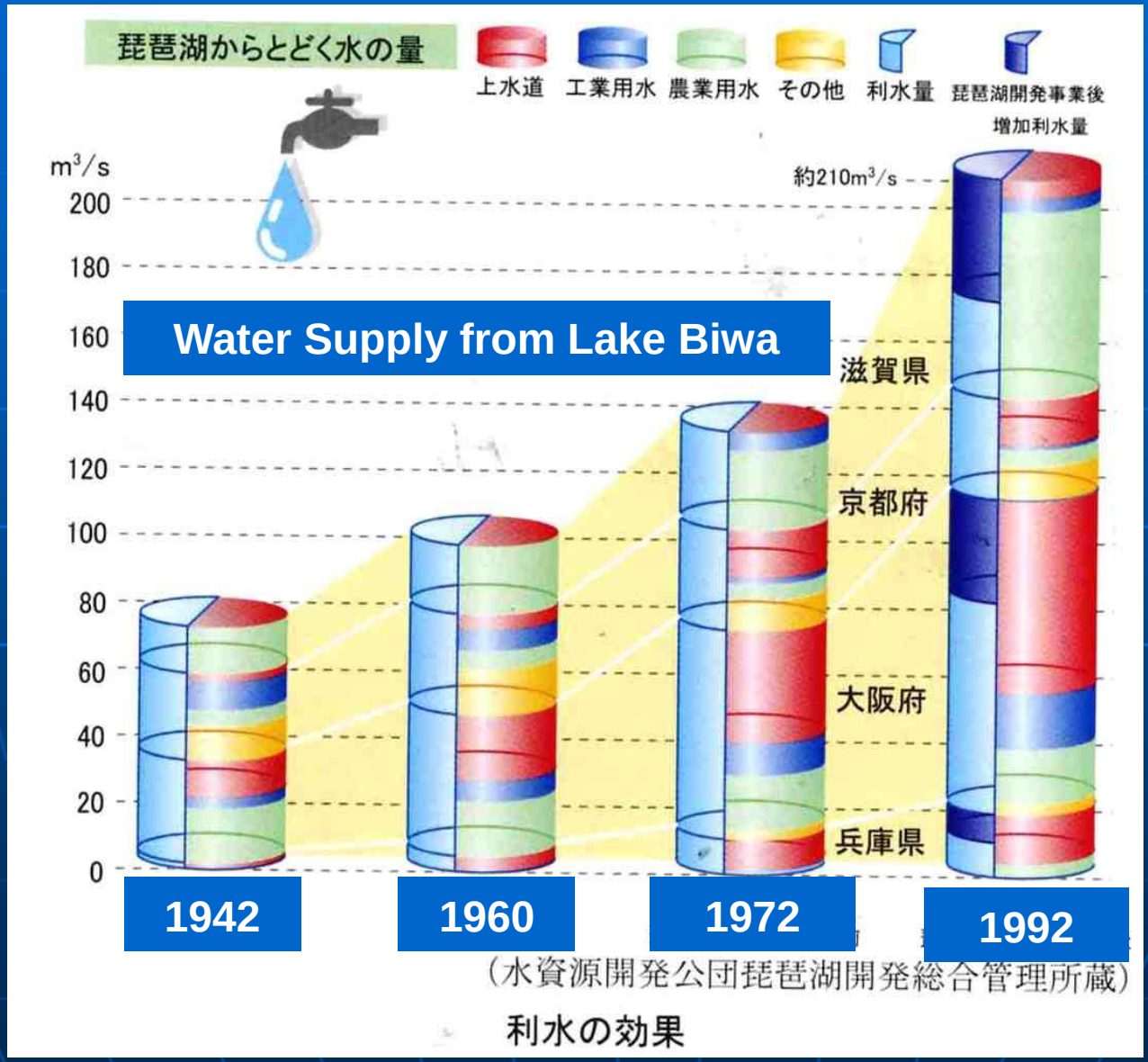
Finance of LBCDP

Projects by Japan Water Agency (Lake Flood Control, Water development and Water Lowering compensation)	351,300 million yen (approx.3,513 m.$)
Projects by Prefectural and Municipal Governments (Other Region Improvement projects)	1,554,243 million yen (approx.15,542 m.$)
Total	1,905,543 million yen (approx. 19,055 m.$)

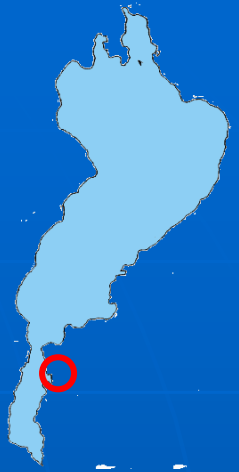
Special Financial Arrangement

- **Higher subsidy rate of national government**
  e.g., Sewerage subsidy: 1/2 to 3/4
- **Osaka/Hyogo Governments Pays part of Shiga's expense**
  60,200 m. yen total (602 m $)
- **Osaka/Hyogo Governments Granted a Loan to Shiga**
  5,000 m.yen total (50 m. $)

LBCDP's results: Water for the Upstream and Downstream Areas

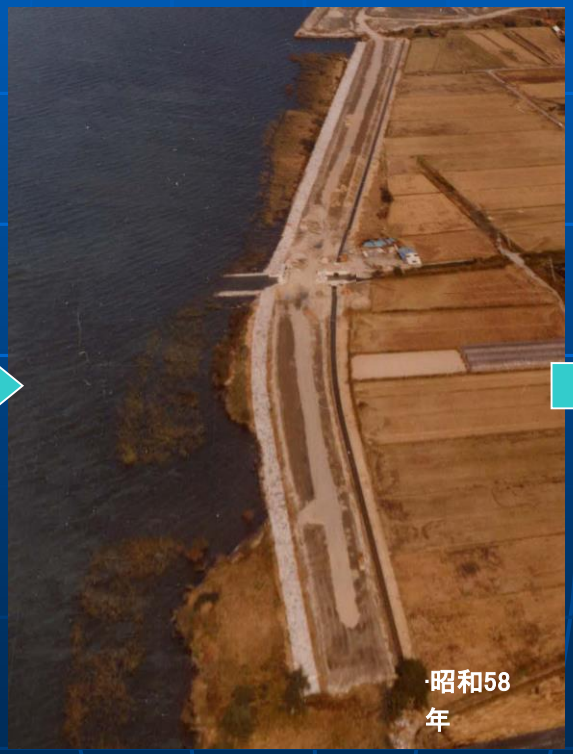


LBCDP's results
Lake Shore Flood Control

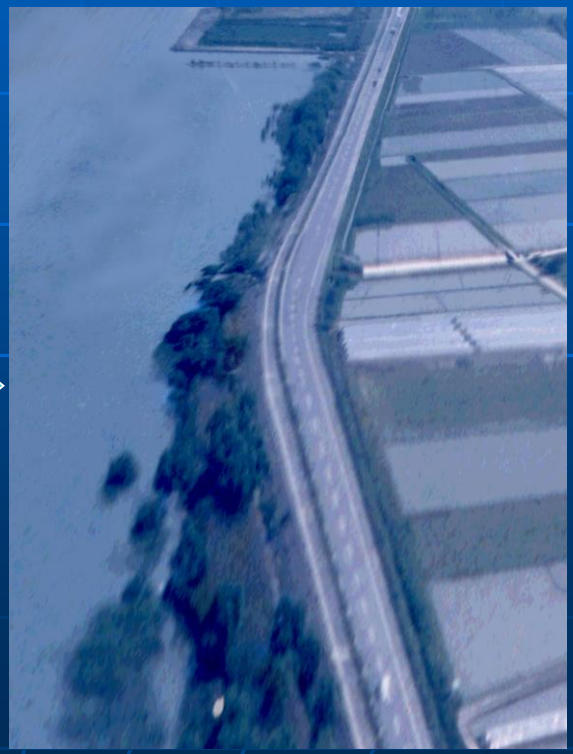


·Kusatsu region, South Shina 2nd area

Before dike construction **under construction** **Completion**



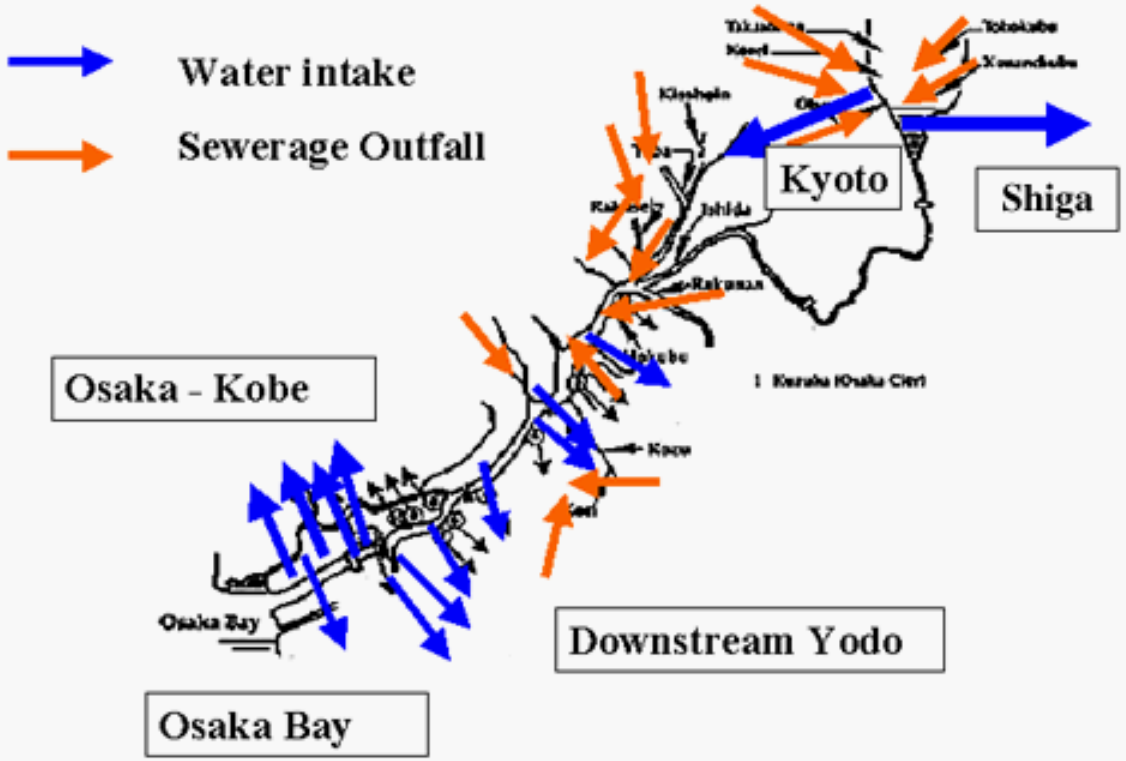
·昭和58年



·出典:「淡海よ永遠に 琵琶湖開発事業史」
(現近畿地方整備局、水資源開発公団)

·出典:「琵琶湖開発事業現況写真」
水資源開発公団

Water Supply and Sewerage for Downstream



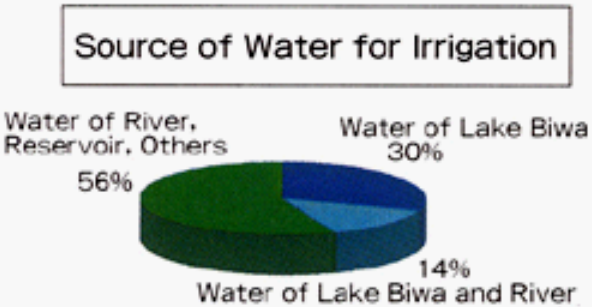
Keihanshin Region:

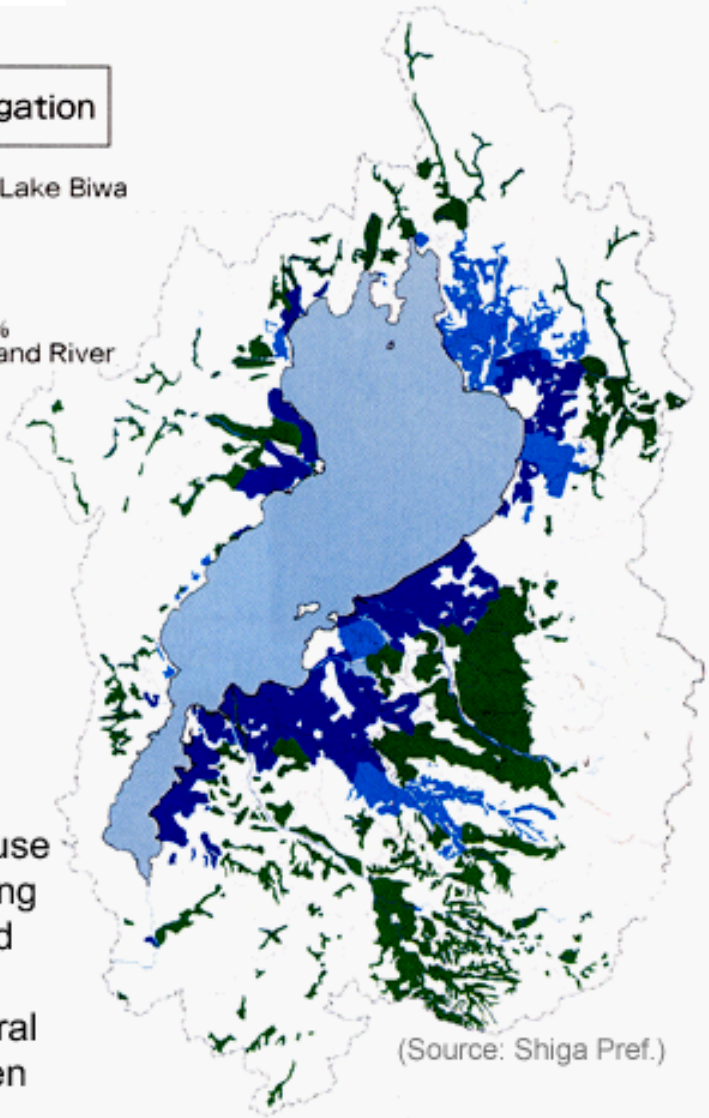
A complex web of water supply and wastewater networks, which support high level of municipal, industrial and agricultural activities, characterize the region. This great metropolitan complex within the Keihanshin (Kyoto, Osaka, Kobe) region has been almost totally dependent on Lake Biwa and the Yodo River for its water resource needs. To meet growing demands, the water resource capacity had to be greatly increased through Lake Biwa Comprehensive Development Project (LBCDP).

Masahisa Nakamura, Executive Director
and Vice President ILEC Foundation:
RCSE Shiga University

Next Sheet

Irrigation and Drainage



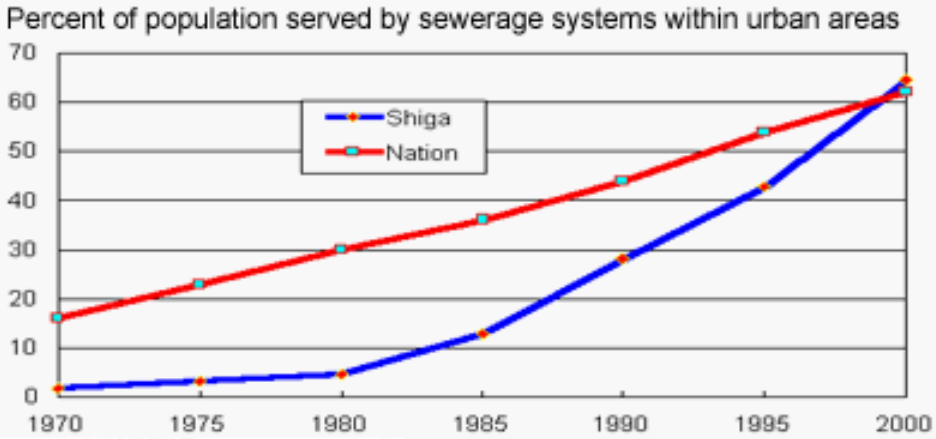


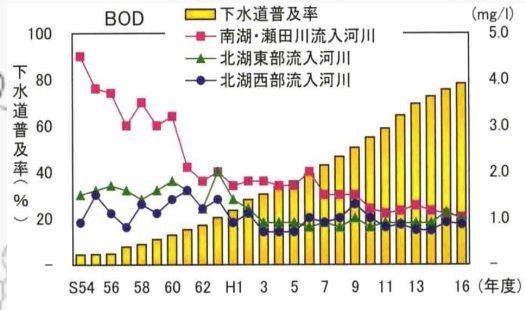
Piped Water Systems:

The traditional cascade irrigation of paddy fields where water was reused repeatedly from upstream to downstream has gradually been replaced by piped water supply systems that use a large amount of water pumped up from the lake. After being applied to each field, the return flow that contains fertilizer and pesticide residues is discharged directly back into the lake through return flow channels shown above. Some of the natural wetland functions of the traditional paddy fields have also been lost.

Masahisa Nakamura, Executive Director and Vice President ILEC Foundation: RCSE Shiga University

Variety of Sewerage Systems





(Source: Shiga Pref.)

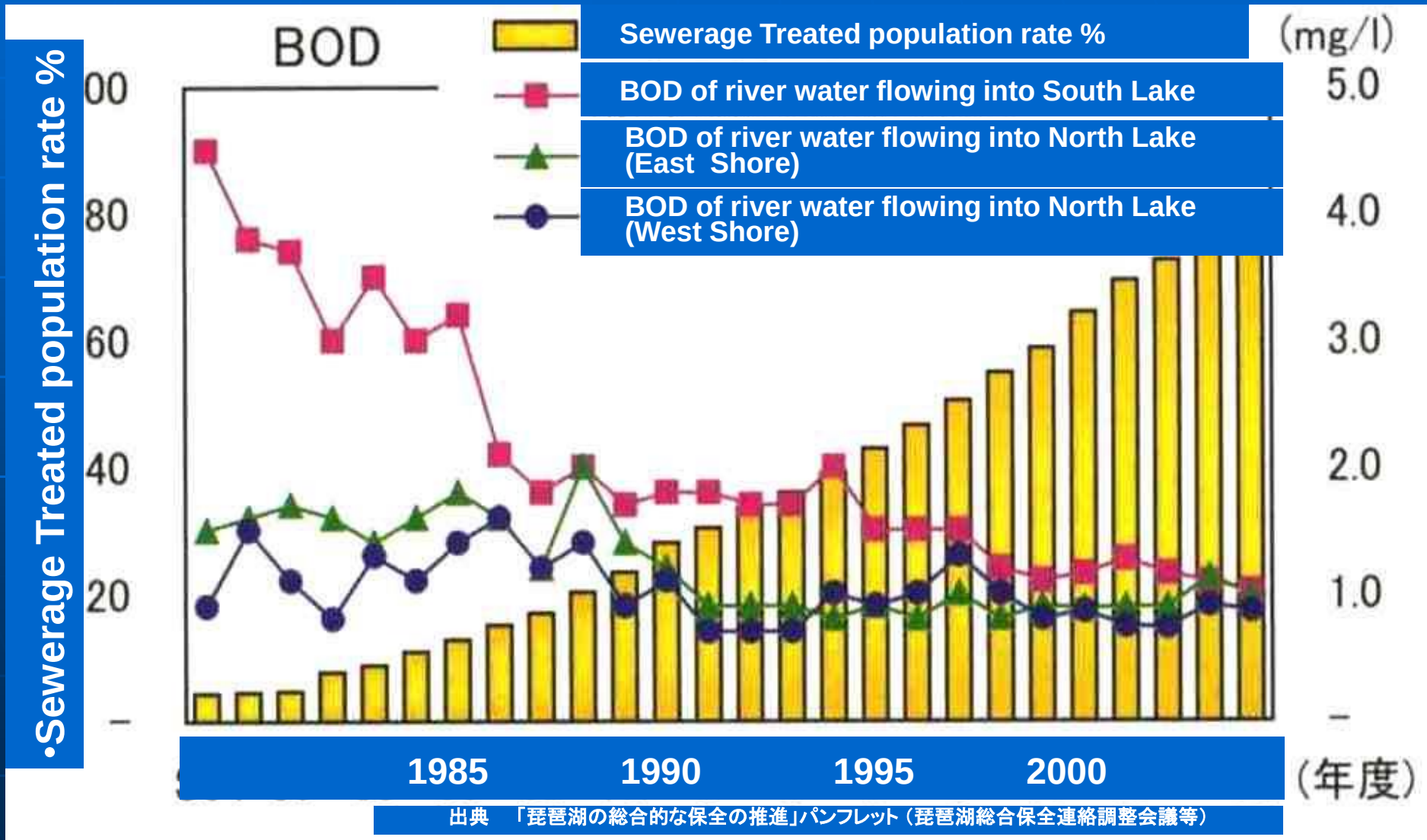
Sewerage:

The sewerage service coverage has rapidly expanded in the past decades.

LBCDP's result Environment conservation in Lake Biwa area

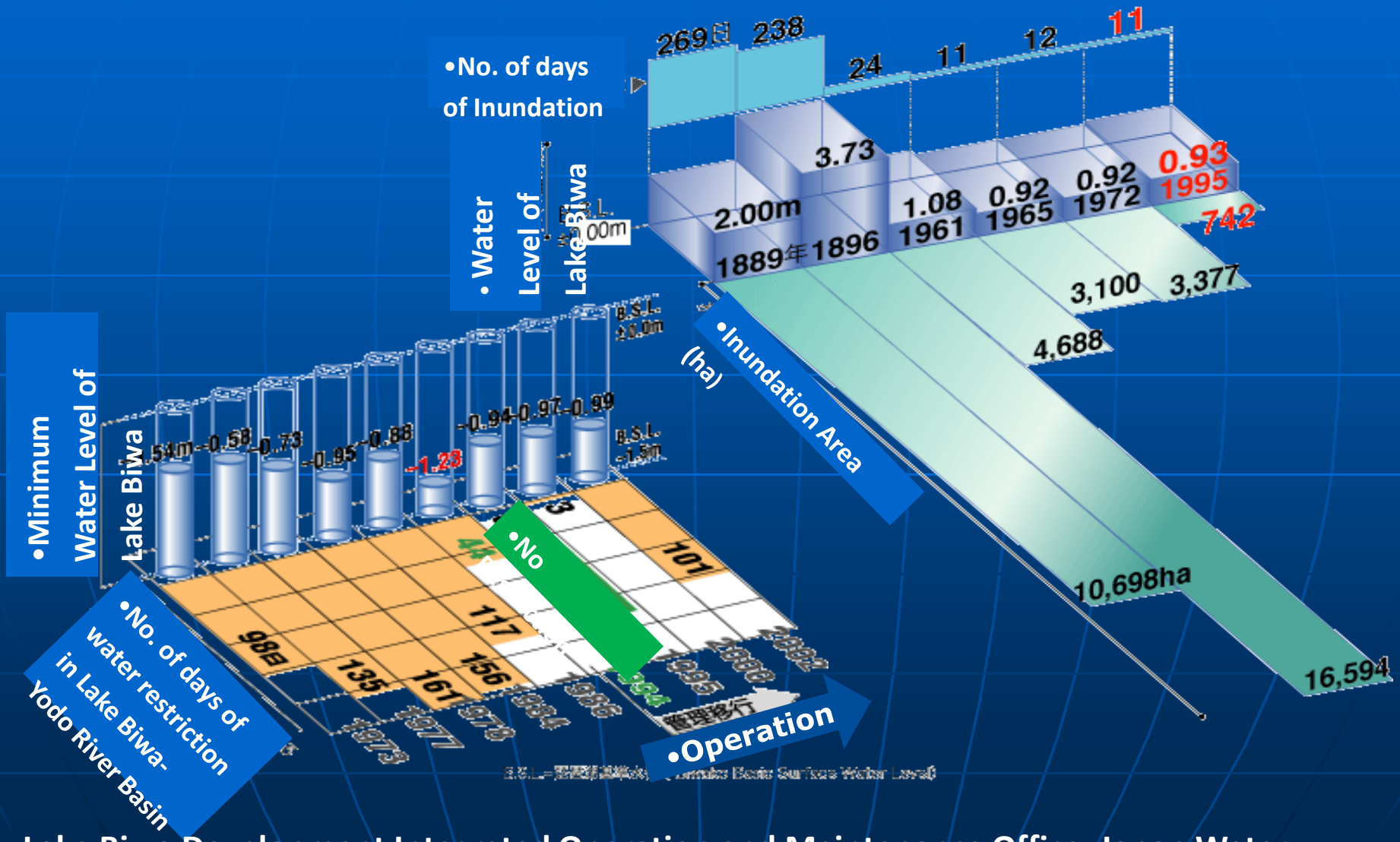
Konan-chubu
Sewage Treatment
Plant

LBCDP's result
Water Quality Improvement in Lake Biwa



出典　「琵琶湖の総合的な保全の推進」パンフレット（琵琶湖総合保全連絡調整会議等）

Outcome of LBCDP in Flood Control and Water Use



- Lake Biwa Development Integrated Operation and Maintenance Office, Japan Water

LBCDP did achieve its major objectives.

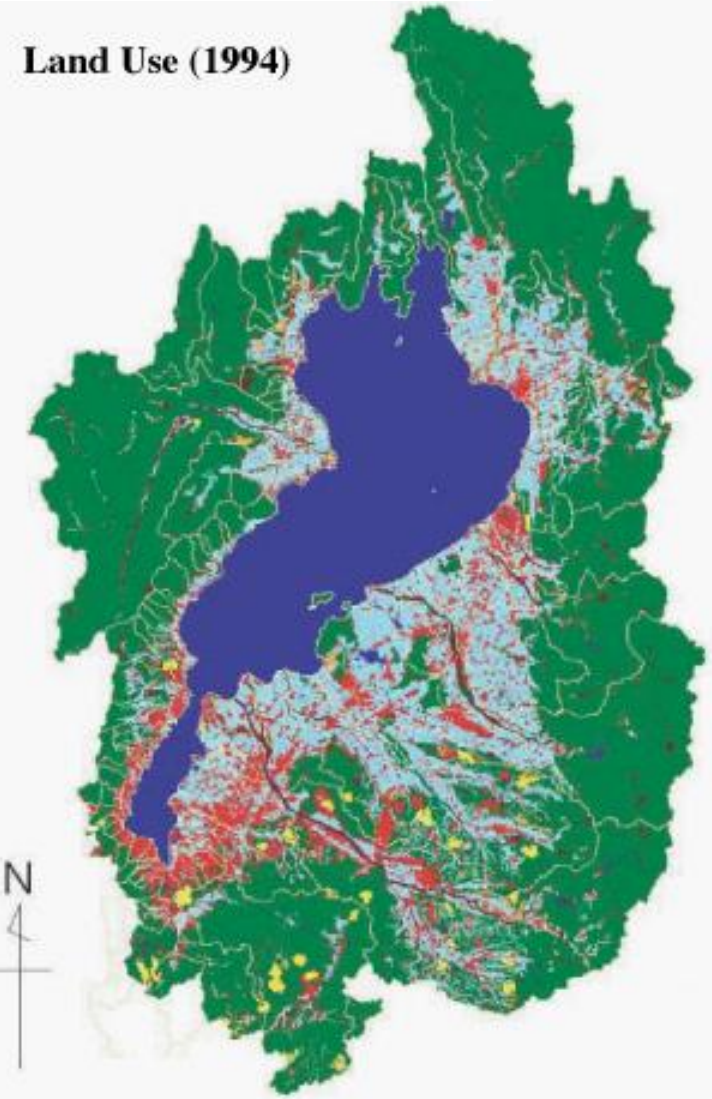
On the other hand,

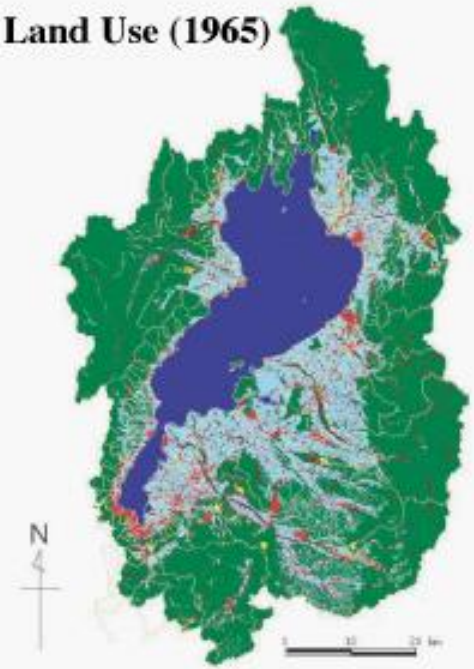
there have been massive transformations in the watershed and lakeshore that led to significant ecosystem deteriorations.

Reason 1

CONTENTS

ıse Transformation





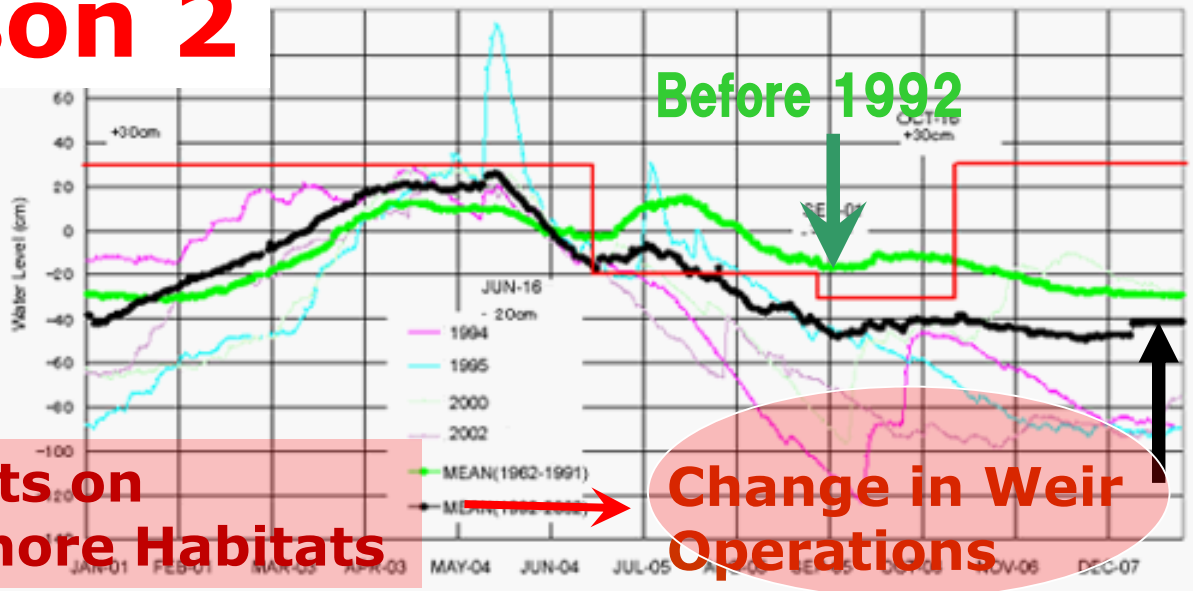
Land-use Changes (1965-1994):

Land use in the Lake Biwa watershed has changed remarkably over the past decades, particularly due to urbanization and industrialization. The increasing demand for more recreational activities has also led to such land development schemes as conversion of forestland into golf courses and reclamation of the shoreline land for construction of parks and other leisure facilities.

FC2. Water Level Control

Reason 2

Changes in the water levels before (1962-1991) and after (1992-2002) the alteration in the weir operation rules



Impacts on Lakeshore Habitats

Change in Weir Operations

(Source: Shiga Pref.)

Fluctuating Water Level:

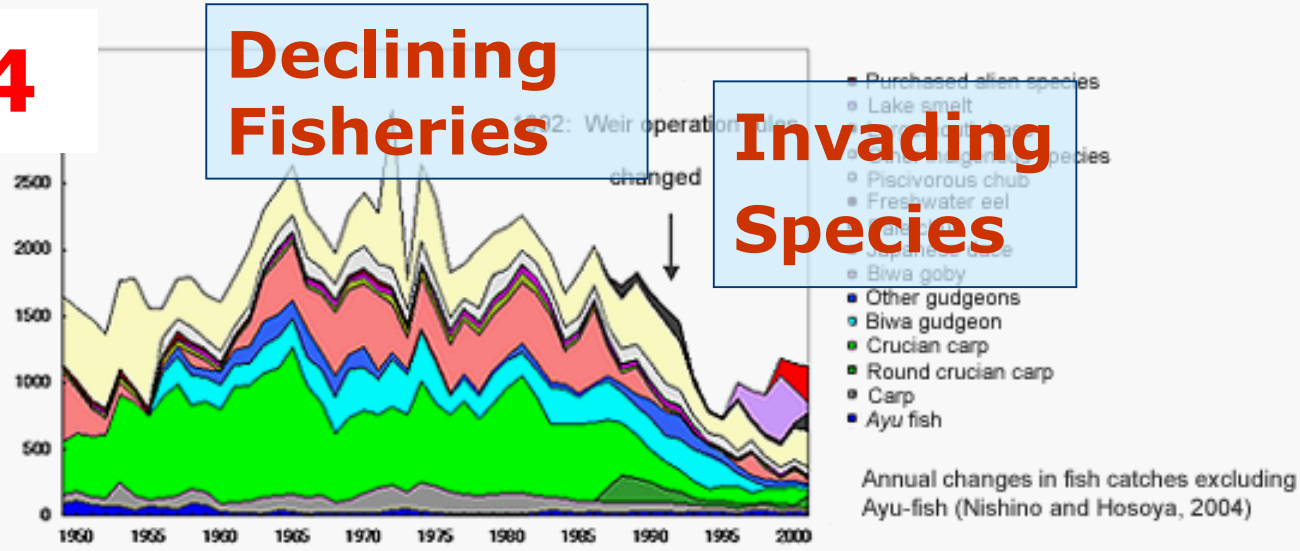
Although the average water level of Lake Biwa has been on the decrease by 1.5m for the past two to three hundred years, the seasonal fluctuation pattern, marked by high water levels after rainfall in summer, has remained unchanged for over a hundred years. However, the alteration in the weir operation rules in 1992 has had an adverse impact on the seasonal fluctuation pattern, causing water levels to drop during summer seasons; sometimes the water levels plunged by nearly 1m if the precipitation in summer was small. The changed water level profile is believed to have had a serious impact on the ecosystem as well as on the biodiversity of Lake Biwa.

LO1. Plants and Animals in Lake Biwa

Result 4

Declining Fisheries

Invading Species



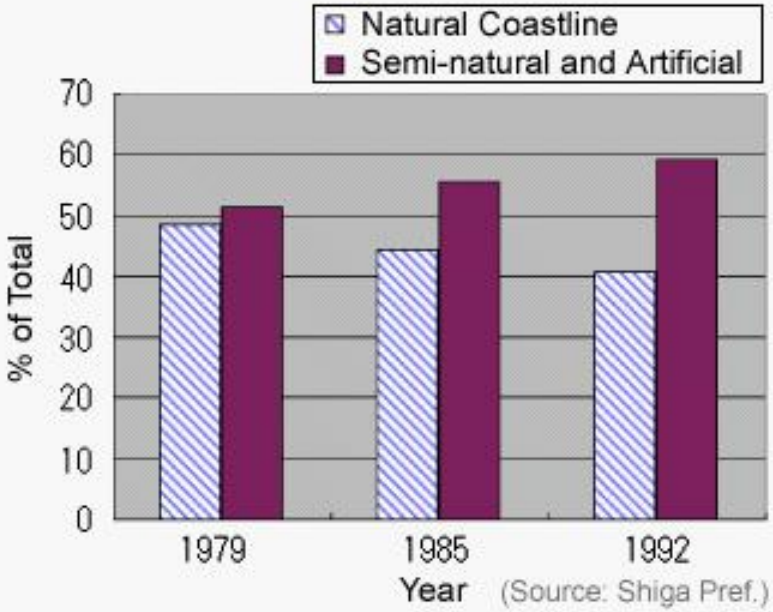
Annual changes in fish catches excluding Ayu-fish (Nishino and Hosoya, 2004)

Sharp Decrease in Fish Catches:

In Lake Biwa, fish catches of most indigenous species, such as the deepbodied crucian carp *Carassius cuvieri* and the round crucian carp *Carassius carassius grandoculis*, have fallen sharply, particularly those of indigenous species with the exception of the osmerid Ayu-fish, *Plecoglossus altivelis altivelis*; with regard to Ayu-fish, their spawning activities have specially been protected by using artificial streams. Some of the possible causes of decline include: a decreased habitat of emergent plants (e.g. reeds) within the Lake and *naikos* (attached lakes), a disruption in the migration route of aquatic animals caused by the changes in the paddy irrigation system around the Lake; changed seasonal patterns of water levels and recurrent low water levels in summer, observed ever since the changed weir operation rules were introduced in 1992; artificial introduction of and the resulting increase in invasive alien species, most notably in largemouth bass and bluegills; and changes in water quality, e.g., eutrophication and the influx of hazardous substances.

SB2. Loss of Natural Environments

Reason 3



Shoreline Transformation:

The construction of motorway-topped levees transformed much of the natural shorelines to artificial ones around the entire lake. Extensive land-filling along the shoreline has also been undertaken particularly in the South Basin.

Masahisa Nakamura, Executive Director and Vice President ILEC Foundation: RCSE Shiga University

Related Sheets Next Sheet

北湖3. 河川水の流入-1

安曇川

河川水の流入： ムービーを見る

河川水は、冬の終わりには比重の大きい融雪水として琵琶湖の深底部に注ぎ込み、春先の代掻き田植え時期には灌漑排水を混入して湖の表層に沿って拡散し、また、夏季の集中豪雨などは強固に発達した水温躍層の上をすべるように広がる。

IR2. Impact of Return Flows

Reason 4

Bird's eye view of the paddy irrigation return flow

Planting Season:

The increase in part-time farmers has resulted in a concentration of spring farming activities to a particular holiday season called "the Golden Week" during which a large amount of irrigation return flow is discharged simultaneously from across the entire lake watershed.

FR1. Forests and Their Functions

Reason 5

Beech Forest in Yogo

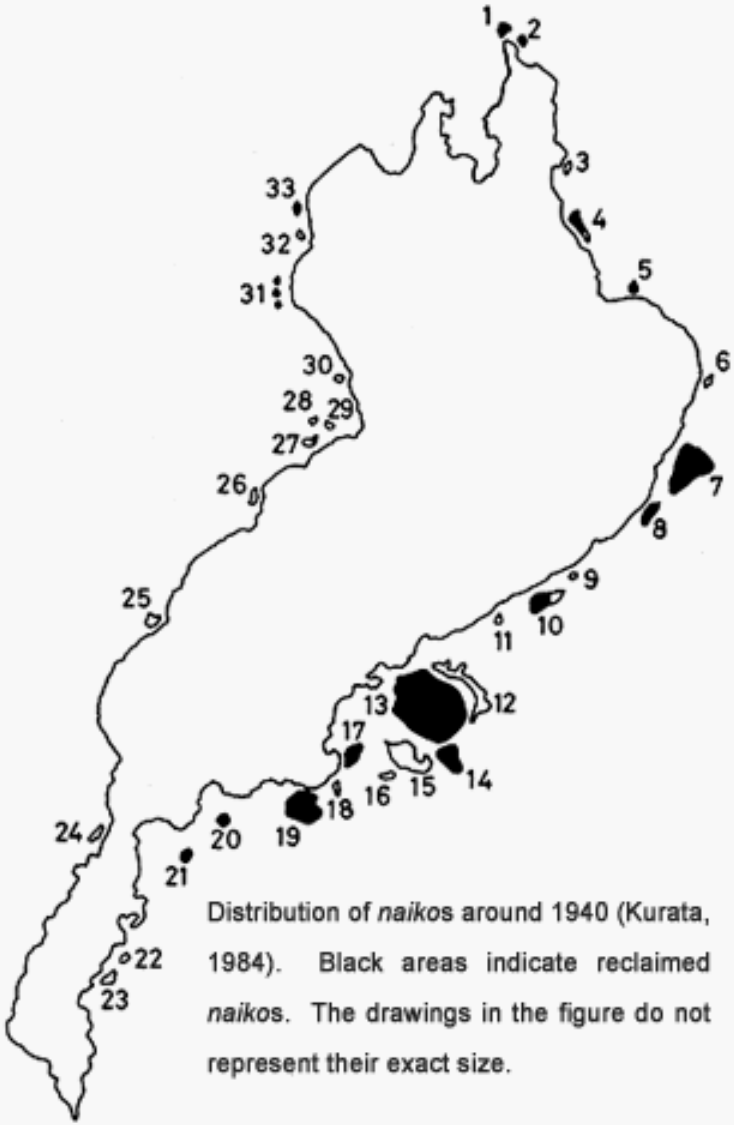
Cryptomeria japonica Forest in Kutsuki

Land Use by Forest Type:

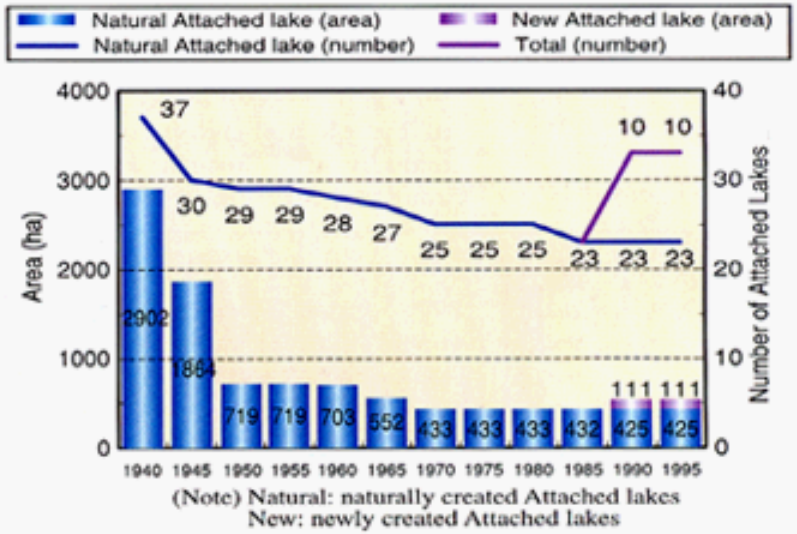
Forests cover some 60% of the Lake Biwa watershed. Natural forests, consisting mostly of evergreen oak and beech forests, make up only 2.8% of the area, while the planted forest land, consisting mostly of Japanese cedar (*Cryptomeria japonica,* or Sugi in Japanese) and cypress (*Chamaecyparis obtuse,* or Hinoki in Japanese) occupy 12.2%. The remaining land is occupied by secondary deciduous forests and pine forests. The transformation from natural to artificially planted or semi artificially introduced tree species over the years is said to have caused reduction in water retention and natural purification capacities.

Result 6

al Environment



Distribution of *naikos* around 1940 (Kurata, 1984). Black areas indicate reclaimed *naikos*. The drawings in the figure do not represent their exact size.



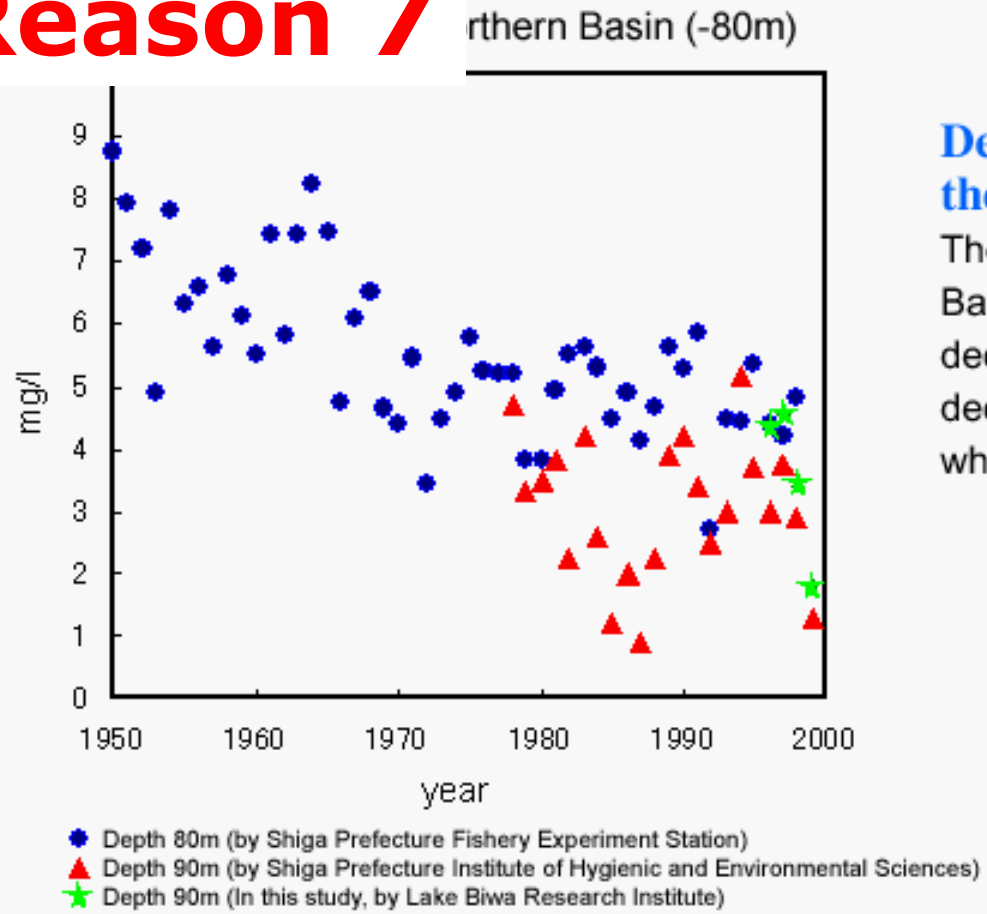
Changes of *Naikos* in Number and Area

Former *Naikos*:

The Nango Weir, a type of dam constructed in an effort to maintain water levels under control, started its operations in 1905. Prior to that, water levels of Lake Biwa used to rise after consecutive rainfalls, causing the shorelines to recede landward greatly. Such recession of shorelines as well as expansion of waters prompted the growth of wetlands, called *naikos* or "attached lakes", particularly those of emergent plants. *Naikos*, surrounded by paddy fields and a network of creeks and ditches, used to provide sufficient open water as well as connection to the lake, allowing many wild fish and bird species to spawn and thrive.

HM3. Climate Change

Reason 7



Decreasing DO Concentration at the Lake Bottom:

The yearly minimum DO at in the North Basin (-80m) has been gradually decreasing over a period of several decades, except for the last decade when the trend has not been so clear.

SB3. Blue-green Algal Blooms

Result 1

Blue-green Algal Blooms:

As the flow in and out of the lake is increasingly controlled, the lake water becomes stagnant more often. This can result in anaerobic conditions in areas where organic sediments accumulate. It also contributes to more frequent algal blooms.

see a movie

"Aoko" or a blue-green bloom in a South Bain bay.

NB5. Benthic Condition

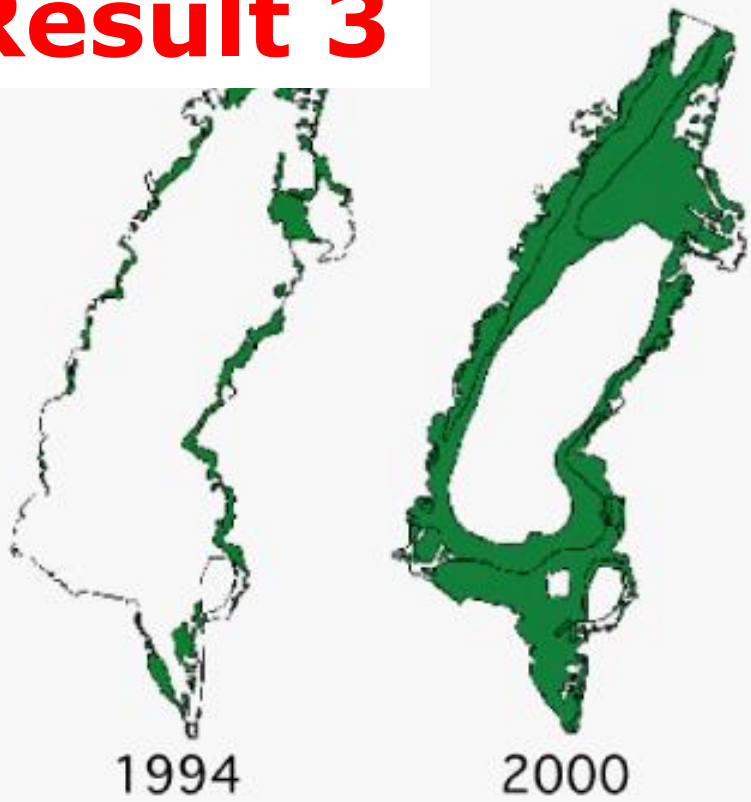
Result 2

Thioploca:

While the general belief is that the water quality of Lake Biwa has not deteriorated for the past decades, various environmental changes have occurred in the lake ecosystem recently. One such change was found in the profundal zone in the northern Lake Biwa: in March 1991, a dense mat of *Thioploca* spp., sulfur-oxidizing bacteria which use hydrogen sulfide as a source of energy, was discovered from the sediment layer at depths of 60m in the northern basin of Lake Biwa (Nishino *et al*, 1998; Nishino, 2002). It was the first report of *Thioploca* occurrence in Japan, and in Asia second only to the case in Lake Baikal. Occurrence of the genus *Thioploca* in high density implies that a considerable amount of hydrogen sulfide is generated in the lake bottom, in other words, the bottom of Lake Biwa is mostly hypoxia (Nishino *et al*, 1998)

SB5. Distribution of Submerged Macrophytes

Result 3



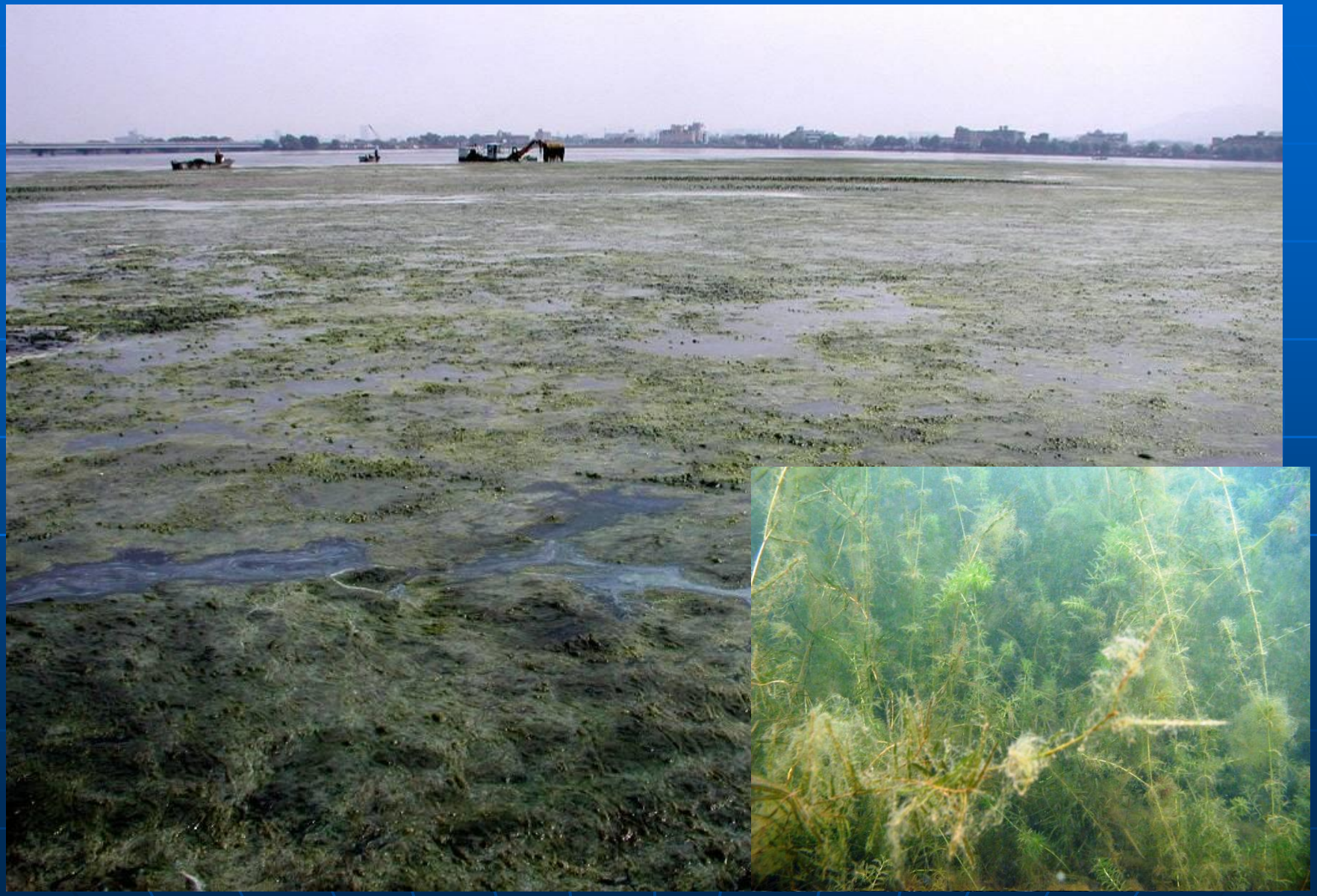
Hydrilla verticillata

Myriophyllum spicatum

Distribution of Submerged Macrophytes:

The area occupied by submerged macrophytes in the South Basin has drastically increased since the 1994 drought, during which an increase in light penetration to lower depths stimulated the germination of plant seeds at the lake bottom.

Macrophytes (Water Plants) Infestations



Exotic Fish Increase

•http://www.isewan-db.go.jp/ise-kankyo/img/B1g/akashio.jpg

“Soap campaign”

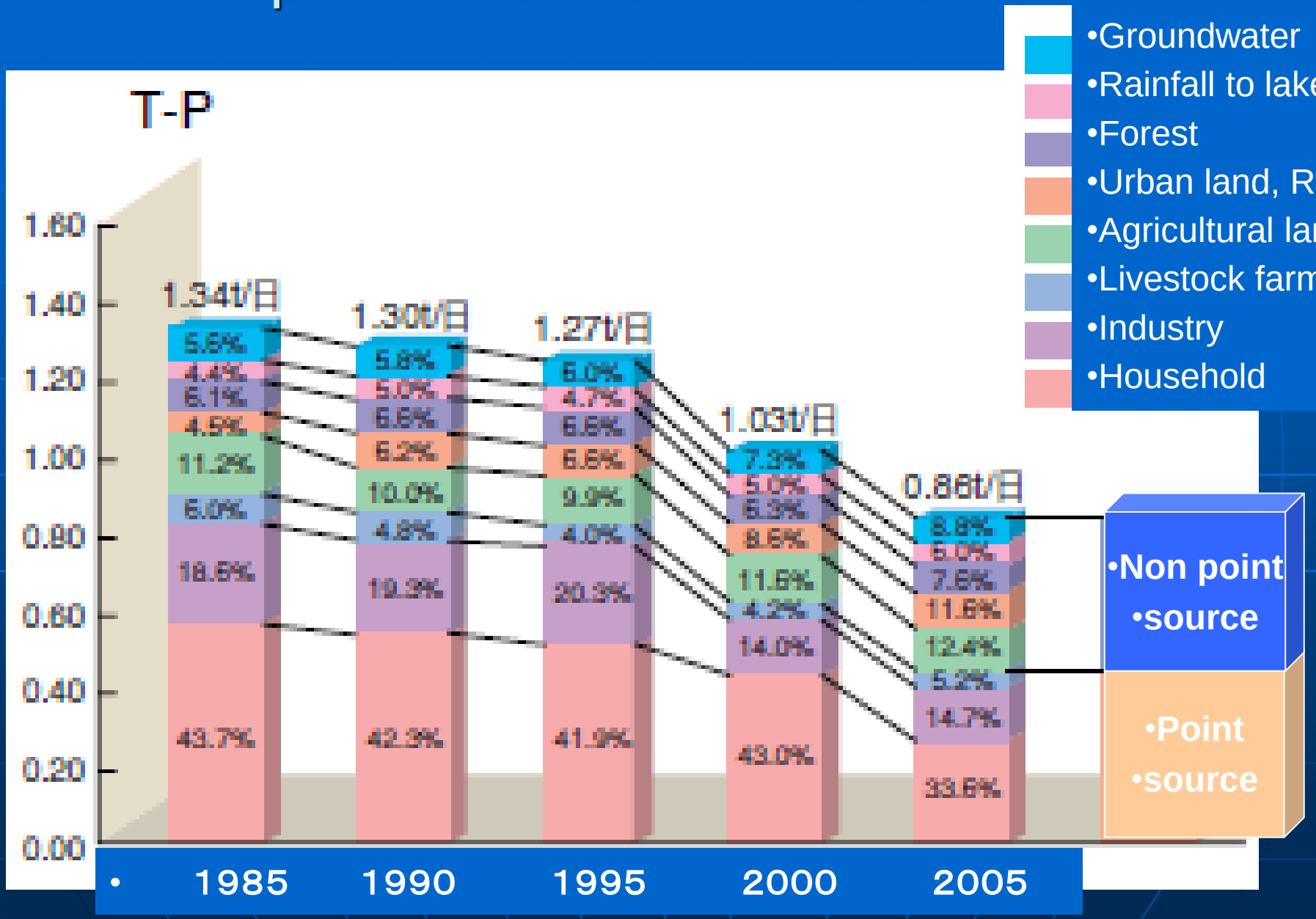
Housewive’s campaign to stop using synthetic detergents

Phosphrus-containing detergents exchanged with soap

•Lake Biwa Eutrophication Prevention Ordinance 1977(Japan’s first legislation for controlling inflow of nitrogen and phosphorus)

Red tide occurrence dramatically decreased next year

Composition of Pollutant Source



Needs for Dedicated Conservation Efforts

Lake Biwa Comprehensive Conservation Plan (LBCCP, 2000-2050)

First 10 Years

- Emphasis on "ecosystem restoration"
- No special national legislation
- Downstream governments reluctant to fund projects

Toward Next 10 Years

- Toward greater societal engagement
- The second phase plan (2011-2020) needs to be improved to meet the emerging needs

Lake Biwa Comprehensive Conservation Plan

First Stage Objectives

■ ***Maintaining water quality***
Restore the influent load to that of the late 1960s

■ ***Improving the Recharge Capacity of the Soil***
Secure an adequate area of forests and farmland for rainfall infiltration

■ ***Preserving the Natural Environment and Scenic Landscapes***
Secure strategic points for the creation of networks to be linked with biotopes

Second Stage Objectives

■ ***Maintaining water quality***
Return water quality to the level before malodorous tap water, freshwater red tides and the aoko water bloom began to be commonly observed in the late 1960s

■ ***Improving the Recharge Capacity of the Soil***
Improve the rainfall infiltration and holding capacity of forests and farmlands

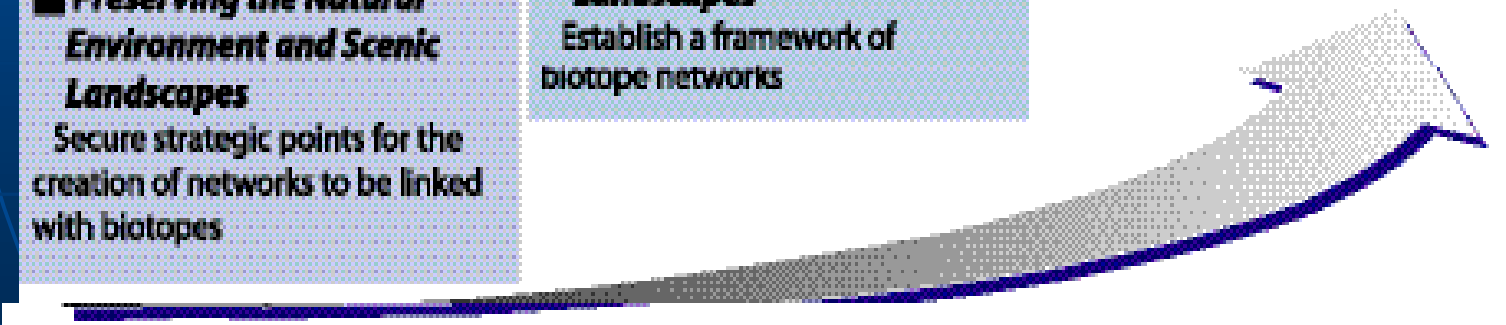
■ ***Preserving the Natural Environment and Scenic Landscapes***
Establish a framework of biotope networks

The Desired State of Lake Biwa

■ ***Maintaining Water Quality***
Water quality returned to the level of the late 1950s

■ ***Improving the Recharge Capacity of the Soil***
Living together with forests to make full use of the natural water cycle

■ ***Preserving the Natural Environment and Scenic Landscapes***
A Lake Biwa that presents beautiful and unique scenery in all four seasons, containing a variety of living creatures in a rich natural ecosystem that preserves the environment of the lake.



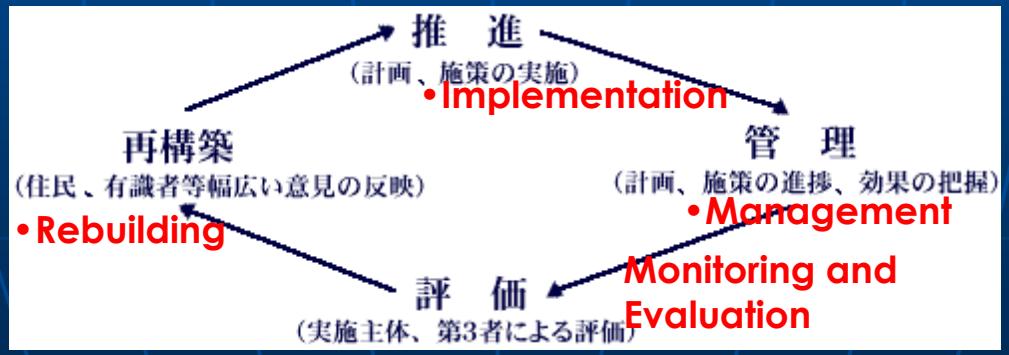
LBCCP to Facilitate Greater Efforts in

- Pursuing the Human - Ecosystem Balance
- Integrating Lake Watershed (River Basin) Management
- Advancing Monitoring and Treatment Technologies
- Enhancing Broader Stakeholder Participation

Ensuring the Plan's Effectiveness

- Flexible Execution
  - Reflecting observations, surveys, research, and technological development
  - Reflecting plan progress and assessment
  - Coordinating groups and measures
  - Considering institutional reform

Plan Mechanisms (for continuous improvement)



Lake Biwa Leisure Use Ordinance, 2002

Rule 1 — **Regulate Motored Pleasure Boats**

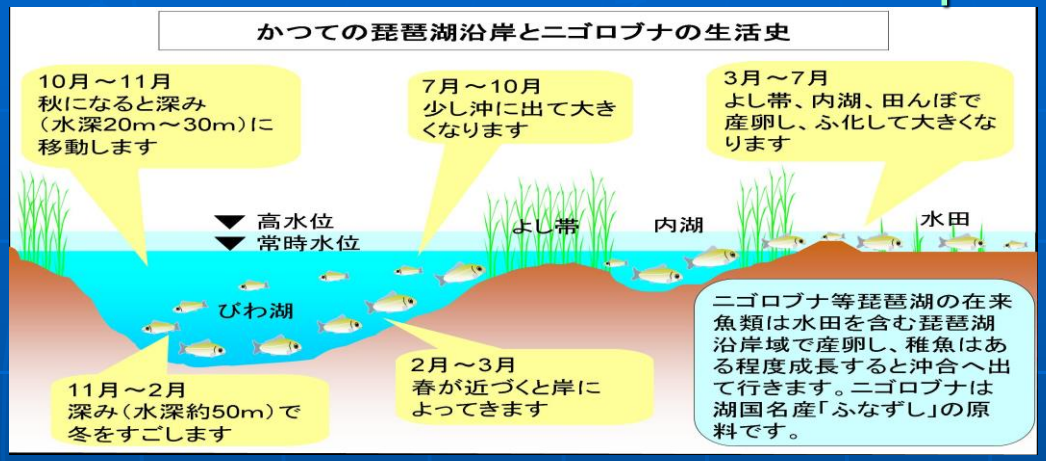
Rule 2 — **Prohibit 2-cycle engine jet ski**

Rule 3 — **Prohibit Releasing exotic fish**

Promoting Shiga Environmental-Friendly Agri-products

Fish Cradle Project

Restoration the lost watercourse between lake and rice field for fish spawning



ほ場整備によってできた水田と
排水路の落差

魚道設置による
水田と排水路の落差解消

Branding
Fish Cradle - Paddy Rice

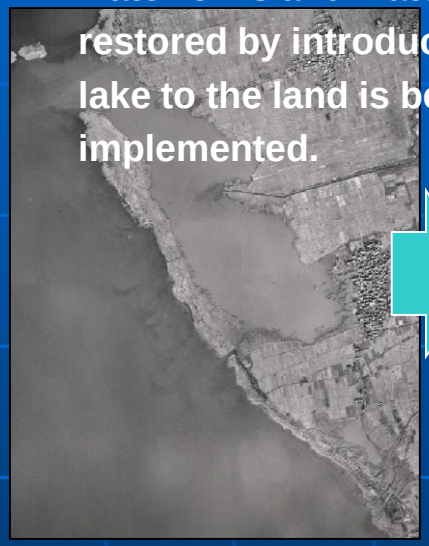
滋賀県

魚のゆりかご水田米

Ecosystem Protection

Reclaimed Attached Lakes to be Restored Back

- The land reclaimed for rice paddy is now being planned to be back to the lake. The Experiment to monitor how waterfowls and water plants will be restored by introducing water from lake to the land is being implemented.



1955

Present

- Future Plan

New Challenges after LBCCP

- **Facility Maintenance and Risk Management**
  - Less attention and no special legislation for management (compared to construction)
  - Less population/tax to cover cost
  - Risk control (earthquake, etc.)

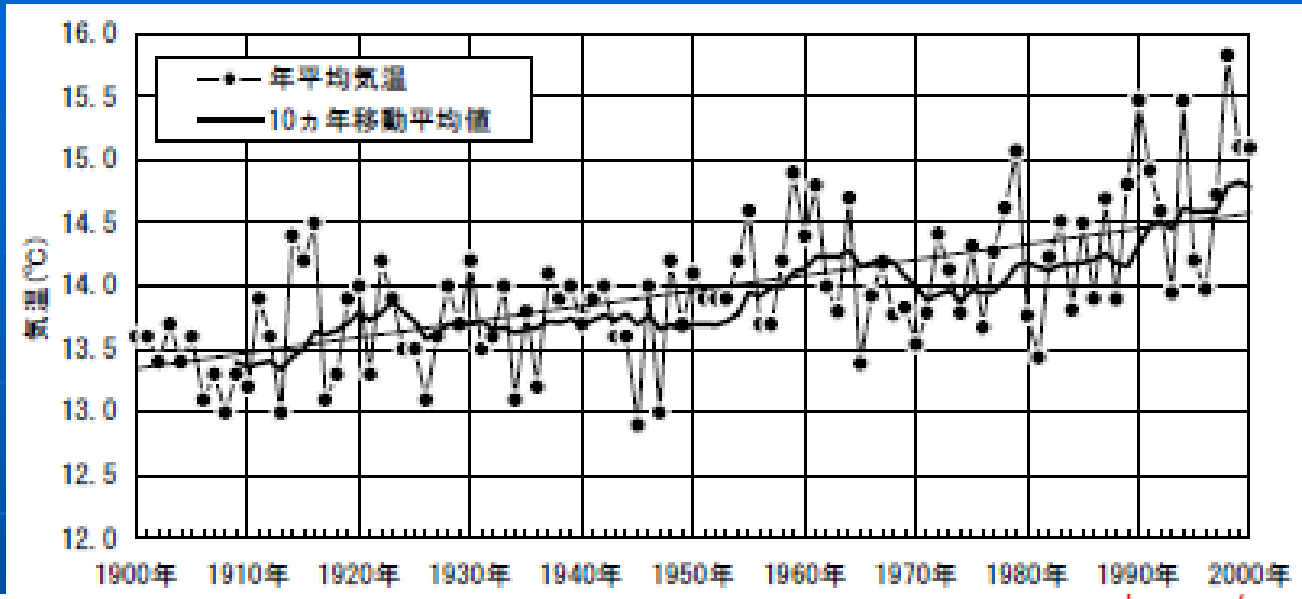
- **Climate Change**
  - Possible more frequent flood/drought
  - Dissolved oxygen decrease in Lake bottom

Risk management against earthquake

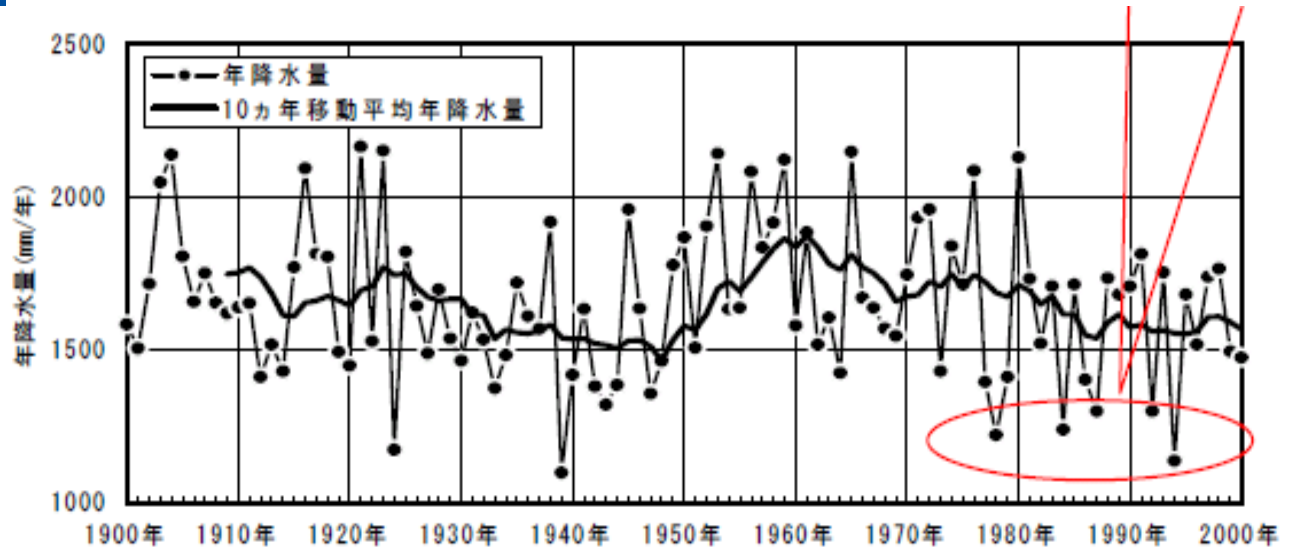
•Damage in Treatment center in Kobe (1995)

Climate Change in Lake Biwa area

- **Rise of Temprature**



- **Decrease of rainfall**



- **琵琶湖河川事務所HP**

出典：彦根地方気象台編(1993)「滋賀県の気象」、気象庁 HP より作成

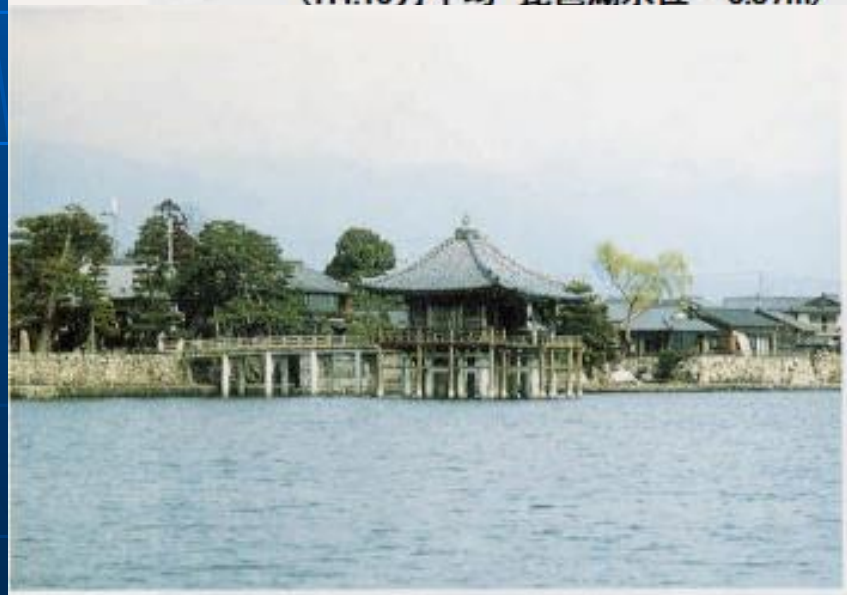
Hardest Drought in Lake Biwa 1994 (-123cm)

•Usual

延勝寺平常時(H4.10)
(H4.10月平均 琵琶湖水位 −0.37m)

1994 drought

延勝寺渇水時
(H6.8.30 琵琶湖水位 −1.03m)

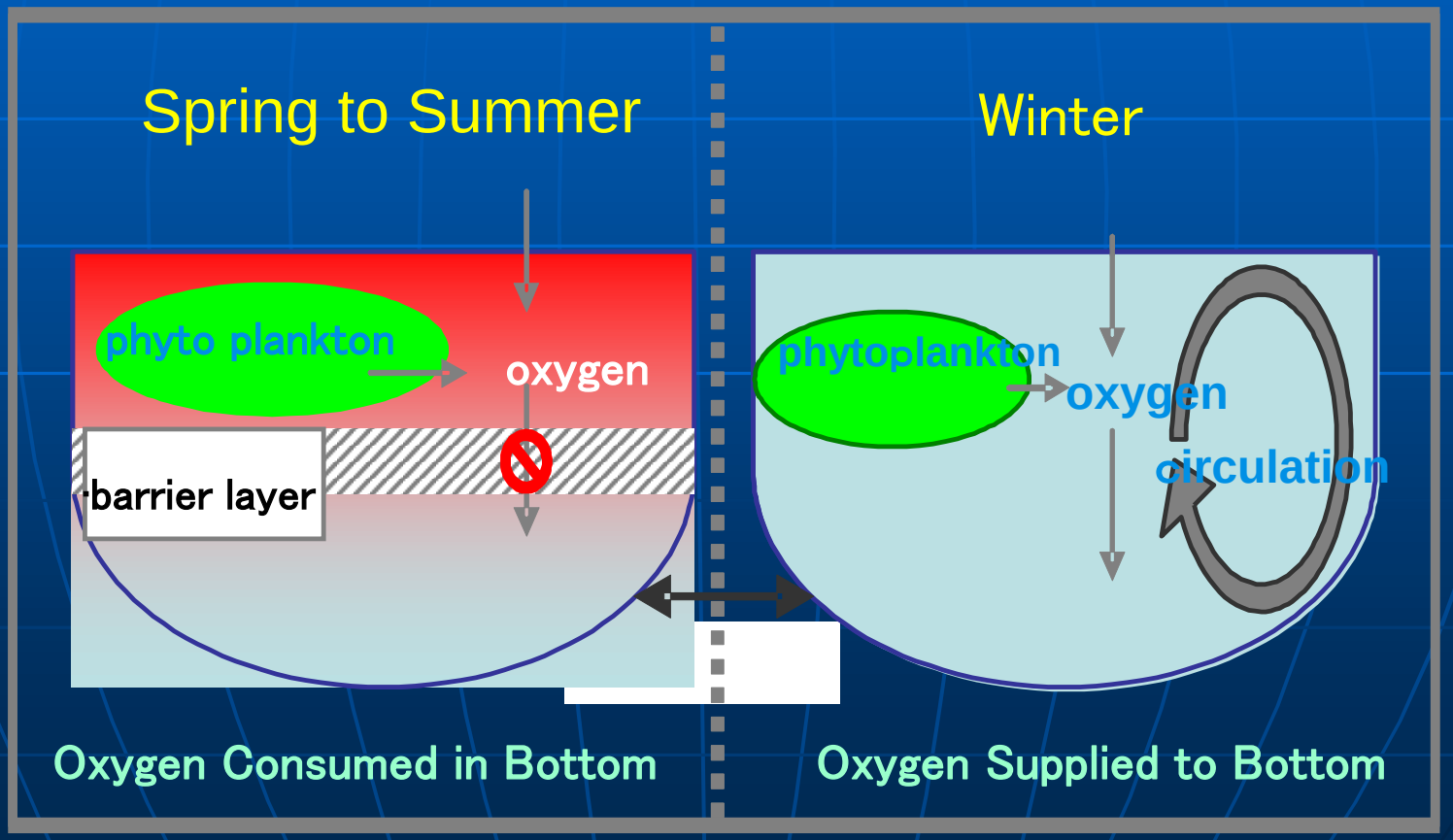


浮御堂平常時 (H4.4.3 琵琶湖水位 0.29m)

浮御堂渇水時 (H6.9.10 琵琶湖水位 −1.16m)

Decrease of Dissolved Oxygen in the Bottom in Lake Biwa

- In usual years, surface water is cooled down in winter and sink down and mix with bottom water, then oxygen is supplied to the bottom water.
- In 2007 winter, this water circulation did not happen until April.



Strong Connections in Lake Biwa and Yodo River Basin

- Past and Present -

Human life, industry, and Transportation based on water resource

Conflict on Flood Control and Water Use

History and Culture
•related to water

Various project implemented on Flood Control, Water Efficient Use and Environment Conservation

Unified urban area developed riparian area

Advanced strategy introduced, e.g., LBCDP, Mother Lake 21

Future of Lake Biwa Yodo and River Basin

Lake Biwa's Strong Connection With Yodo River Basin

- Degradation of Water Quality and Ecosystem
- Loss of original landscape
- Weakening of relationship between human and water
- Declining of urban vitality

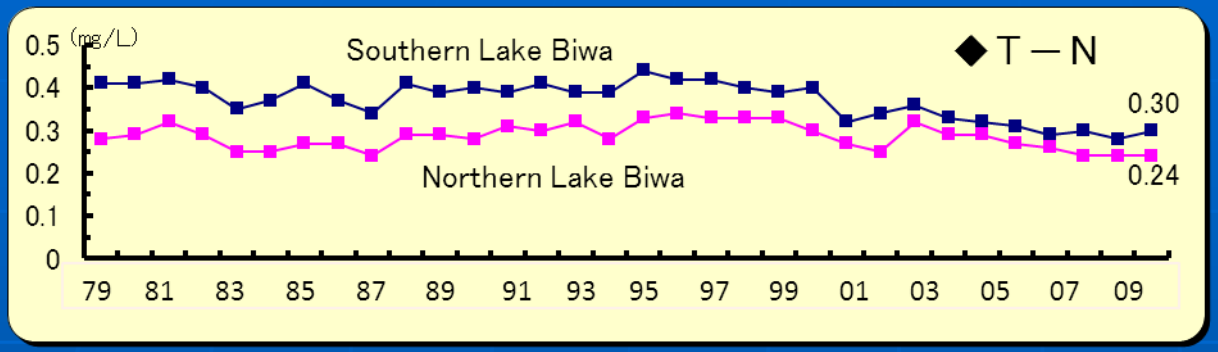
Problems of Lake Biwa cannot be solved only within Lake Biwa Basin

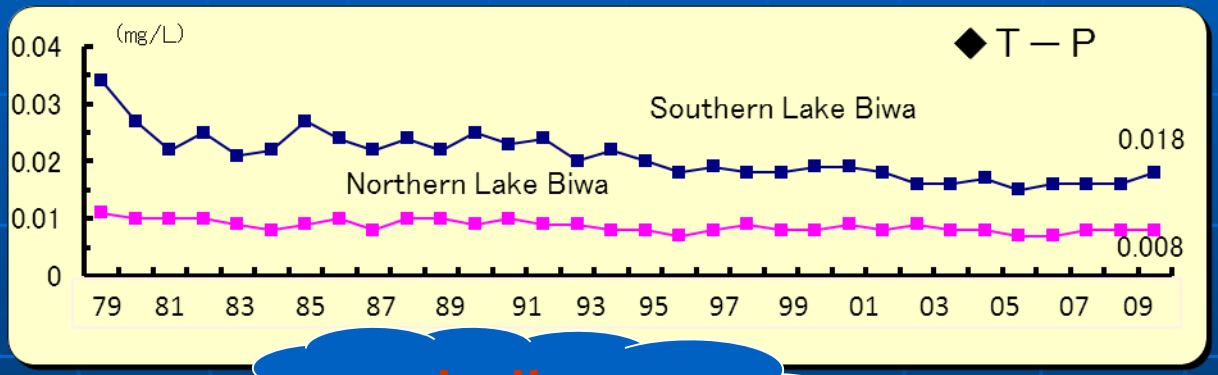
Lake Biwa and Yodo River shares common problems

Movement to prefectural government system restructuring for larger area governance

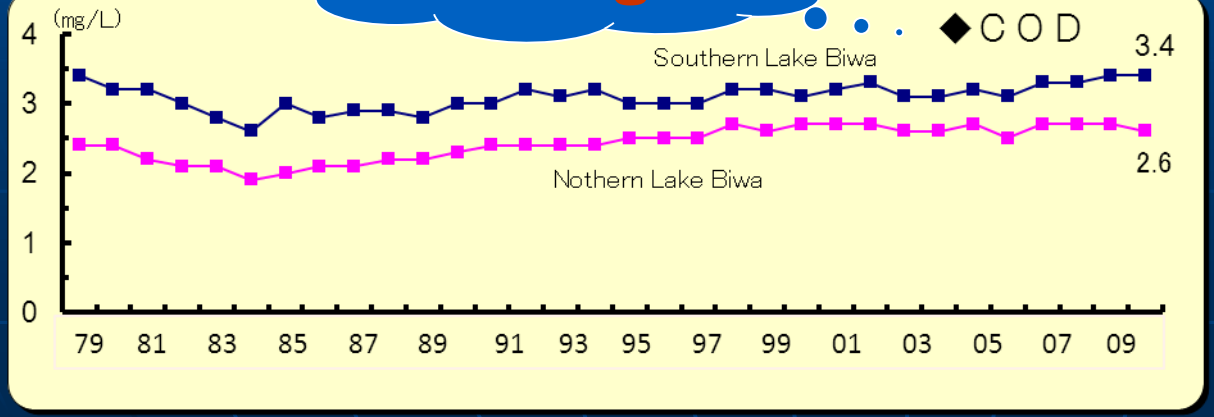
We need **Integrated Basin Management** in **Lake Biwa and Yodo River Basin**

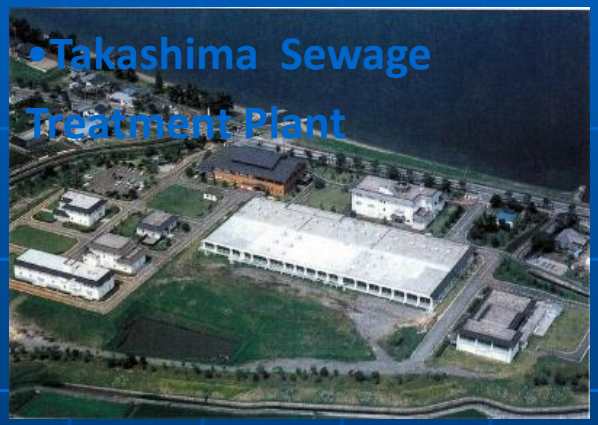
Water Quality in Lake





·challenge

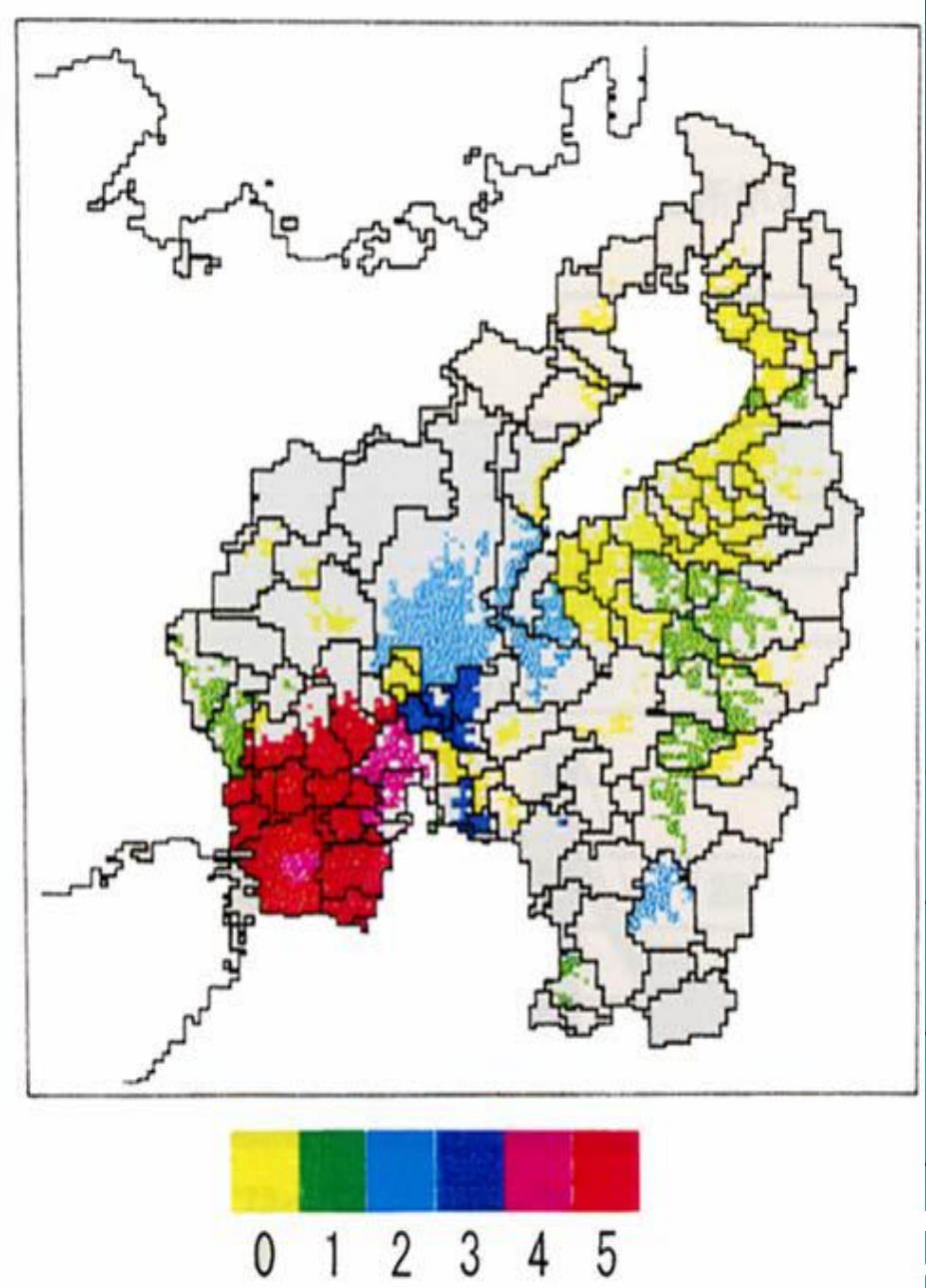




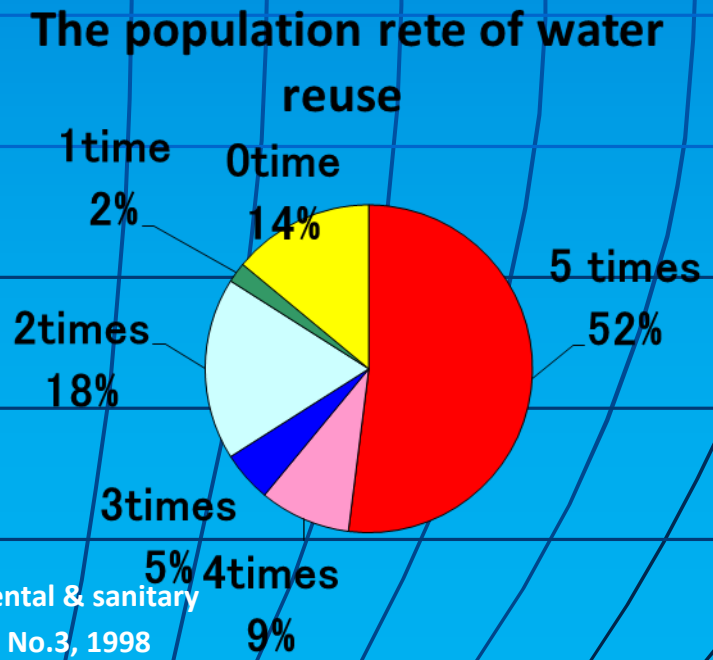
THE CHALLENGES AHEAD (Emerged Policy Frameworks)

- Yodo River Improvement Plan, **2009**
- Integrated Management Lake Proposed Conceptual Framework, **2011**
- the Kansai Broader Region Collaboration Framework, **2012**
- Passing of the "Basic Law for Circulatory Management of Water", necessitates the Biwa – Yodo region to develop a "Basic Plan for Circulatory Water Management", **2014**

Water Use in Lake Biwa-Yodo River Basin

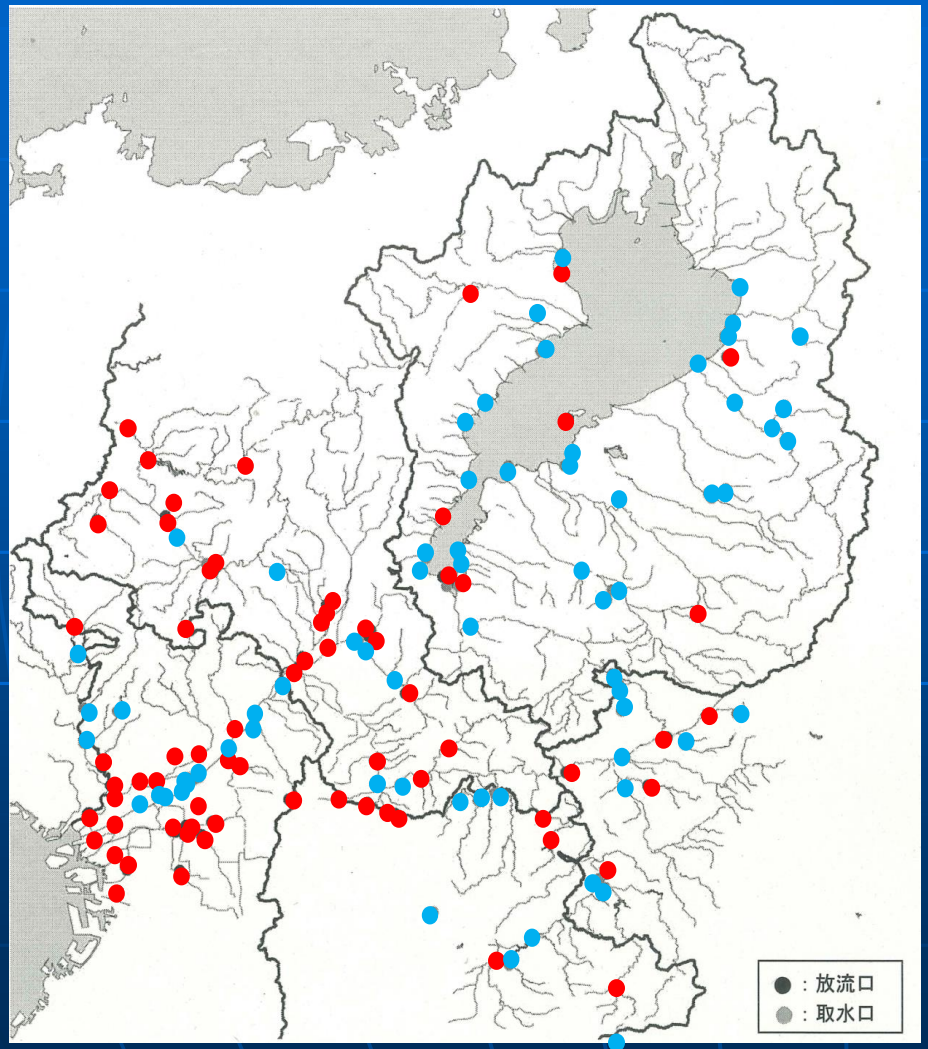


Prefecture	Water supplied population from Lake Biwa (persons)
Shiga	1, 148, 702
Kyoto	1, 811, 645
Osaka	8, 817, 876
Hyogo	2, 757, 285
SUM	14, 535, 508



Environmental & sanitary
ch, Vol.12, No.3, 1998

Increasing Water Contamination Risks



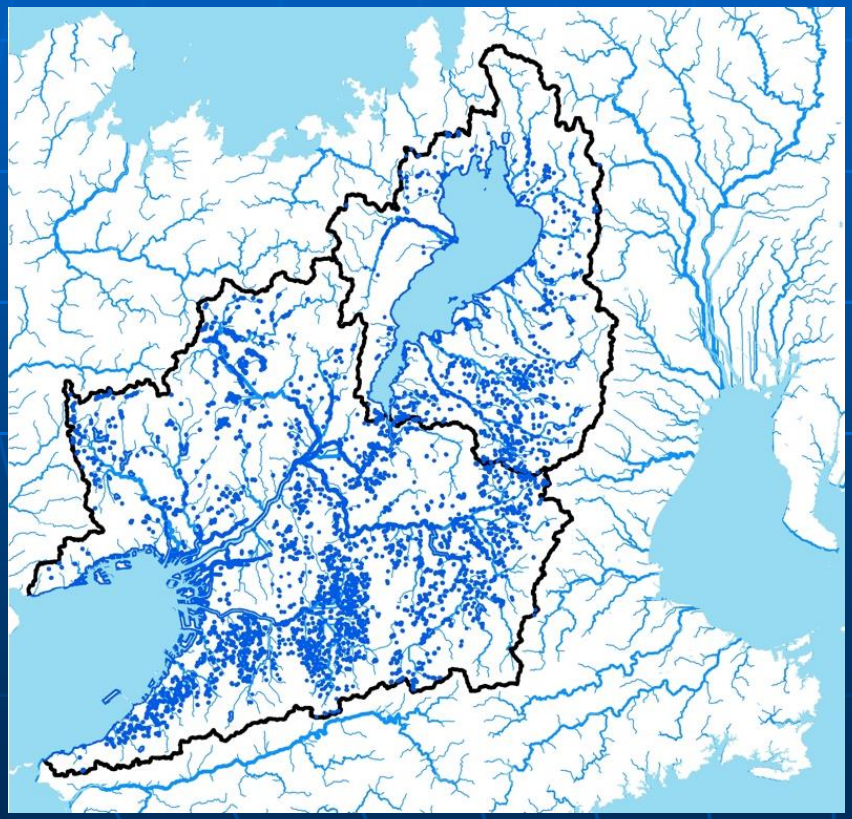
Complicated and highly reused water system

Increasing of tap water contamination risks by
•micro-pollutant and microbe

- Sewage Treatment Plant Drain
- Tap Water Intake

Source: Lake Biwa-Yodo River Water Quality Preservation Organization

Then Need for Broader Basin Governance involving Lentic – Lotic systems consisting of the entire Lake Biwa, Yodo River and the Osaka Bay region



•Lentic and Lotic Water Systems in Yodo River Basin and Osaka Bay Region

Lentic Water Systems
ex. Lakes, Reservoirs, Ponds, Wetlands etc.

Lotic Water Systems, ex. Rivers, Canals etc.