

JICA Knowledge Co-Creating Program

**“Integrated Lake, River and Coastal Basin
Management for Sustainable Use and
Preservation of Water Resources”**

Commemorative Publication

International Lake Environment Committee Foundation (ILEC)

Introduction

JICA Knowledge Co-Creating Program titled “Integrated Lake, River and Coastal Basin Management for Sustainable Use and Preservation of Water Resources” originated from an international training course on lake water quality management organized by the International Lake Environment Committee Foundation (ILEC). The program began in FY1990 as the “Lake Water Quality Management Course,” commissioned by the Japan International Cooperation Agency (JICA).

In FY2005, the curriculum was revised, and the course was renamed the "Integrated Basin Management for Lake Environment (ILBM Course)." Starting in FY2016, the scope of water resource management was expanded to include rivers and coastal areas, and the course has since continued under its current title through FY2024.

To date, a total of 334 participants from 65 countries around the world have taken part in this training (for details, please refer to the list of training records at the end of this publication).

Now, with the conclusion of this training program after 35 years since its inception in FY1990, we are pleased to publish this commemorative publication to reflect on its journey and to express our sincere gratitude to all those who have been involved.

2025

- Table of Contents -

1. At the End of the Training Program	1
2. Messages from Lecturers	9
2-1. Looking Back on the JICA/ILEC Lake Water Quality Management Course (FY1990–2004) (Saburo Matsui)	9
2-2. Institutions (Tsuguhiro Watanabe)	10
2-3. Policies (Shigekazu Ichiki)	11
2-4. Participation (Shinji Ide)	12
2-5. Technology (Yoshihisa Shimizu)	13
2-6. Information (Masahisa Sato)	14
2-7. Finance (Adelina C. Santos-Borja)	15
3. Voices of Participants	16
3-1. Asia: India (Jigar K. Trivedi)	16
3-2. Europe: Albania (Xhemi Jaupaj)	20
3-3. Africa: Zimbabwe (Lightone T Marufu)	24
3-4. Latin America: Cuba (Odalys Jacobo Rodríguez)	28
4. Photo Retrospective	32
5. Structure of the Training Curriculum	47
5-1. Curriculum Structure in FY2024	47
5-2. Curriculum Structure in FY1990	51
6. Appendices (List of Training Records)	53

1. At the End of the Training Program

Masahisa Nakamura, Course Leader

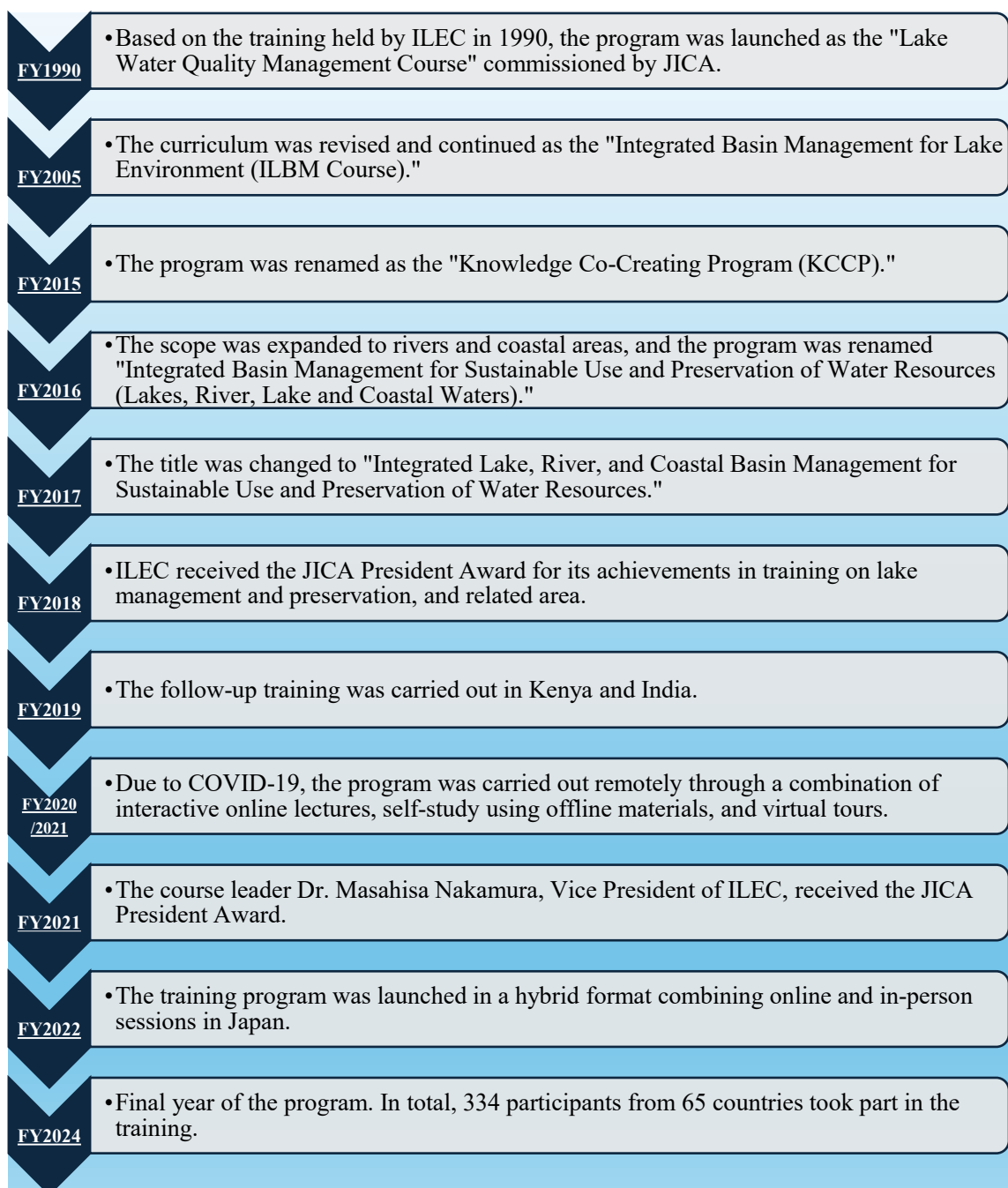
Global Sharing of the Lake Biwa Lessons: 35 Years of ILEC-JICA Lake-Basin Training

Introduction: History and Significance of the Training Program

The **“Knowledge Co-Creation Program,”** jointly implemented by the International Lake Environment Committee (ILEC) and the Japan International Cooperation Agency (JICA), began in 1990 and continued for over three decades. In February of this year, that long journey reached an important milestone.

Drawing on Japan's experiences—especially the lessons from Lake Biwa—the program brought together government officials, engineers, and researchers from across the world to learn about sustainable lake-basin management. It went far beyond the transfer of technology: it became a hub for developing human resources and fostering an international network dedicated to lake conservation. Looking back, the program was not merely a place to study lake management; for all of us who were involved, myself included, it became a shared journey—an inseparable part of our professional lives.





Chapter 1: Training Themes and Participants' Activities

1.1 Training Theme: Integrated Lake Basin Management (ILBM)

This program was designed for engineers, government officials, researchers, and others responsible for planning and implementing conservation and management policies in lake, river, and coastal basins. Its central theme was **Integrated Lake Basin Management (ILBM)**. This approach promotes sustainable resource use and conservation in lakes and their basins through cooperation among all relevant organizations and stakeholders.

Lakes are exposed to multiple stresses from water use and other watershed activities, both inside and outside their basins. These stresses often remain in the lake for many years, undergo complex biological, chemical, and physical changes, and eventually degrade the ecosystem. Once an ecosystem deteriorates, recovery can take decades. During that time, society must strengthen the “Six Pillars of Basin Governance”—the multidimensional foundation for long-term lake-basin management.



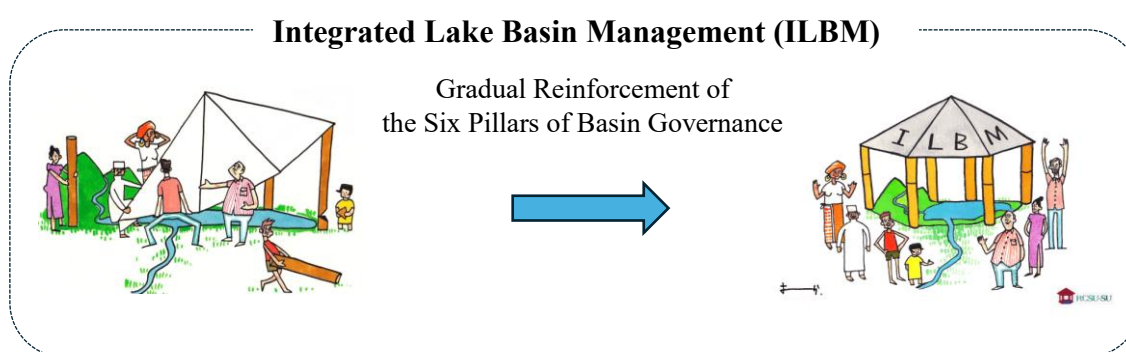
Lake Basin Governance

A system in which stakeholders involved in lake basins engage in decision-making, consensus-building, and implementation through social collaboration and participation, including partnerships and networks.

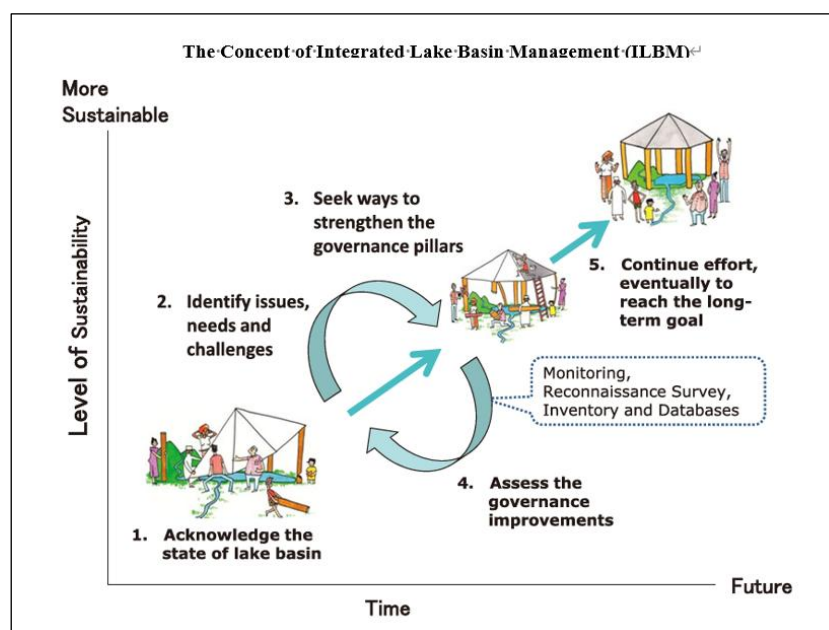
Components of “Lake Basin Governance”

Institutions	Institutions and frameworks that operate at various levels, from local to international, to manage lakes and their basins for the benefit of all resource users.
Policies	Guidelines that regulate the use of lake resources and their impacts, ranging from laws and ordinances to informal arrangements (such as traditions, customs, practices, and conventions).
Participation	Participation of all relevant institutions, organizations, groups, and stakeholders involved with lakes, including government agencies, research institutions, local residents, and other interested parties.
Technology	Conservation and environmental improvement technologies, such as river flow regulation and channel modification, wastewater treatment, wetland restoration and creation, forest regeneration and afforestation, lake level management, and sediment dredging.
Information	Information for effectively managing lake basins, ranging from traditional knowledge to scientific knowledge.
Finance	Funding necessary to sustain lake basin management over the long term.

Around the world, communities facing lake degradation often struggle to know where to begin. Lake Biwa's experience is illustrative: when red tides broke out in 1979, the six pillars were still weak, and it took years of step-by-step efforts across society to strengthen them. This training aimed to help participants understand the process and develop the capacity to adapt it to the lake-related policies and challenges of their own countries.



To achieve this, step-by-step actions, as illustrated in the figure below, are required. Participants learn each step, prepare a written report applying what they have learned to the lake-related issues in their own countries, and reflect their findings in post-training activities. Japan's "Lake Water Quality Conservation Plan" is also an example of ILBM, and studying the history and current practices at Lake Biwa further deepens participants' understanding.



1.2 Participants' Activities

Over the 35 years of the program, the lakes studied ranged from the vast tropical Lake Victoria in Africa to cold, high-altitude wetland lakes in the Himalayas. The challenges they faced were just as diverse, together forming a microcosm of the world's lakes.

Despite this diversity, the approach for pursuing sustainable use and conservation of lake resources was essentially the same: the ILBM framework. This shared approach enabled participants, instructors, and other stakeholders to collaborate effectively in tackling each lake's issues. For ILEC, which leads global efforts in lake conservation, the baseline information collected through the program—and the practical solutions proposed by the participants—has been invaluable for strengthening cooperation with international organizations and supporting global projects.

When human activities in a basin are limited and the lake’s natural purification functions remain intact, people can use its resources with relatively few restrictions. But as population grows and competition for use intensifies, it becomes necessary to establish rules for fair and sustainable use. When impacts on water quantity and quality emerge, technical measures are also required. Furthermore, climate-driven changes in lake dynamics and water quality affect both upstream and downstream communities, and in times of floods or droughts, responses must differ from those during normal conditions.

Because lakes within the same country may be at very different stages of degradation or management, some participants found that Lake Biwa’s historical experiences—including early mistakes and lessons learned—were more useful to them than the most recent advanced measures.



Presentation of Participant’s Own Country Issue (FY2017)

1.3 From “Lake Basin Management” to “Lentic–Lotic Basin Management”

The training program initially focused on “Lake Basin Management.” However, the nature of lake-related challenges has evolved over time. It therefore became necessary to broaden the scope to include the basins of inflowing and outflowing rivers, the downstream coastal zones, and even the broader economic and climatic regions that influence lake conditions.

As this evolution took place, water-resource development and management—once centered on lakes as relatively still-water (lentic) systems—expanded to embrace integrated management. This included river-basin and coastal-zone management as well as disaster-risk measures such as flood and drought responses under climate change.

This new perspective regards not only the unique traits of lentic waters but also the lakes, rivers, and coastal areas as parts of “a complexly interconnected system of lentic and lotic waters.” It therefore extends traditional “lake basin management” to the broader concept of “lentic–lotic basin management,” now widely referred to as **Integrated Lentic–Lotic Basin Management (ILLBM)**.

1.4 Participants' Post-Training Activities

After returning home, participants were expected to share the action plans they had developed during the program with their home institutions and related agencies, and to translate them into concrete local initiatives for strengthening ILBM.

In practice, their subsequent career paths have been diverse; not all continued to work directly in lake-basin management. Even so, these individuals have played—and are expected to continue playing—key roles in basin management involving lakes, especially in such challenging areas as water-resource development for lakes, river- and coastal-basin management, and disaster-risk management.

Many of their experiences and achievements are highlighted in the section “Voices of Participants.”

Chapter 2: Outcomes Achieved

One of the most significant achievements of the program is the global dissemination of the ILBM concept, which has been incorporated into policies and projects in many countries. The action plans that participants brought home often translated into tangible measures, and numerous alumni have gone on to promote lake conservation in leading positions within their governments or in international organizations.

Over three decades, the program also fostered an international network of professionals dedicated to lake conservation. This network has become a vital foundation for ILEC's international cooperation efforts and continues to serve as a driving force for advancing lake-basin conservation worldwide.

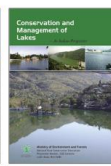
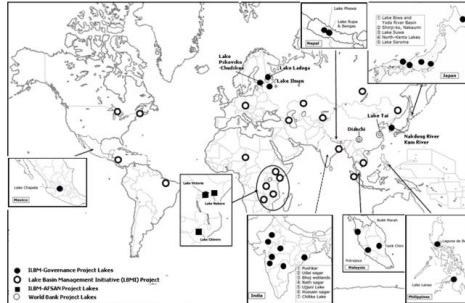
The photos and testimonies included in this volume offer a glimpse of how the program has not only shared knowledge but also connected people and inspired practical action in the field.



Follow-up Training in Kenya (FY2019)

■ APPLICATION CASES OF ILBM

The number of ILBM application cases is today slowly but steadily growing in different regions of the world, such as Japan, India, Nepal, Malaysia, Philippines, Indonesia, Mexico, Russia, USA, Kenya, Zimbabwe and so on.



National Strategy and /or PLAN

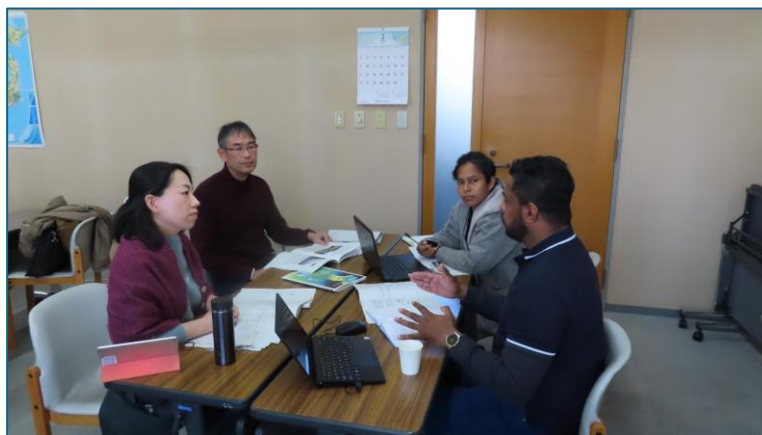
Chapter 3: Emerging Issues

At the same time, several important challenges became evident.

First, as the program's focus expanded from water-quality conservation to include river- and coastal-basin management and eventually disaster-risk reduction, the concept of ILLBM itself remained insufficiently defined and systematized.

Second, sustaining the outcomes of the training after participants returned home proved difficult. Organizational constraints and limited funding sometimes hindered the continued implementation of the action plans.

Third, there was a lack of robust mechanisms to make full use of the growing alumni network. Although many graduates have become leaders on the international stage, the systems to keep this network active and impactful over the long term have been inadequate.



Participants Discussing Issues (FY2024)

Chapter 4: Future Perspectives

Up to now, the training program has been anchored in ILBM while steadily moving toward an ILLBM-oriented approach. Looking ahead, this direction needs to be deepened and strengthened—expanding attention from lakes alone to the entire basin’s water cycle and disaster-risk concerns, while complementing other ongoing initiatives as necessary. In this way, the program can evolve into an even more effective and practical tool for basin governance.

To achieve this, the program must extend beyond the individual learning of participants and engage a broad spectrum of basin stakeholders—including government agencies, research institutions, local communities, and the private sector—so that the training’s insights and practices can be reflected in national plans and regional strategies.

In its 2025–2030 Medium-Term Plan, ILEC has clearly prioritized the development of an integrated program with ILLBM at its core and has already taken important steps in this direction. The challenges ahead can build on the expectations and hopes already voiced by participants and instructors.

Final Chapter: Concluding Remarks

The Knowledge Co-Creation Program has been a remarkable 35-year journey, cultivating a new generation of professionals in lake-environment management and building an enduring international network. Its legacy will continue to influence lake-basin governance around the world.

At the same time, to address the emerging challenges of our era—such as climate change and population growth—there is a pressing need for integrated training with even greater breadth and depth. Drawing on the rich experience and human capital developed over the past decades, we aspire to take on new initiatives that connect lakes, rivers, and coastal zones, and to carry these collaborative efforts forward into the future.

The many memories and messages captured in this commemorative volume are a vivid reminder of the collective journey we have shared.

Finally, I wish to express my heartfelt gratitude to all the individuals and organizations who have supported this training program throughout its long history.

2. Messages from Lecturers

First, we invited Professor Emeritus Matsui to reflect on the early years of the training, particularly the “Lake Water Quality Conservation Course” carried out during its initial phase. Following this, we received messages from long-standing lecturers, each offering their perspective based on one of the six pillars of ILBM.

2-1. Looking Back on the JICA/ILEC Lake Water Quality Management Course

(FY1990–2004)

Saburo Matsui, ILEC Trustee, Professor Emeritus, Kyoto University



In 1990, ILEC held an international training course on “Lake Water Quality Management” for participants from five countries: China, Ethiopia, Malaysia, Thailand, and the Philippines. Building on this initiative, ILEC conducted “Lake Water Quality Management” course under the commission of Japan International Cooperation Agency (JICA) from the following year until FY2004. Over the years, the participating countries expanded to 40 in total, including Algeria, Argentina, Benin, Bolivia, Brazil, Cambodia, Chile, China, Colombia, Ecuador, Egypt, Ghana, Guatemala, Hungary, India, Indonesia, Iran, Kenya, Laos, Macedonia, Malawi, Malaysia, Mexico, Myanmar, Nicaragua, Pakistan, Paraguay, Peru, the Philippines, Poland, Singapore, Sri Lanka, Syria, Tanzania, Thailand, Turkey, Uganda, Venezuela, Vietnam, and Zimbabwe, with a total of 155 participants completing the course. This period included the 1992 Earth Summit in Rio de Janeiro, when global environmental issues became a major focus for the United Nations. During this time, ILEC emphasized the importance of lake environmental issues, which started to attract interest from developing countries. The training introduced fundamental techniques for lake water quality management, including water and sediment measurement techniques, pollution prevention and treatment, predictive (modeling) techniques, as well as regulatory and management techniques. Field visits were also included. Participants presented their country-specific water quality issues in lakes, dam lakes, and rivers as Country Reports, sharing information with other participants. Finally, participants prepared and presented training reports demonstrating how they would apply the new knowledge gained during the course to address their own challenges. Enthusiastic discussions continued until the final day of the training.

2-2. Institutions:

Tsuguhiro Watanabe, Professor Emeritus, Kyoto University



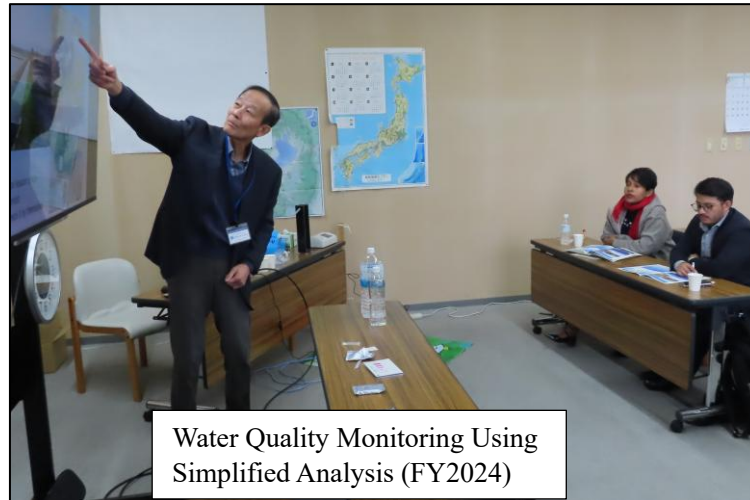
I had the privilege of delivering the lecture on “*The Role of Irrigation and Agriculture in Lake Basin Management*” over many years. Its central focus was the global challenge of *Participatory Irrigation Management (PIM)*, closely linked to two fundamental pillars of Integrated Lake Basin Management (ILBM): Institution and Participation. The lecture emphasized the roles and engagement of farmers and farmer organizations, as well as their interactions with administrative agencies, in the management of irrigation and drainage within Land Improvement Districts in Japan. Using the paddy field areas along the eastern shore of Lake Biwa as a case study, participants examined the effects and implications of these practices on water circulation and the conservation of the river basin’s aquatic environment.

Although many participants were not directly involved in agricultural water management, they gained a clear understanding of the importance of delineating responsibilities and sharing information among end-users/beneficiaries, local communities, and administrative authorities in basin water management. Following the training, some participants conveyed both their commitment and enthusiasm to apply these lessons to their respective duties, inspiring hope that such efforts may ultimately contribute to the advancement of ILBM.

While acknowledging the “*uniqueness*” of Japan’s agricultural water management, shaped by its history and culture, it is equally important to interpret it within a broader, generalizable context. At the same time, as Japan’s agriculture and rural communities undergo profound transformation, new forms of participatory management must be thoughtfully redesigned. In this regard, Japan confronts challenges similar to those faced by countries and regions that are tasked with developing or enhancing such systems.

2-3. Policies:

Shigekazu Ichiki, Technical Advisor, ILEC



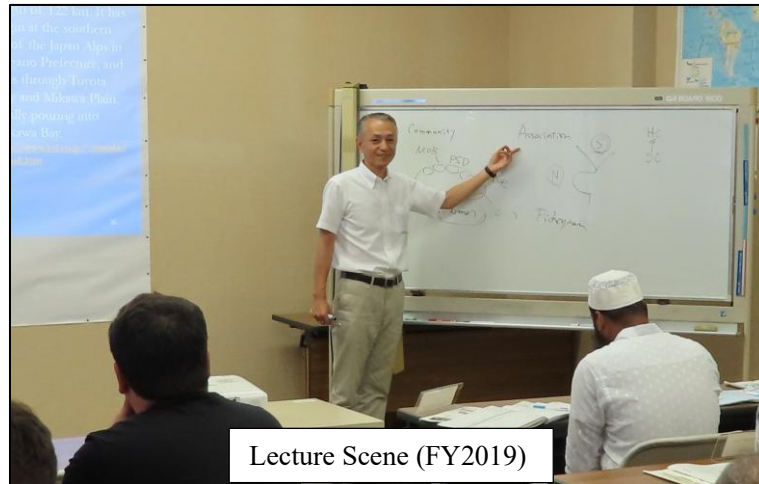
I served as Secretary General of ILEC starting in 2015. Prior to that, I worked at the Shiga Prefectural Government as an officer in charge of environmental administration, and in 2010, during my assignment to the Lake Biwa Environmental Research Institute, I was responsible for hosting training programs. As an official engaged in environmental administration at the Shiga Prefectural Government, including responsibility for Lake Biwa's water quality conservation, I believe that the development and the history of Lake Biwa's conservation measures have been a process of trial and error within a broad policy framework. The initial policies, based on the three pillars of flood control, water use, and conservation, were later revised considering their achievements and shortcomings. The shift in conservation from an era when focusing on water quality was sufficient to one emphasizing the more complex issue of ecosystem health was particularly difficult to fully grasp.

I have worked on Integrated Lake Basin Management (ILBM) from the perspective of "policies." While policies set the broad direction and drive other elements forward, they cannot be established without support through "participation" and "technology." I have come to realize the importance of conveying examples of such comprehensive, mutually supportive systems and the outcomes they achieve.

In JICA training programs, it is important not only to attend lectures and site visits but also to gain hands-on experience. During the training, I had the opportunity to serve as the practical instructor for simple water quality analysis. I would be glad if participants were able to learn techniques that can be applied even without highly specialized knowledge.

2-4. Participation:

Shinji Ide, ILEC Trustee, President, The University of Shiga Prefecture



I began giving a lecture on the theme of participation in this training program in 2005. My predecessor was Professor Takehiko Hobo, former Vice President of Shimane University, and the course I inherited was titled *Conservation and Citizen Activities for Environment*.

At that time in Japan, the conflict between “development” and “conservation” was still very real. In Isahaya Bay, lawsuits over the operation of the tidal dike were still underway, while at Lake Nakaumi and Lake Shinji, the citizen movement led by Professor Hobo achieved a major breakthrough, bringing an end to land reclamation and desalination projects. Many other citizen movements across the country were likewise marked by protest and resistance to government policies, and the lecture title *Citizen Activities* reflected this climate.

In 2020, the lecture was renamed *Participation in Japan*. This change symbolized a broader shift—from “citizens in opposition” to “citizens working together.” By then, the importance of environmental conservation was widely recognized, and it had become natural for citizens, government, businesses, and experts to collaborate in addressing challenges.

Through all these societal changes, the training program continued for many years, offering a precious opportunity to share ideas and experiences with participants from around the world. I am proud to have been part of this journey, and as we now bring it to a close, I do so with both gratitude and a touch of sadness.

2-5. Technology:

Yoshihisa Shimizu, ILEC Trustee, Professor Emeritus, Kyoto University

I have lived in nature since I was a child. As I studied subjects such as mathematics, physics, chemistry, and biology, I came to appreciate the beauty of science, which humans have developed as a way to describe the natural world.

You have probably heard of the terms, “differentiation” and “integration.”

Newton was the one who developed this field. In order to describe nature, he devised a method of breaking down the many diverse phenomena within it into separate parts for analysis. This is the beginning of “differentiation.” He also attempted to connect individual elements to describe the whole. This is “integration.”



At Research Center for Environmental Quality Management, Kyoto University (FY2019)

In the 17th century, when Newton was active, Japan also had a genius of nature description: Matsuo Bashō. “The ancient pond: a frog leaps in — the sound of the water” (Furuike ya / kawazu tobikomu / mizu no oto — 17 Japanese syllables). This description of nature, in only 17 syllables, still moves our hearts.

In recent years, we often hear the term SDGs. The SDGs consist of 17 goals and 169 targets. Why did the United Nations create so many goals and targets? It was necessary to have a large number in order to encompass and realize the diverse dreams of the many young people who come to the United Nations. This is also the reason individuals, private companies, NGOs, and government agencies can contribute from multiple angles and engage with the SDGs in various ways. In a sense, the United Nations has succeeded in “differentiation.”

There is something that many people tend to forget about the SDGs. This is “integration.” A positive contribution in one area can sometimes lead to negative side effects in another. With the SDGs, we need to ultimately integrate all individual contributions and negative impacts, and evaluate the overall outcome “in an integrated manner.”

Achieving “Integrated Lake Basin Management” requires both “differentiation” and “integration.” I hope that many of the participants from various countries who have joined our training programs so far will succeed in “differentiation” and “integration.” I also look forward to the International Lake Environment Committee Foundation playing a significant role, combining both the scientific insight of Newton in the 17th century and the observational skills of Matsuo Bashō, as a hub for research, human resource development, and information provision.

Finally, I would like to express my respect and gratitude to all those who have been involved in supporting this training program over the long years.

2-6. Information:

Masahisa Sato, Professor, Tokyo City University



Knowledge and Information based on Bioregionalism

In promoting Integrated Lake Basin Management, “knowledge and information,” including environmental ethics and environmental education, play an important role. The environmental ethics (bioregionalism) addressed in my lecture is a set of views that approaches environmental issues on a regional scale and aims to make food, energy, industry, and other aspects sustainable within it. This ethical framework includes maintaining and restoring the natural environment, adapting to environmental conditions, serving as a means for the biosphere, ecosystems, and local communities to achieve conservation and stability, and accumulating local knowledge and a sense of ownership. Bioregionalism empowers the knowledge and information related to Integrated Lake Basin Management, and also brings greater depth to educational practices (environmental education) and community activities (participation and collaboration). Through my lectures, diverse participants have engaged with each other in practices (scientific knowledge and practical knowledge) that connect to their own educational and community activities, drawing on knowledge and information related to Integrated Lake Basin Management, sharing their own values, and learning from domestic and international case studies. Lively discussions that drew on the perspectives of different regions, countries, and diverse backgrounds deepened the participants’ learning and provided an opportunity for them to renew their awareness of the importance of continuing these efforts in their own work. The fact that participants have continued to stay in contact with one another even after the lectures is a valuable asset. I believe that the knowledge and information derived from bioregionalism will continue to serve as a foundation for promoting Integrated Lake Basin Management. I hope to continue collaborating with participants while upholding such ethical principles in the future.

2-7. Finance:

Adelina C. Santos-Borja, ILEC Scientific Committee, Chair



My participation in the ILEC-JICA Training Course was both a privilege and an invaluable opportunity. As one of the five initial trainees in 1990 for Lake Water Quality Management, I was fortunate to be part of a pioneering program that laid the foundation for what would later evolve into the JICA Knowledge Co-Creation Program (KCCP) on “**Integrated Lake, River, and Coastal Basin Management for Sustainable Use and Preservation of Water Resources.**” This program provided a timely and effective platform for equipping participants with essential knowledge and practical skills to understand, appreciate, and implement the **Six Pillars of Integrated Lake Basin Management (ILBM)** - a framework developed by ILEC based on global insights and lessons from lake management across various continents.

I was especially grateful to ILEC for involving me in the development of **ILBM**, where I had the opportunity to contribute my firsthand experience in the management of **Laguna Lake in the Philippines**. Another meaningful opportunity arose when I was invited to serve as a lecturer for the training participants, focusing on the application of the **ILBM Framework in Developing and Implementing Management Policies and Programs for the Laguna Lake Basin**, with special emphasis on **Sustainable Financing**. The latter encompasses the **organizational and legal structure** of the entity mandated to manage the lake basin, as well as the **local conditions** that shape its governance and institutional framework. Understanding these factors is crucial for ensuring effective and long-term lake basin management.

Equally valuable was the diverse expertise and experiences shared by the training participants from different countries, which further enriched the ILBM framework and expanded perspectives for its continuous enhancement. Given the significant number of professionals who have completed this training course, conducting follow-ups on their applications within their professions and institutions would be highly beneficial. Understanding the challenges and opportunities they have encountered would provide critical insights in assessing the objectives, relevance and effectiveness of the training program.

3. Voices of Participants

We have received contributions from returning participants from Asia, Europe, Africa, and Latin America under “Voices of Participants.” They share memorable experiences from the training as well as updates on the progress of their action plans after returning to their countries.

3-1. Asia (India)



Jigar K. Trivedi
Chief Engineer and Additional Secretary
Water Resources Department,
Government of Gujarat State, India
Participant in FY2017

About Geographic Area:

India, located in South Asia, is the seventh-largest and most populous country in the world. The country consists of thirty-one states and eight union territories, with “Gujarat” being one of these states. The Indian Constitution includes water in the State List, indicating that state governments have primary authority over its development and management. However, the central government is also supportive, particularly in regulating and developing interstate river water, as well as fostering nationwide awareness and building capacity for water conservation, river rejuvenation, and national water-related knowledge institutions.

Issues and Challenges with Water Resources

Gujarat primarily relies on surface water, encompassing 185 river basins and a total water quota of 62681 million cubic meters. Of this volume, 38100 million cubic meters is surface water, accounting for only 2% of India's total surface water allocation. Furthermore, the distribution of available surface water is uneven throughout the state. The groundwater resources are estimated at 24581 million cubic meters. Both surface and underground water quotas serve various purposes, including drinking, industrial activities, agriculture, hydropower and fisheries. Nearly 80% of the total is designated for agricultural production.

The state is divided into four regions (Chart 1), each facing distinct challenges related to water resources. The Central and Southern regions benefit from considerably higher rainfall and more plentiful water supplies, while the other regions experience less rainfall and limited water resources.

The state lacks extensive natural lakes; instead, its surface water resources are mainly utilized by constructing dams of various sizes along rivers and their tributaries. The seven major rivers also cross state lines, and since the state is located at the end of these rivers, effective water resource management is crucial for Gujarat to develop resilience against climate change.

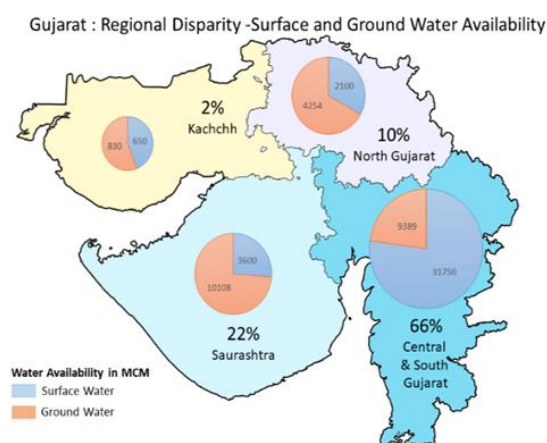


Chart 1: Availability of Water Resources

Each of the 185 basins faces unique challenges related to water stress, increasing water demands, climate change, salinity intrusion, waterlogging, rapid urbanization, flash flooding, and groundwater use. While individual river basins have distinct critical issues, it is crucial to tackle them collectively for efficient water resource management at the state level. Chart 2 summarizes these key issues and their associated challenges.

Chart 2 : Issues and Challenges



A brief about the learnings:

In 2017, I was fortunate to have the opportunity to participate in JICA's Knowledge Co-creation Program (KCCP) on "Integrated Lake, River and Coastal Basin Management for Sustainable Use and Preservation of Water Resources."

The International Lake Environment Committee Foundation (ILEC) organized the program and effectively explained the concepts, processes, and aspects of ILBM during the classroom sessions. Additionally, visits to various facilities, field tests, and interactions with multiple stakeholders, such as farmers, fishing societies, professionals, researchers, students, government agencies, and private institutions, were impactful and reinforced classroom learning.

Grasping the six governance pillars of ILBM—(1) Institutions, (2) Policy, (3) Technology, (4) Participation, (5) Information, and (6) Finance—offered conceptual clarity and enhanced understanding of their integration, which is vital for effective lake basin management.

The platform process steps: (1) Acknowledging the state of the basin, (2) Identifying issues and challenges, (3) Adopting measures/actions to integrate and strengthen governance challenges, (5)

Monitoring and verifying improvements, and then repeating previous steps for continuous improvement and sustainability – the cyclic process. Furthermore, ILBM Indicators- stress reduction indicators, enabling process indicators, and environmental status indicators - are a crucial tool for monitoring the complex process of improvements.

Reflection of learnings in the professional field

The ILBM platform's methodology has been validated for lentic (lake) basins and applies to lotic (river) basin governance and management. Additionally, the ILBM approach monitors the intricate process of enhancements while considering the various resource values critical for sustainable development and effective water resource management in these basins. Given these benefits, the integrated version of IWRM and ILBM will facilitate the effective management of water resources.

In line with the above, the preparatory phase of the draft action plan involved reviewing crucial information regarding the basin, identifying key issues, and highlighting major governance challenges. Furthermore, a matrix outlining issues, challenges, governance pillars, proposed actions, engaged stakeholders, and indicators for monitoring progress was developed during the KCCP in Japan.

The KCCP provided better insights into various facets of governance and their linkages with one another. Such clarity helped to reshape the vision for water resources management.

Key activities that embody the lessons learned at the KCCP, aimed at enhancing the governance pillars for water resource management, include the following:

- The draft action plan created during the KCCP has been approved at both state and national levels as a State Specific Action Plan (SSAP) for water resources. This plan has also motivated other states across the country to develop their own SSAP.
- Drafts of the state water policy and groundwater management bill are in the final stage of approvals at the state government level.
- A real-time groundwater monitoring network with 2585 points, 890 offline piezometers, and 1439 open wells is operational, collecting water quality data using mobile vans that are available for public use.
- A real-time hydro-meteorological network with 947 in situ monitoring points has been established. Biannual surface water quality observations are conducted at 812 locations, and the data is shared publicly. Additionally, monitoring using satellite-based technologies is in place for visualisation.
- The water quality monitoring program for the Lake Biwa is replicated in two reservoirs, Ukai and Kadana, for periodic comprehensive assessments.
- An online Reservoir Management System that tracks inflow, storage, and outflow for 208 major dams is now operational, with information shared daily.
- A master plan is being developed to create new water resources, evaluate existing interventions, assess available runoff, and identify new potential locations for each river basin.
- Significant efforts are underway to enhance water use efficiency in the irrigation sector by restoring older canal systems and establishing piped irrigation networks, along with micro-irrigation systems. Similar measures for other bulk water supply networks are also being implemented.
- Various anti-sea erosion and salinity ingress control measures are being implemented to control salinity along the coastlines.

- Technologies for reusing greywater are being adopted more widely in both rural and urban areas.
- Inter-basin transfers, along with intra-basin water transfers, aim to alleviate water stress and enhance institutional capabilities to promote equity. Concurrently, watershed-level interventions are encouraged on a larger scale to meet local needs.
- Public participation is increasingly encouraged in water conservation, irrigation management, the development of water self-help groups in rural areas, social forestry, and more.
- Funding arrangements for water infrastructure projects include allocations in state and national budgets, local resources, and public-private partnership models.

Future perspectives for sustainable water management

As the population grows, the daily demand for water to meet various needs is increasing, resulting in greater scarcity, while climate change poses significant challenges for managing water resources. In this context, all stakeholders must actively engage and fulfill their responsibilities. Each governance pillar requires ongoing reinforcement, and reviewing the outcomes will undoubtedly reshape future actions.

In Gujarat, both the government and the public are keenly aware of their important roles. Many actions outlined in the draft action plan are currently being implemented, incorporating some innovative elements. This comprehensive approach is strengthening the foundations of governance to effectively manage our valuable surface water and groundwater resources. Public awareness and participation are key to managing water resources, and thus greater emphasis is required for their involvement.

Suggestions for future JICA training and ILBM initiatives

The ongoing efforts of JICA and ILBM, along with exchanges among ILBM trainees, help in fostering approaches for managing dynamic water resources. Follow-up sessions would facilitate the sharing of expert insights and lessons learned, contributing to continuous improvements.

3-2. Europe (Albania)



Xhemi Jaupaj
Head of Water Resources Sector
Water Resources Management Agency, Albania
Participant in FY2022

Title: “Flowing Forward: A Journey from the Vjosa River to Lake Biwa”

When you are responsible for managing one of your country’s most important river basins, every drop count—scientifically, environmentally, and politically. As the Head of the Water Resources Sector at Albania’s Water Resources Management Agency (WRMA), I have spent the last years navigating the delicate, often complex intersection between policy, nature, and people.

But it was not until I joined the JICA-ILEC Knowledge Co-Creation Program (KCCP) in Japan that I truly learned what it means to govern water holistically. That experience—immersive, eye-opening, and deeply transformative—helped me view my role and our national water governance in a new light.

• From the Vjosa to Japan

My primary responsibility within WRMA is leading the preparation and implementation of river basin management plans in line with the EU Water Framework Directive (WFD). The Vjosa River Basin—Albania’s second largest—is at the heart of this work. The Vjosa is a unique and rare European river. It flows freely and undisturbed from its source in Greece to the Adriatic Sea, supporting hundreds of species and sustaining communities across its banks.

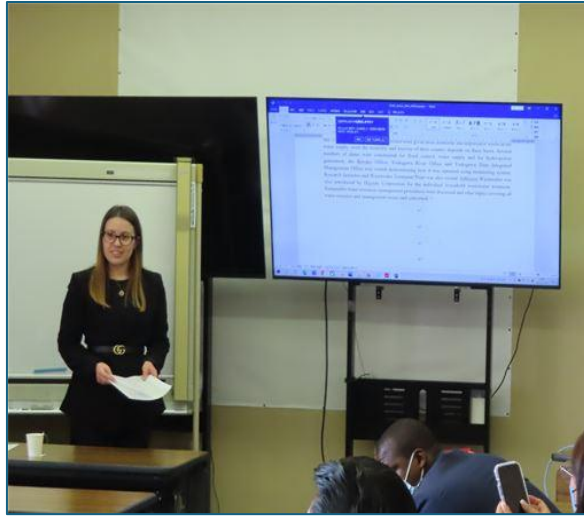


Figure 1: During the stay in Japan

But despite its natural richness, the basin faces numerous pressures:

- Hydromorphological threats from proposed hydropower plants,
- Lack of wastewater treatment infrastructure in rural areas,
- Increasing agricultural and urban pollution,
- And a general lack of long-term monitoring systems.

These challenges demanded new solutions, new perspectives. That's what took me to Lake Biwa—and to the doorstep of ILBM (Integrated Lake Basin Management).

• **The ILBM Lens: Governance with Depth**

In Japan, I encountered a water governance framework that did more than organise responsibilities—it transformed the way I understood integration. The ILBM's six pillars—policies, institutions, participation, technology, information, and finance—offered a roadmap that was both structured and adaptive. It was governance not as a checklist, but as a living, evolving process.



The visit to the Biwako Office remains etched in my memory. Seeing the Seta Weir and learning about Japan's flood protection systems, I saw how infrastructure, heritage, and environmental management coexist in harmony. Likewise, the innovative septic tank systems for individual households in remote areas provided a direct, scalable idea for the wastewater challenges we face in the Vjosa basin.

But perhaps the most striking lesson came from the people. The level of civil participation—especially in Lake Biwa's monitoring and protection—reminded me that true resilience comes not only from institutions, but from empowered communities.

• **Bringing the Experience Home**

Returning to Albania in February 2023, I brought more than just knowledge—I brought a sense of mission. I restructured our approach to the Vjosa River Basin Management Plan using ILBM as a guiding concept. In doing so, we started aligning cross-sectoral cooperation and stakeholder engagement with a deeper sense of ecological and social responsibility.

The timing was remarkable. In March 2023, after years of advocacy and technical work, the Vjosa was officially declared Europe's first Wild River National Park. This achievement—historic for our country—has set a precedent for integrated protection and management. I was honored to contribute to the preparatory phase, aligning WRMA's planning mandates with the conservation objectives of the park.



Figure 2: Field visit in Vjosa -May 2023 (sampling at the delta, multiparametric sonde)

The Vjosa RBMP drafting process has already started, and the experience I gained in Japan is helping me every day as we navigate the technical, institutional, and community-related complexities of the plan. From incorporating participatory principles in public consultations to designing realistic monitoring frameworks and identifying financing strategies for long-term sustainability, the ILBM training has become an essential reference in my daily work.

We've also initiated transboundary dialogues with Greek authorities with key stakeholders—rural communities, municipal governments, and civil society organisations—who are now actively contributing to the basin planning process. This alignment of voices and vision is a direct reflection of the values I absorbed during my time in Japan.

• **Looking Ahead: Leadership Beyond Borders**

As a water governance leader, I believe the ILBM model should be widely adopted across all basins, lakes or rivers. The blending of science, community, and institutional alignment is precisely what's

needed to meet the challenges of the 21st century. In Albania, we're now applying these principles not only in Vjosa but as a standard for all future basin plans.

Looking ahead, I hope JICA and ILEC continue to support alumni and institutions like mine through regional networks, applied research projects, and thematic exchanges. We are not just beneficiaries of this knowledge—we are carriers of it, working to scale impact across borders.

I remain deeply grateful to the professors, coordinators, and my fellow participants who made the program so impactful. The friendships and professional connections I gained continue to guide and inspire my work.

And to those still wondering if real change is possible in water governance, I would simply say: YES, IT IS. It flows from commitment, from collaboration, and from the clarity that comes when you look at your river not as a resource to control, but as a legacy to protect.

3-3. Africa (Zimbabwe)



Lightone T Marufu
Lecturer and Researcher (Aquatic Ecologist)
Department of Biological Sciences and Ecology
Faculty of Science
University of Zimbabwe
Participant in FY 2015

The current status and challenges of lake management in your country

Lake management in Zimbabwe falls under various ministries depending on where the lake is located eg in a national park or in private or public land. While the Zimbabwe National Water Authority (ZINWA) oversees the overall management and administration of water resources which includes lakes and dams, ZimParks is involved in the conservation and management of wildlife, including managing recreational areas around lakes.

The main challenges of lake management in Zimbabwe are issues to do with *governance, climate change, biodiversity loss* and *habitat loss* and *pollution*.

Coordination of management of water resources continues to be a major problem particularly in water resources that are found in national parks or shared lakes eg Lake Chivero. Need for harmonization/coordination of activities and responsibilities. *Climate change* has led to erratic and irregular rainfall patterns over the years in Zimbabwe and this has inevitably caused an increase in pressure towards water resources particularly in lakes. *Habitat loss* due to pressures to provide agricultural, industrial and residential stands has increased the pressures on lake basin resources eg wetlands. *Pollution* remains one of the major challenges in lake management in Zimbabwe. Pollution sources from mines, industries, agriculture and domestic sources continue to be a problem in Zimbabwe. These affect water quality and quantity. Introduction of *invasive species* to lakes continues to be a problem as they contribute to biodiversity loss and habitat loss.

Professional activities

I am currently working as a researcher and lecturer at the University of Zimbabwe, Biological Sciences and Ecology Department. My job involves teaching, research and community engagement, innovation and producing industrial/stakeholder relevant solutions in my field. *Teaching*: I am involved in the teaching and training of aquatic ecologists, wetland managers and conservation managers across different degree programmes. I am the coordinator of one of our new degree

programmes which we developed in my department called BSc Hns in Aquatic Science and Ecology (HASE). We also continue to train and teach the BSc Hns in Biological Sciences students. *Research:* I am involved in research as an *aquatic ecologist* and also supervision of DPhil and MPhil students. My main research areas include Invasive Species, Wetland Restoration and management and fisheries biology. *Community engagement, Innovation and Industrial/stakeholder engagement:* As part of my work I am currently also actively involved in the development of the *National Biodiversity Plan* with government. I also train sustainable fisheries and aquaculture practices to stakeholders and also biodiversity management.

Key learnings from the ILBM training program

Key learnings from the ILBM process that I learnt included 1) the importance of involving all key stakeholder especially communities in conservation and restoration efforts of lakes, 2) The lake environment is affected by what happens in its basin not just what happens in it 3) Need to strengthen the various (six) governance pillars in order to have effective and tangible results in the ILBM process, 4) Need to revisit the process as it is a *continuous process* that will need to be consistently monitored, evaluated and strengthened and 5) the need for a secretariat to drive the process

Reflections on your experience in Japan

The training in Japan was hands on and did not just include interacting with just experts during lectures but also with the communities and stakeholders eg industry in the lake basins we visited. This was very good. Networking with other participants made the co knowledge sharing as part of the training which was very good.



Networking during field trips and training in japan with experts from different nations

The experience in Japan created a good platform for networking with participants from many other countries and made participants appreciate the many different aspect that may affect different lakes depending on location/country

Lake Biwa field trip and sampling was very good and helped to give a practical aspect to Lake basin management issues which I also applied in my studies in lake Kariba when I was investigating the distribution of invasive species, *Cherax quadricarinatus*



*Sampling in Lake Kariba, Zimbabwe for invasive crayfish, *Cherax quadricarinatus**

The visit also helped to give a picture of the society in Japan and the nature of the people. Eg Through riding in the trains/buses and going to the shops we met ordinary people which was a good opportunity to now what the people are like.

Future perspectives or plans for sustainable water management

Three main aspects. *Firstly*, I am happy that you included the word sustainable. I think an element that will be key in the future is to have a module/training on having a balance between the need for industrial growth and also management and conservation of water resources particularly in lakes/wetlands and their basins. Secondly, Sustainable water management efforts will have to look seriously at the aspect of *climate change* mitigation and adaptation strategies from a household to a community/larger stakeholder level and *lastly*, sustainable water management endeavors in the future will also need to seriously consider having methods of dealing or handling transboundary water resources and water basin resources.

Suggestions or expectations for future JICA training and ILBM initiatives

The training that I went through was very good and much appreciated. Just a very few (5) suggestions for future trainings;

- *Follow Up Reporting* and capacity building workshops will be good *to measure impact* of the initial JICA and ILBM initiatives training
- Sustainable water management issues will need to seriously consider *climate change* adaptation and mitigation strategies in ILBM initiatives.
- Future training should consider a longer period for the training as some of the aspects seemed to be hurried through yet they were very important.
- The option of training between biomonitoring and GIS (at ILEC) I feel was a bit unfair as I later found out that both can and should complement each other. More time should however be given to those that may be slow in grasping GIS methods.
- Having *blended lectures* where sometimes participants participate online and sometimes have in person interactive lectures will be very good.
- I also think training resources should be availed (upon request) to alumni who may need to help in capacity building of experts in ILBM in their own countries.

Other Pictures from Japan

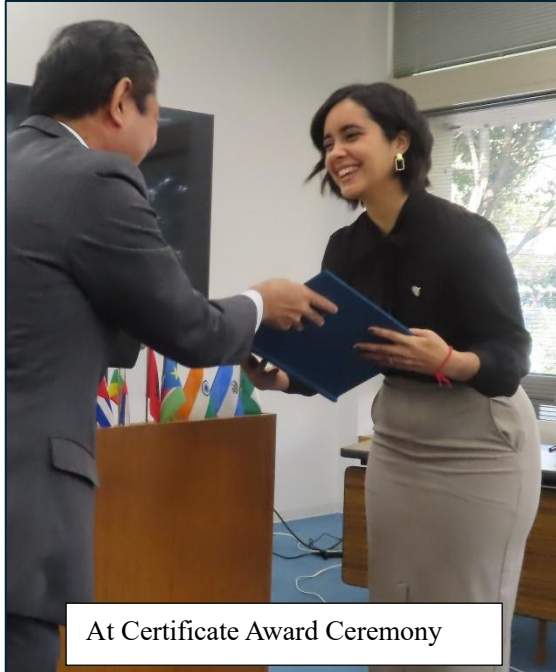


With other participants before visiting a cultural site in Japan.



With a fellow participant Mr Saisi (From Kenya) in Japan during the JICA ILEC training

3-4. Latin America (Cuba)



At Certificate Award Ceremony

Odalys Jacobo Rodríguez
MSc. Eng.
Hydraulic Research Center
Cuba
Participant in FY2023

Current status of Cuban earth dams management and the importance of ILBM

Cuba is at a critical juncture in managing its dams, with the potential for catastrophic consequences in the event of failure. The country operates 238 dams constructed from local materials, but over the years, more than 50 failures have been documented. The recurring failures and ongoing deterioration of the dams have raised concerns about the safety of the population. These issues not only pose serious risks to public safety but also contribute to significant socio-economic challenges. The need for comprehensive and sustainable management of these dams is critical to safeguard the well-being of the population and stabilize the country's economy.



Figure 1 Slide of the downstream slope, Cuban-Bulgarian Friendship Dam.

In Cuba, the behavior of the order of occurrence of failures in loose material dams differs from the rest of the world, being from higher to lower frequency: slope slippage, overtopping of the curtain, siphoning, leaks and cracking.

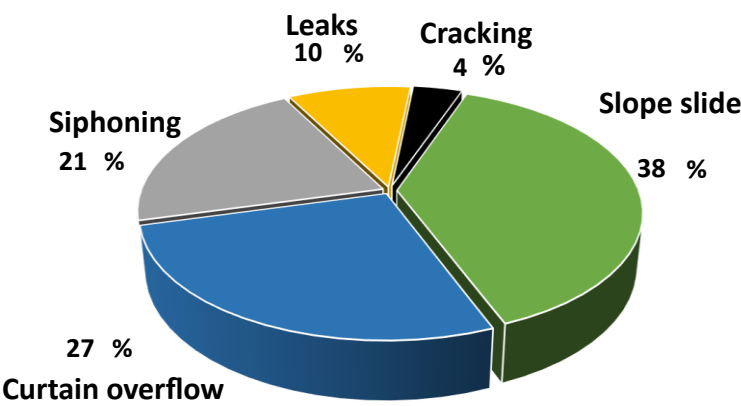


Figure 2 Order of occurrence of failures in Cuba. dams.

Among the failures caused by slope slide, the most frequent are those caused by the impact of precipitation, which have increased in recent years due the climate change. We are currently modelled, with the software GeoStudio, this impact on Cuban dams to analyse the tipping point for failure with respect to rainfall infiltration after long periods of drought, resulting the advance preparation for meteorological events and preventing catastrophic failures.

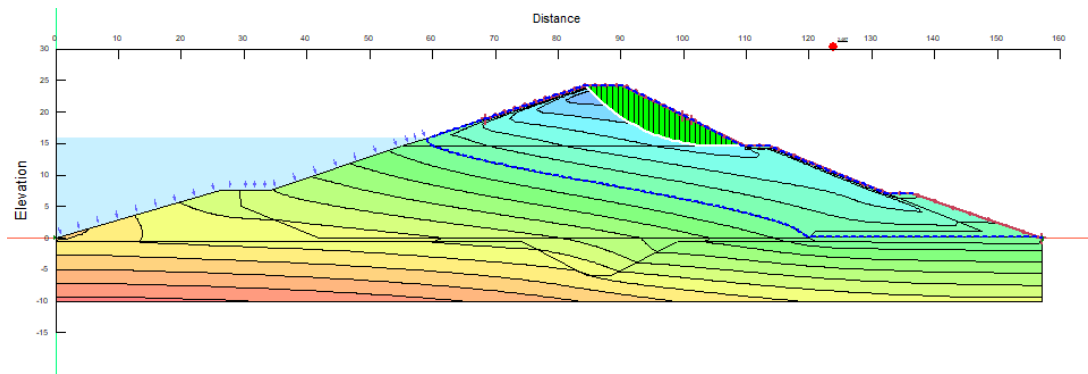


Figure 3 Numerical model of slope stability in GeoStudio 2024.

My experience in Japan and the concept of ILBM (Integrated Lake Basin Management) was driving and inspiring force for all my work. Japan, a country with a history marked by its relationship with water and its constant exposure to natural disasters, has developed innovative and effective approaches for the comprehensive management of water resources. The study of water management revealed the importance of long-term planning, adaptability and cross-sector collaboration in

sustainable water management. The Japanese have demonstrated an exceptional ability to design and implement hydraulic infrastructure that not only protects against floods, but also promotes water conservation and disaster mitigation.

During my visit to the Comprehensive Dam Management Office and the Ohara Dam in Japan, I was impressed by the meticulous attention paid to the monitoring and management of these critical infrastructures. In the office, I was able to witness firsthand the deployment of advanced technology and the implementation of rigorous protocols to continuously monitor the status of the dams. From sensor systems to real-time monitoring equipment, each element was designed to detect any sign of deterioration or potential risk immediately.



Figure 4 Ohara Dam, Japan.

The introduction of the ILBM concept in Japan was eye-opening, offering a holistic approach to managing watersheds and aquatic ecosystems. This integrated approach recognizes the interconnectedness of natural and human systems, and emphasizes the importance of community participation and inclusive governance in water-related decision making.

Right now, I'm applying for my PhD in Japan and my title is "Compound Risk Assessment (Drought + Flood) for Hydraulic Infrastructure Using Satellite Data and Statistical Models", I want to develop an innovative assessment framework that systematically integrates satellite observations with advanced statistical modelling to evaluate these interconnected risks. The study specifically will address the critical gap in current methodologies that analyse droughts and floods as independent phenomena, despite overwhelming evidence that 78-82% of catastrophic infrastructure failures in tropical regions occur precisely during transitional periods between these extremes. Building on extensive field research documenting dam and reservoir failures under sequential climate stresses, this project will establish a transferable protocol combining large-scale climate monitoring with localized vulnerability indicators, providing actionable insights for climate-resilient infrastructure management in vulnerable regions. The research maintains particular focus on earthen structures and aging water systems that demonstrate heightened sensitivity to compound events.

My participation in the course, Integrated Lake, River and Coastal Basin Management for Sustainable Use and Preservation of Water Resources, was an experience I didn't expect, but one that completely change my professional life. It was a comprehensive course, full of new knowledge and fascinating experiences. I know that whatever the next course proposal is, it will be wonderful, not only for its content but also for the professionals who teach it. ILEC professionals have extensive experience in a variety of topics that would be very interesting to share with professionals of other countries. However, in today's world, where it is increasingly difficult to prioritize a good relationship with the environment, I think a course on their experience in adapting to climate change and the steps they take to mitigate it would be interesting.



4. Photo Retrospective



Mikami Shrine Festival (FY2017)

Experience in Japan 1



Ise Daikagura Lion Dance (FY2023)





Tea Ceremony (FY2019)

Experience in Japan 2



At Reed Light Exhibition
in Lake Nishinoko (FY2017)



Snow Road to Hiayoshi Dam (FY2024)



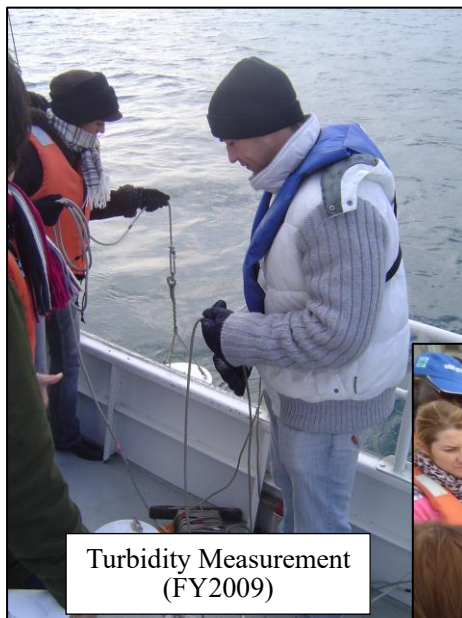
Snow at Lake Shirakaba (FY2010)



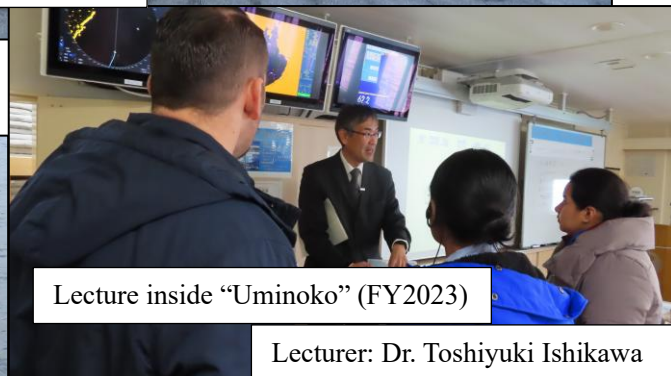
Field Trip (At Lake Biwa)



Learning Ship “Uminoko”
Commemorative Photo after Boarding (FY2024)



Turbidity Measurement
(FY2009)



Lecture inside “Uminoko” (FY2023)

Lecturer: Dr. Toshiyuki Ishikawa



Collecting Water from Lake Biwa
using Water Sampler (FY2015)



Experiencing Clam Collecting
at Mikata Five Lakes (2019)

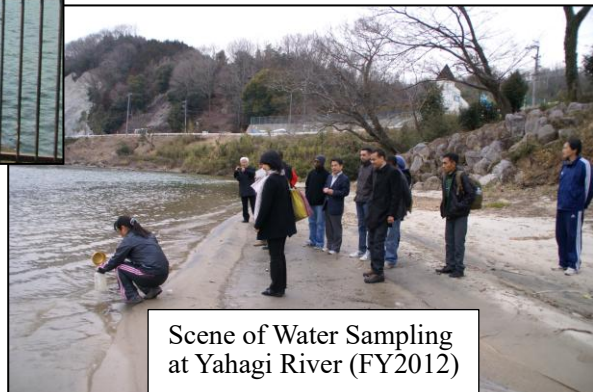


From Lake Biwa Canal to
Suirokaku Aqueduct (FY2024)

Field Trip (Outdoor)



Visit to Seta River Weir (FY2017)



Scene of Water Sampling
at Yahagi River (FY2012)

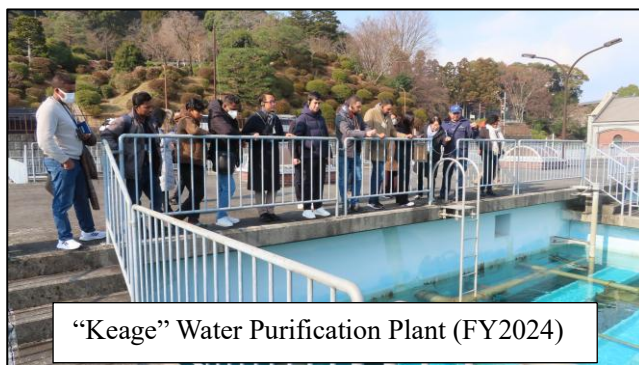


“Konan-Chubu” Sewage
Treatment Plant (FY2023)



“Sabae” Wastewater Treatment Plant (FY2023)

Field Trip (Water Treatment/Purification Plant)



“Keage” Water Purification Plant (FY2024)

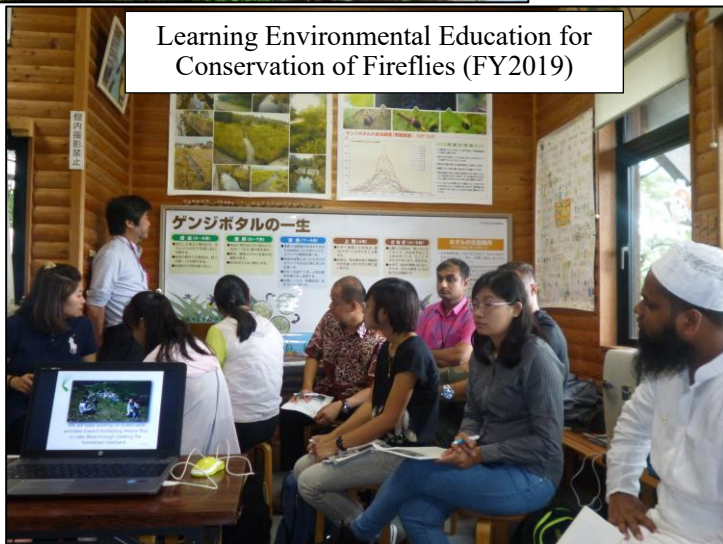


“Kitayamada” Water Purification Plant
(FY2009)



Tasting Spring Water at “Harie Shozu-no-Sato” (FY2019)

Visits to NPOs



Learning Environmental Education for Conservation of Fireflies (FY2019)



Learning about Fish Cradle Rice Paddies at Traditional Japanese House (FY2024)



Through Giant Aquarium Tunnel to Aquarium Exhibits (FY2024)

Lake Biwa Museum



Observing Microorganisms in Lake Biwa (FY2006)



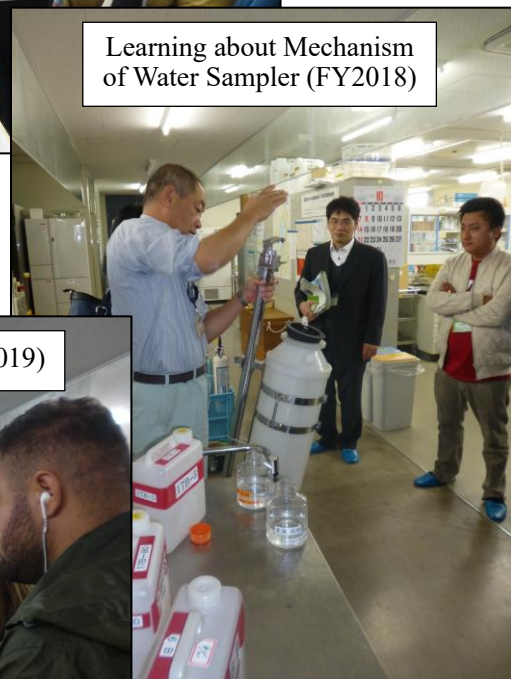
Commemorative Photo in Exhibition Room of Traditional Japanese House (FY2009)



Taking Lecture on Environmental Education (FY2024)



Lake Biwa Environmental Research Institute

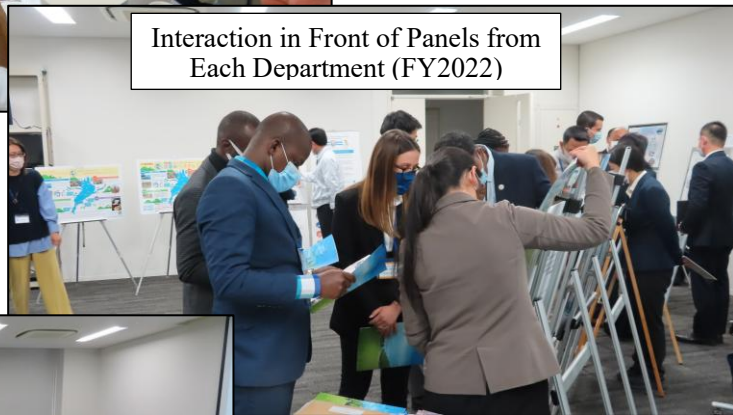
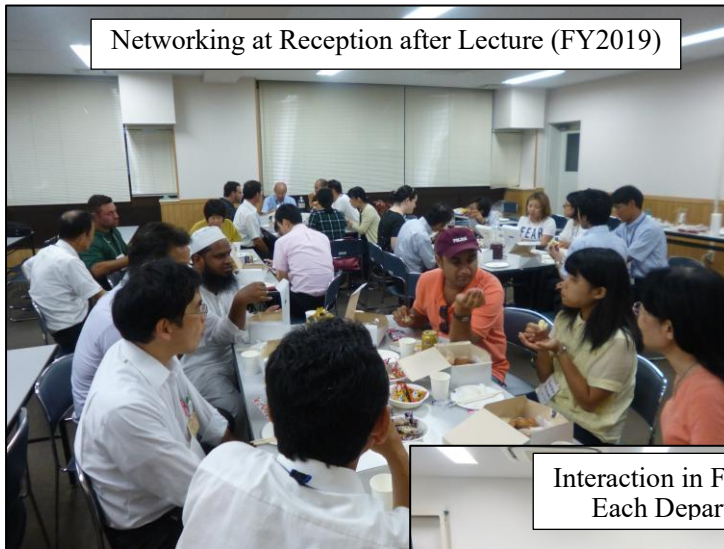




Visits to Government Offices

We visited numerous government offices, including the Ministry of the Environment, the National Institute for Environmental Studies (Tsukuba), the Yodo River Office, and the Yodogawa Dam Integrated Management Office.

Scene from the Visit to the Shiga Prefectural Office:



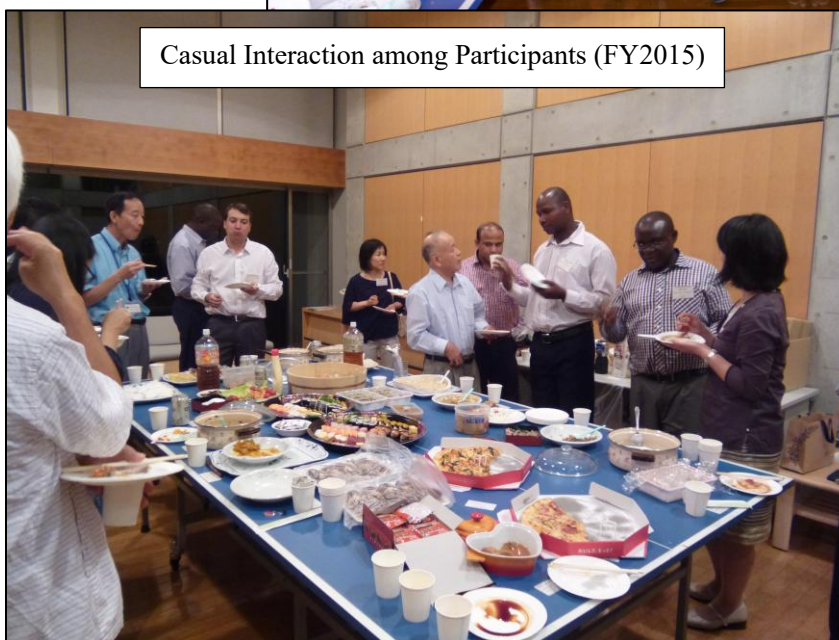


Participants with Their Handmade Dishes (FY2019)

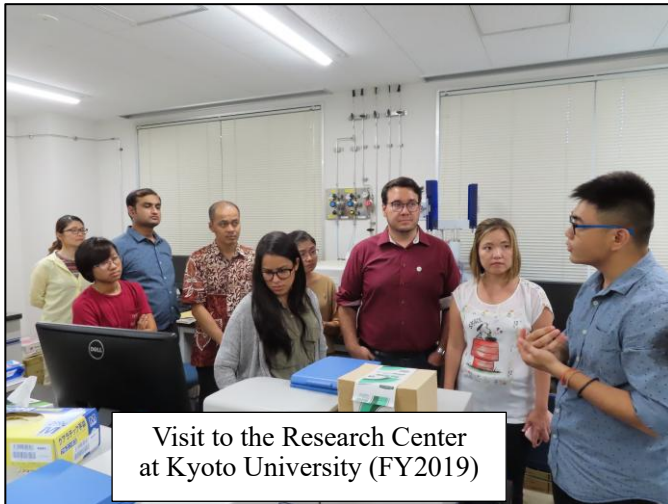


All Participants Together for a Commemorative Photo (FY2012)

Welcome Party



Casual Interaction among Participants (FY2015)



Visit to the Research Center
at Kyoto University (FY2019)

Visits to Universities



At the President's Office,
The University of Shiga Prefecture (FY2023)



At the Lecture Room,
The University of Shiga Prefecture (FY2023)

Lecturer: Dr. Masahiro Maruo

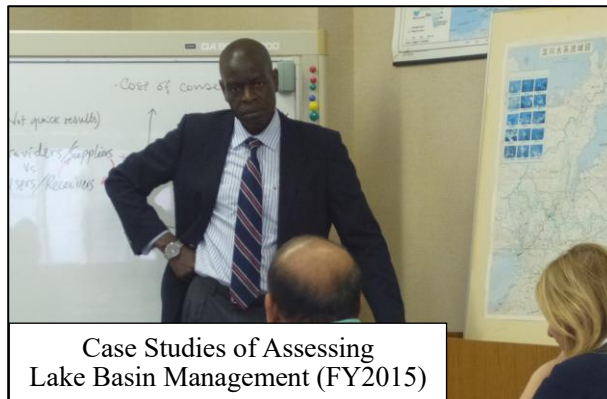


At the Lecture Room,
The University of Shiga Prefecture (FY2024)

Lecturer: Dr. Kohei Yoshiyama



Lecture Scene 1



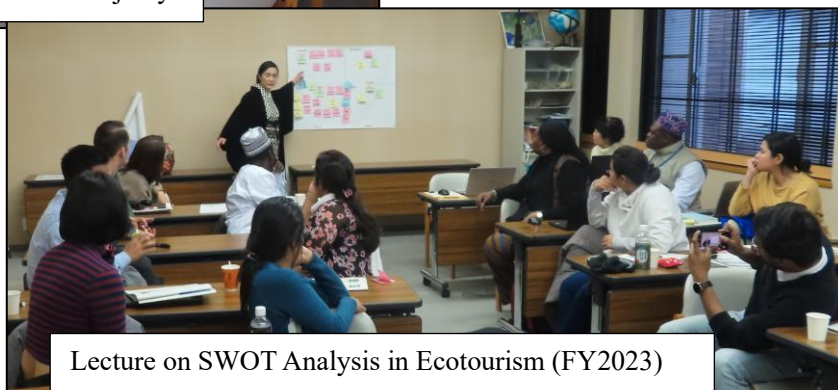
Case Studies of Assessing
Lake Basin Management (FY2015)

Lecturer: Dr. Victor Muhandiki



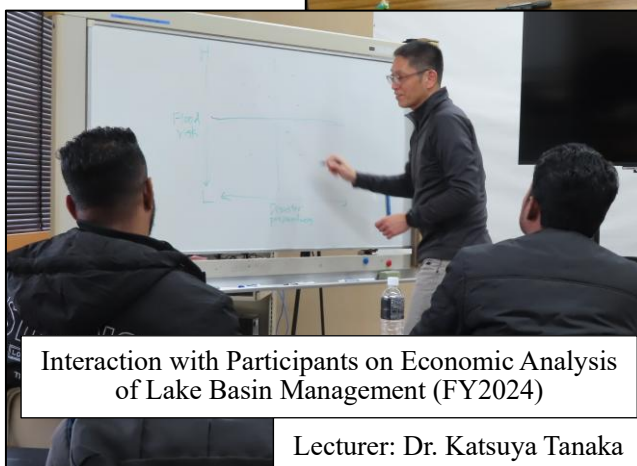
Sharing Experiences of Basin Management
from Different Countries (FY2019)

Lecturer: Dr. Kenji Oya



Lecture on SWOT Analysis in Ecotourism (FY2023)

Lecturer: Dr. Yoshika Yamamoto



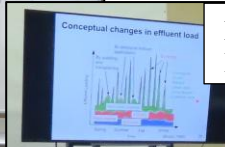
Interaction with Participants on Economic Analysis
of Lake Basin Management (FY2024)

Lecturer: Dr. Katsuya Tanaka



Ecological Sanitation (FY2016)

Lecturer: Dr. Hidenori Harada



Lecture before the Visit to the Land Improvement District (FY2023)

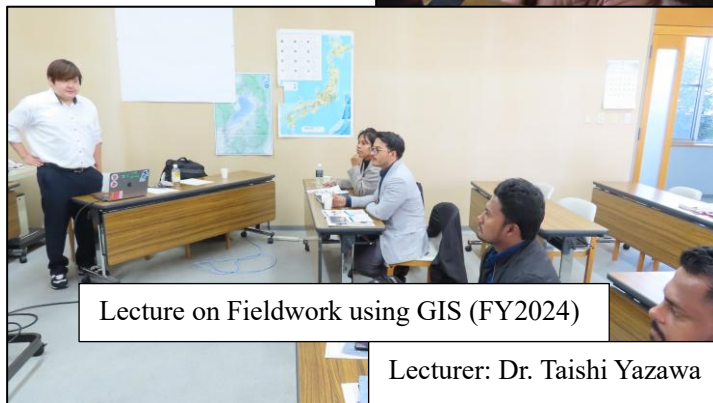
Lecturer: Dr. Kimihito Nakamura

Lecture Scene 2



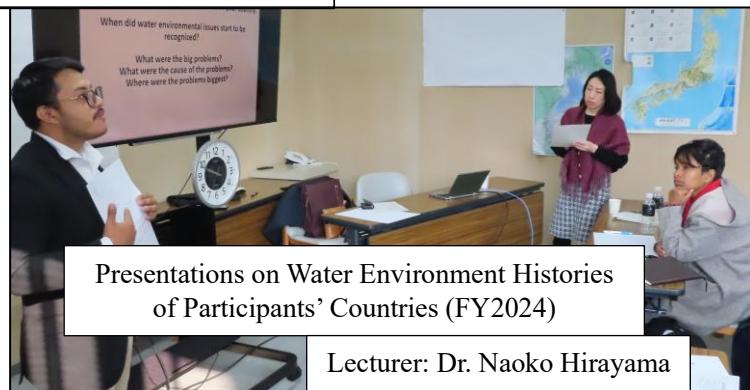
Acknowledgment from a Participant after the Lecture (FY2023)

Lecturer: Dr. Misuzu Asari



Lecture on Fieldwork using GIS (FY2024)

Lecturer: Dr. Taishi Yazawa



Presentations on Water Environment Histories of Participants' Countries (FY2024)

Lecturer: Dr. Naoko Hirayama



Online Scene



Opening Ceremony Streamed from ILEC (FY2020)



Online Tour of Hiyoshi Corporation (FY2020/FY2021)



Scene from Online Lecture (FY2022)

Lecturer: Dr. Keiko Wada



Opening Ceremony



Commemorative Photo (at ILEC) (FY2006)



Welcome Speech from JICA (FY2019)

Closing Ceremony



Commemorative Photo with Certificate (FY2022)



Scene from Closing Ceremony (FY2023)

5. Structure of the Training Curriculum

5-1. Curriculum Structure in FY2024

The current training curriculum is based on the "Integrated Basin Management for Lake Environment (ILBM Course)," which was revised in FY2005. In FY2016, its scope was expanded to include rivers and coastal areas. Since then, the contents have been reviewed annually in accordance with changing circumstances, leading to the present form.

The goals of this training program are described below.

- (1) To study local, regional, national and international programs for Integrated Lake, River and Coastal Basin Management for Sustainable Use and Preservation of Water Resources with particular reference to the development and implementation of legal, administrative and institutional policy tools.
- (2) To gain experience in field study, monitoring and techniques for analyzing and assessing lakes, rivers and coastal waters environment management.
- (3) To acquire skills for developing sound programs of lakes, rivers and coastal basin management by properly integrating the components of the governance framework involving institutions, policies, stakeholder participation, technological investments, information, financing and other considerations.

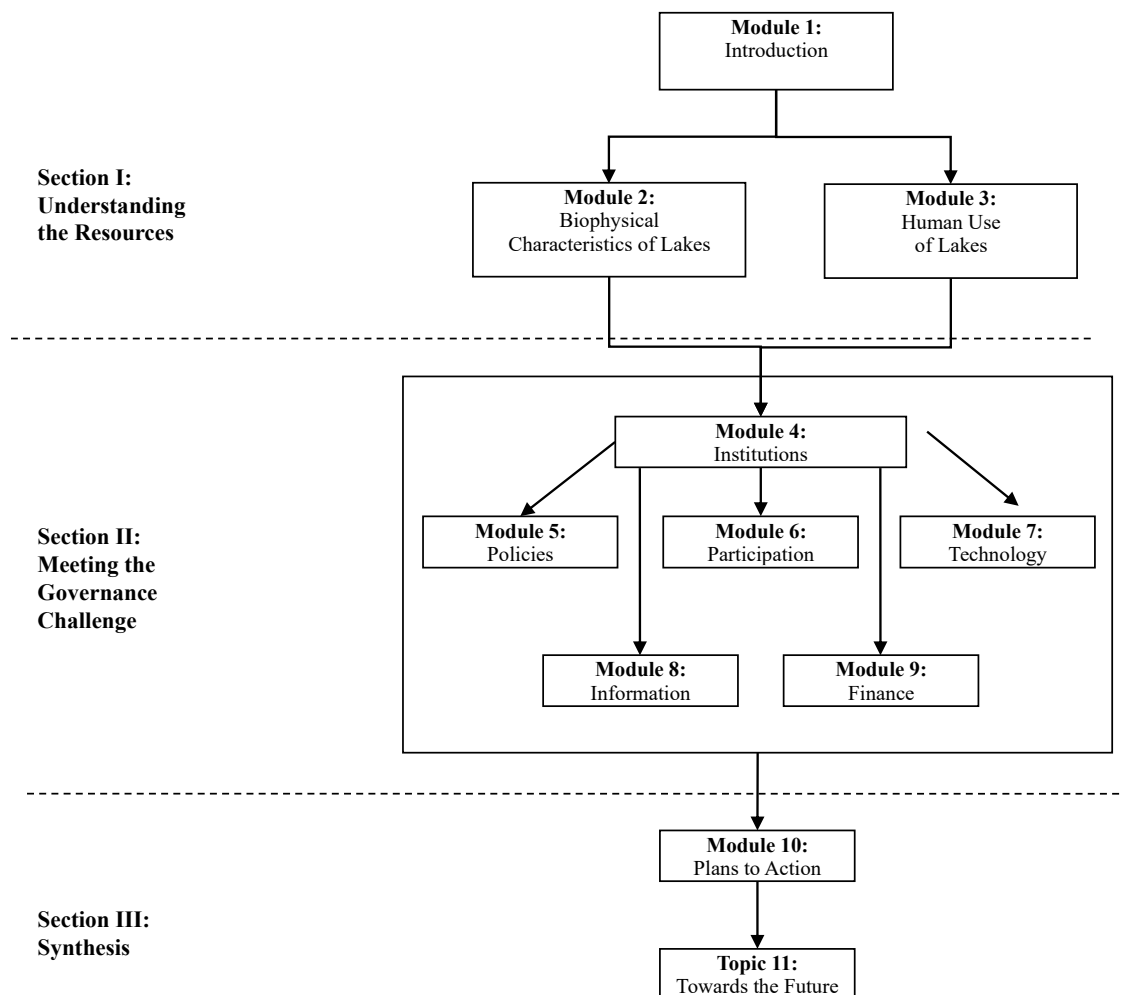
This course is organized in eleven modules under three sections.

Section I includes three modules that provide the background for understanding the challenges facing lake, river and coastal basin, their potential values and uses as a key resource for sustainable livelihoods and development around the world, as well as for maintaining important life-supporting ecosystems.

Section II includes six modules. It presents the key lessons learned on the main themes of lake, river and coastal basin management: institutions, policies, participation, technology, information, and finance.

Section III includes final two modules. The module on planning brings all the themes of Section II together and discusses how lake, river and coastal basin management is carried out in practice. The final module presents guidelines for taking action to improve the conditions of lake, river and coastal basin, and the people and nature that both depend on it.

The curriculum structure of this training program is outlined on the next page.



Curriculum Structure

The training contents and their relation to the modules for FY2024 are shown below.

Training Subject	Lecturer	Mode	Module
Basin Report Presentation by the Participants	Masahisa Nakamura, Vice President, ILEC Shinji Ide, President, The University of Shiga Prefecture Yoshihisa Shimizu, Professor Emeritus, Kyoto University Toshiyuki Ishikawa, Professor, Shiga University Koji Shimada, Professor, Ritsumeikan University Naoko Hirayama, Associate Professor, The University of Shiga Prefecture Keisuke Sato, Associate Professor, Ritsumeikan University	Presentation (Online)	—
Integrated Lentic Lotic Water Basin Management (ILBM)	Masahisa Nakamura, Vice President, ILEC	Lecture (Online/On-site)	1~9
The Role of Irrigation and Agriculture in Lake Basin Management	Tsuguhiro Watanabe, Professor Emeritus, Kyoto University Kimihito Nakamura, Professor, Kyoto University	Lecture (On-site)	4
Lake Biwa Environmental Research Institute	Lake Biwa Environmental Research Institute	Lecture (On-site) Site Visit	4
• Introduction of Lake Biwa Environmental Research Institute			
• Basin management of Lake Biwa by various entities			
• Lecture about Monitoring of Water Quality and Facility Tour			
Lectures from Shiga Prefectural Government	Shiga Prefectural Government Office	Lecture (On-site)	4,5
Practical Examples of ILBM (Philippines)	Adelina Santos-Borja, ILEC Scientific Committee Vice Chair	Lecture (Online)	4,5,9
Practical Examples of ILBM (India)	Ajit Kumar Pattnaik, ILEC Scientific Committee	Lecture (Online)	4,5,9
Economic Analysis of Lake Basin Management	Katsuya Tanaka, Professor, Shiga University	Lecture (On-site)	5
Visit to "Paddy Fields Maintained as Fish Cradles"	Seseragi-no-Sato	Lecture (On-site)	5
Practical Examples of ILBM (Mexico)	Alejandro Juarez Aguilar, ILEC Scientific Committee	Lecture (Online)	6
Waste Management	Misuzu Asari, Professor, The Research Institute for Humanity and Nature	Lecture (On-site)	6
Environmental Conservation and Citizens' Participation	Naoko Hirayama, Associate Professor, The University of Shiga Prefecture	Lecture (On-site)	6
Moriyama Hotaru (Firefly) Museum Medagawa River	Environmental NGO "Houjyounosato"	Lecture (On-site) Site Visit	6
Participatory Ecosystem Services Shared Value Assessment (PESSVA) in Malaysia	Zati Binti SHARIP, National Water Research Institute of Malaysia (NAHRIM)	Lecture (Online)	6,8
Ecotourism	Yoshika Yamamoto, Professor, Heian Jogakuin (St. Agnes') University	Lecture (On-site)	6,9
Water Quality Monitoring	Wong Yong Jie, Junior Associate Professor, Kyoto University of Advanced Science	Lecture (On-site)	7
Case Studies of hydrology and water quality monitoring using GIS	Taishi Yazawa, Assistant Professor, Institute of Industrial Science, Research Associate, The University of Tokyo	Lecture (On-site)	7
Introduction of Water Quality Inspection Devices	Horiba Advanced Techno Co., Ltd.	Lecture (On-site)	7
History, Transition of System, and Current Status and Problems about Water Supply and Sewerage on Lake Biwa Basin	Naoko Hirayama, Associate Professor, The University of Shiga Prefecture	Lecture (On-site)	7
Lake Biwa - Yodo River Basin ; Water use, Water purification and Water management	Keiko Wada, Deputy Director General, Lake Biwa-Yodo River Water Environmental Research	Lecture (On-site)	7
Visit to "Lower Yasu River" Land Improvement District	Land Improvement Office of the Lower Yasu River	Lecture (On-site) Site Visit	7
Ecological Sanitation and Wastewater management	Hidehori Harada, Associate Professor, Kyoto University	Lecture (On-site)	7
Introduction to Lake Modeling	Shinji Ide, President, The University of Shiga Prefecture	Lecture (On-site)	7
Introduction to Lake Modeling: Practical Training using PC	Shinji Ide, President, The University of Shiga Prefecture	Practice	

Training Subject	Lecturer	Mode	Module
Water Quality Monitoring Using Simplified Analysis	Shigekazu Ichiki, Technical Advisor, ILEC	Practice	7
"Konan-Chubu" Sewage Treatment Plant	Omi Environmental Conservation Foundation	Site Visit Lecture (On-site)	7
Omi Environmental Plaza			
Kusatsu City Clean Center	Green Park - Kusatsu	Site Visit	7
Field trip (Kyoto): Keage Purification Plant, Keage Power Station, Lake Biwa Canal Museum, Suikokaku Aqueduct, Nanzenji Temple	Yoshihisa Shimizu, Professor Emeritus, Kyoto University	Site Visit	7
Wastewater Management System in Rural Area	Hiyoshi Corporation	Site Visit Lecture (On-site)	7
Environmental Conservation Initiatives by Private Company, Night Soil Treatment and Domestic Wastewater Treatment Systems in Japan			
Assessing Lake Basin Management Programs from an ILBM Perspective	Victor Muhandik, NJS CO., LTD.	Lecture (Online)	8
Environmental education and observation of lake environments	Toshiyuki Ishikawa, Professor, Shiga University	Lecture (On-site)	8
Environmental Education and Education for Sustainable Development (ESD)	Masahisa Sato, Professor, Tokyo City University	Lecture (On-site)	8
Fundamentals of Limnology	Masahiro Maruo, Professor, The University of Shiga Prefecture	Lecture (On-site)	8
Impacts of Global Warming on Lake Ecosystems	Kohei Yoshiyama, Associate Professor, The University of Shiga Prefecture	Lecture (On-site)	8
Lake Biwa Museum: Environmental Education	Lake Biwa Museum	Lecture (On-site)	8
Lake Biwa Museum Tour		Site Visit	
Visit to "Uminoko" Learning Ship (Shiga Prefectural Biwako floating school)	Toshiyuki Ishikawa, Professor, Shiga University	Site Visit	8
Lake Biwa Canal, Miidera Temple	Masahisa Nakamura, Vice President, ILEC	Site Visit	9
Field trip (Lake Biwa - Yodo River - Osaka Bay): Hiyoshi Dam, Aqua-BIWA (Seta Weir)	Masahisa Nakamura, Vice President, ILEC	Site Visit	9
Field trip (Lake Biwa - Yodo River - Osaka Bay): Kinki Environmental Partnership Office, Taikoh Gesui (Lord Sewerage), Osaka Castle	Masahisa Nakamura, Vice President, ILEC	Lecture (On-site) Site Visit	9
Reports from Training Returnees	Amir Hossain, Bangladesh Water Development Board Sanjida Islam Archi, Bangladesh Water Development Board	Lecture (Online)	10
Discussion on Preparation of Action Plan	Masahisa Nakamura, Vice President, ILEC Shinji Ide, President, The University of Shiga Prefecture Yoshihisa Shimizu, Professor Emeritus, Kyoto University Toshiyuki Ishikawa, Professor, Shiga University Koji Shimada, Professor, Ritsumeikan University Naoko Hirayama, Associate Professor, The University of Shiga Prefecture Keisuke Sato, Associate Professor, Ritsumeikan University	Lecture (Online/On-site)	10
Presentation of Action Plan	Masahisa Nakamura, Vice President, ILEC Shinji Ide, President, The University of Shiga Prefecture Yoshihisa Shimizu, Professor Emeritus, Kyoto University Toshiyuki Ishikawa, Professor, Shiga University Naoko Hirayama, Associate Professor, The University of Shiga Prefecture Keisuke Sato, Associate Professor, Ritsumeikan University	Presentation (On-site)	11
Group Discussion	Masahisa Nakamura, Vice President, ILEC	Discussion	—

5-2. Curriculum Structure in FY1990

The first training course in FY1990 was launched as the “Lake Water Quality Management Course.”

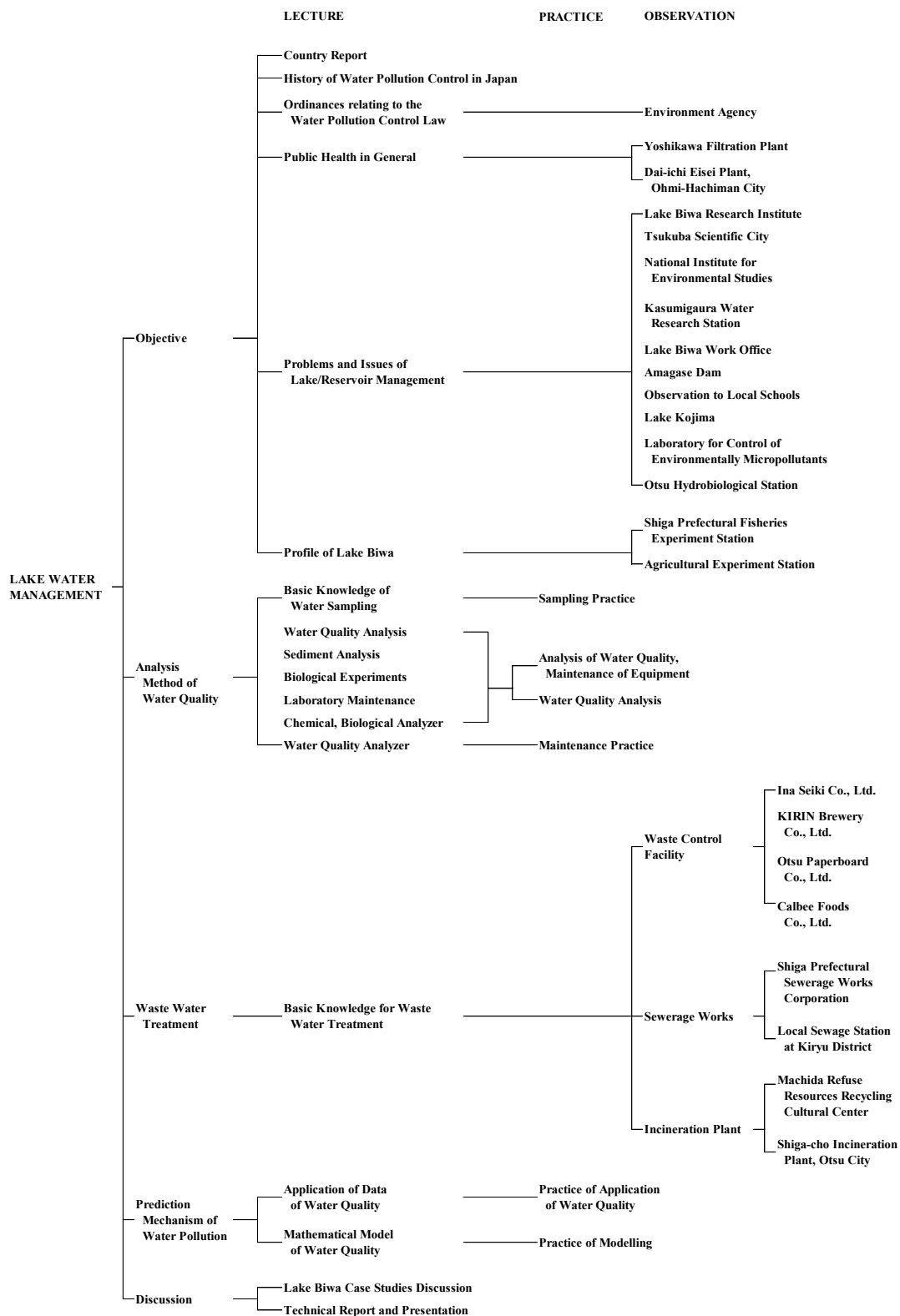
“Lake Water Quality Management Course” is intended for technical administrators and leading researchers in developing countries who are engaged in formulating conservation measures and management plans for the implementation of lake water quality management, including reservoirs. The course provides advanced learning and practical training in measurement, prevention, estimation, and management techniques related to the management of lake water quality conservation. In doing so, it enables participants to acquire the fundamental knowledge necessary for planning and formulating administrative measures for proper lake water quality management, thereby improving the capabilities of leading technical experts in each country and contributing to the appropriate management of lakes and their environments, as well as to their balanced development.

The goals of this training program are described below.

- (1) To study laws and regulations and their relation to development for lake water quality management through case studies from Japan and Lake Biwa.
- (2) To acquire and apply fundamental knowledge in ecology, hydrology, biology, and related fields necessary for lake water quality management.
- (3) To acquire and apply measurement and control techniques for living environment parameters, health indicators, and eutrophication factors related to water pollution in lakes.
- (4) To acquire and apply techniques for calculating pollution loads and predicting water quality, serving as the basis for lake water quality management planning.
- (5) To improve environmental management capabilities, such as the comprehensive and systematic promotion of lake water pollution control.

The distinctive feature of this training program lies in enabling participants to acquire practical know-how in lake water quality management by integrating experiences from local governments in lake water quality management techniques, achievements of water pollution prevention technologies in industry, and the technical expertise accumulated at universities and ILEC. To this end, the program alternates between lectures and on-site training, including hands-on exercises using factory treatment facilities, factory visits, and demonstrations of monitoring and measurement techniques, so that participants can acquire comprehensive lake management skills. The curriculum also incorporates lectures based on the experience of manufacturers and factories regarding the operation and maintenance of treatment facilities and analytical instruments.

The curriculum structure of this training program is outlined on the next page.



Curriculum Structure

6. Appendices (List of Training Records)

No.	Country	Lake Water Quality Management	Integrated Lake Basin Management	Integrated Basin Management (Lakes, Rivers and Coastal Waters)	Total
		1991-2004	2005-2015	2016-2024	
1	Albania		1	5	6
2	Algeria	1	1		2
3	Armenia			1	1
4	Argentina	8	4		12
5	Azerbaijan		1		1
6	Bangladesh			8	8
7	Benin	2	2		4
8	Bolivia	4		1	5
9	Brazil	12	9	2	23
10	Burundi		2		2
11	Botswana			4	4
12	Cambodia	5		1	6
13	Central African Republic			1	1
14	Chad		2	1	3
15	Chile	1	4		5
16	China	12	2		14
17	Colombia	1	1		2
18	Côte d'Ivoire		2	1	3
19	Cuba*			2	2
20	Ecuador	1			1
21	Egypt	3	2	3	8
22	El Salvador			2	2
23	Ethiopia		1	2	3
24	Ghana	3	2		5
25	Guatemala	1	6		7
26	Haiti		1		1
27	Hungary	2			2
28	India	5	7	4	16
29	Indonesia	8	3	1	12
30	Iran	2			2
31	Iraq			5	5
32	Kenya	9	10		19
33	Kyrgyzstan		1		1
34	Laos	1			1
35	Malawi	1	3		4
36	Malaysia	4	2	3	9
37	Mexico	5	1	3	9
38	Mongolia		2		2
39	Morocco		2		2
40	Myanmar	1	5	5	11
41	Nepal*			1	1
42	Nicaragua	4		3	7
43	Nigeria			2	2
44	North Macedonia	1	2	1	4
45	Pakistan	1			1
46	Panama			1	1
47	Paraguay	2	1		3
48	Peru	2			2
49	Philippines	8	1	2	11
50	Poland	1			1
51	Rwanda		1		1
52	Singapore	1			1
53	South Sudan			1	1
54	Sri Lanka	8	2	1	11
55	Sudan			5	5
56	Syria	3	1		4
57	Tanzania	4			4
58	Thailand	10	2		12
59	Turkey	4	2		6
60	Uganda	2	2	3	7
61	Uruguay		1		1
62	Venezuela	6	4		10
63	Vietnam	1	2		3
64	Zambia			1	1
65	Zimbabwe	5	3		8
	Total	155	103	76	334

* : In FY2021, Cuba participated in only part of the remote training Part.1 In FY2020, Nepal participated as an observer.

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